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ICS No.

Pakistan Standard on

Polypropylene (PP) Pipes Dimensions



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PAKISTAN STANDARDS AND QUALITY CONTROL AUTHORITY

STANDARDS DEVELOPMENT CENTRE

(STANDARDIZATION WING),

1ST FLOOR, ST-7-A, BLOCK-3

GULISTAN-E-JAUHAR

Karachi

Pakistan Standard on Polypropylene (PP) Pipes Dimensions

FOREWORD:

0.1 This Standard was adopted by Pakistan Standard & Quality Control Authority after recommendations of the Technical Committee for “**BUILDER’S HARDWARE AND SANITARY FITTINGS**” (BDC-06) on **1999**. The same had been approved and endorsed by the Civil Engineering National Standards Committee (CENSC) on **06-12-1999**.

0.2 This Standard has been prepared after taking into consideration the views and suggestions of the manufacturers, technologists, suppliers and utilizing agencies.

0.3 In preparation of this Standard the Technical Committee acknowledges with thanks the assistance drawn from the standard **DIN 8077**.

0.4 This Standard is subject to periodical review in order to keep pace with development in industry. Any suggestions for improvement will be recorded and placed before the committee in due course.

Pakistan Standard on Polypropylene (PP) pipes Dimensions

1 Scope

This standard specifies dimensions and tolerances for seamless pipes of circular cross section, made from homopolymer polypropylene (PP-H 100), block copolymer polypropylene (PP-B 80) or random copolymer polypropylene (PP-R 80), as specified in DIN 8078. It covers all available types of polypropylene pipes for all possible applications.

2 Normative references

This Pakistan 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 amendment 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 8078	Types 1, 2 and 3 polypropylene (PP) pipes- General quality requirements and testing
DIN EN ISO 12162	Thermoplastics materials for pipes and fittings for pressure applications- Classification, designation and overall service (design) coefficient (ISO 12162:1995)
ISO 161-1:1996	Thermoplastics pipes for the conveyance of fluids –Nominal outside diameters and nominal pressures – Part 1: Metric series
ISO 4065: 1996	Thermoplastics pipes – Universal wall thickness table
ISO 11922-1: 1997	Thermoplastics pipes for the conveyance of fluids – Dimensions and tolerances – Part 1: Metric series

3 Concepts

3.1 Pipe series

Dimensionless number related to the nominal outside diameter of a pipe and its wall thickness (designated by S).

On the basis of this number, the wall thickness is to be calculated as follows:

$$S = \frac{d}{2S + 1}$$

Where S is to be taken from table 1 of ISO 4065.

3.2 Standard dimension ratio

The ratio of the outside diameter of a pipe to its wall thickness. It is to be calculated as follows:

$$SDR = 2S + 1 \approx d/s$$

Where S is to be taken from table 1 of ISO 4065.

4 Material designation

The material designation is based on the minimum required strength, MRS (i.e. the resistance to internal hydrostatic pressure) in water at 20°C for 50 years, as specified in DIN EN ISO 12162 (cf. table 1).

Table 1: Material designation

Material designation	MRS in N/mm ²
PP-H 100 ¹⁾	10
PP-B 80 ²⁾	8
PP-R 80 ³⁾	8
¹⁾ Previous designation: PP-H (type 1)	
²⁾ Previous designation: PP-B (type-2)	
³⁾ Previous designation: PP-R (type-3)	

5 Safety factors

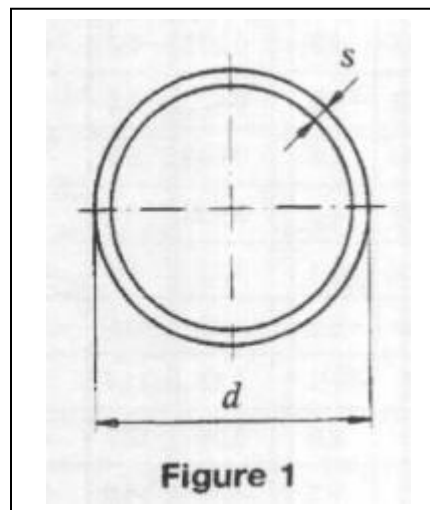
Safety factors shall be specified in the appropriate product standards. Minimum values are given in table 2 as a function of the material. Since the impact strength of PP-H 100 decreases as the temperature increases, the safety factors have been specified accordingly.

Table 2: Safety factors, SF

Type of material	Safety factor for a temperature, in °C		
	From 10 to under 40	From 40 to 60	Above 60
PP-H 100	1,6	1,4	1,25
PP-B 80	1,25		
PP-R 80			

Values for allowable working pressure are given in tables 6, 8 and 10, taking into account the safety factors specified in table 2. Tables 7, 9 and 11 include additional values which are based on constant safety factors of 1,7 (for PP-H 100) or 1,5 (for PP-B 80 and PP-R 80).

6 Dimensions and designation



Designation of a pipe made from PP – B 80, with an outside diameter, d , of 50mm and a wall thickness, s , of 2,9mm: Pipe DIN 8077 – 50 x 2,9 – PP – B 80

6.1 Wall thickness and mass

Table 3: Wall thickness and mass *)

d	Pipe series (S)															
	20		26		12,5		8,3		5		3,2		2,5		2	
	Standard dimension ratio (SDR)															
	41		33		26		17,6		11		7,4		6		5	
s	Mass, in kg/m	s	Mass, in kg/m	s	Mass, in kg/m	s	Mass, in kg/m	s	Mass, in kg/m	s	Mass, in kg/m	s	Mass, in kg/m	s	Mass, in kg/m	
10	-	-	-	-	-	-	-	-	-	-	-	1,8	0,046	2,0	0,050	
12	-	-	-	-	-	-	-	-	-	-	-	1,8	0,057	2,0	0,062	
16	-	-	-	-	-	-	-	-	-	-	-	2,2	0,095	2,7	0,110	
20	-	-	-	-	-	-	-	-	-	1,9	0,107	2,8	0,148	3,4	0,172	
25	-	-	-	-	-	-	-	-	-	2,3	0,164	3,5	0,230	4,2	0,266	
32	-	-	-	-	-	-	-	1,8	0,172	2,9	0,261	4,4	0,370	5,4	0,434	
40	-	-	-	-	1,8	0,217	2,3	0,273	3,7	0,412	5,5	0,575	6,7	0,671		
50	-	-	1,8	0,274	2,0	0,301	2,9	0,422	4,6	0,624	6,9	0,896	8,3	1,04		
63	1,8	0,349	2,0	0,382	2,5	0,474	3,6	0,659	5,8	1,01	8,6	1,41	10,5	1,65		
75	1,9	0,438	2,3	0,528	2,9	0,647	4,3	0,935	6,9	1,41	10,3	2,01	12,5	2,34		
90	2,2	0,616	2,8	0,758	3,5	0,936	5,1	1,23	8,2	2,03	12,3	2,87	15,0	3,36		
110	2,7	0,903	3,4	1,12	4,2	1,37	6,3	1,99	10,0	3,01	15,1	4,30	18,3	5,01		
125	3,1	1,18	3,9	1,45	4,8	1,76	7,1	2,55	11,4	3,91	17,1	5,53	20,6	6,47		
140	3,5	1,48	4,3	1,80	5,4	2,22	8,0	3,20	12,7	4,87	19,2	6,95	23,3	8,12		
160	4,0	1,91	4,9	2,32	6,2	2,92	9,1	4,17	14,6	6,38	21,9	9,04	26,6	10,6		
180	4,4	2,38	5,5	2,94	7,1	3,63	10,2	5,25	16,4	8,07	24,6	11,4	29,0	13,4		
200	4,9	2,92	6,2	3,68	7,7	4,50	11,4	6,50	18,2	9,95	27,4	14,1	33,2	16,5		
225	5,5	3,70	6,9	4,57	8,6	5,65	12,8	8,19	20,5	1,26	30,8	17,9	37,4	20,9		
250	6,2	4,63	7,7	5,67	9,6	6,99	14,2	10,1	22,7	15,5	34,2	22,1	-	-		
280	6,9	5,73	8,6	7,09	10,7	8,72	15,9	12,6	25,4	19,4	38,3	27,6	-	-		
315	7,7	7,20	9,7	8,97	12,1	11,1	17,9	16,0	28,6	24,6	-	-	-	-		
355	8,7	9,14	10,9	11,3	13,6	14,0	20,1	20,3	32,2	31,2	-	-	-	-		
400	9,8	11,6	12,3	14,4	15,3	17,8	22,7	25,7	36,3	39,6	-	-	-	-		
450	11,0	14,7	13,8	18,2	17,2	22,5	25,5	32,5	40,9	50,1	-	-	-	-		
500	12,3	18,2	15,3	22,4	19,1	27,7	28,4	40,2	-	-	-	-	-	-		
560	13,7	22,6	17,2	28,2	21,4	34,7	31,7	50,3	-	-	-	-	-	-		
630	15,4	28,6	19,3	35,6	24,1	44,0	35,7	63,7	-	-	-	-	-	-		
710	17,4	36,4	21,8	45,2	27,2	55,9	40,2	80,8	-	-	-	-	-	-		
800	19,6	46,1	24,5	57,2	30,6	70,8	45,3	103	-	-	-	-	-	-		
900	22,0	58,3	27,6	72,5	34,4	89,5	51,0	130	-	-	-	-	-	-		
1 000	24,5	72,0	30,6	89,2	38,2	110	-	-	-	-	-	-	-	-		
1 200	29,4	104	36,7	128	45,9	159	-	-	-	-	-	-	-	-		
1 400	34,3	141	42,9	175	53,5	216	-	-	-	-	-	-	-	-		
1 600	39,2	184	49,0	226	61,2	283	-	-	-	-	-	-	-	-		

*) The mass has been calculated taking the average density as 0,91 g/cm³ and the wall thickness as the nominal size plus half the tolerance specified. For other densities, the mass shall be established by linear interpolation.

6.2 Tolerances on outside diameter and circularity (ovality)

Table 4: Tolerances on outside diameter and circularity (ovality)

d	Limit deviations for mean outside diameter ¹⁾²⁾	Circularity tolerance		d	Limit deviations for mean outside diameter ¹⁾²⁾	Circularity tolerance	
		Straight pipes	Coiled pipes			Straight pipes	Coiled pipes
10	+ 0,3 (+ 0,3) 0	1,1	1,0	225	+ 2,1 (+ 1,4) 0	4,5	
12	+ 0,3 (+ 0,3) 0	1,1	1,0	250	+ 2,3 (+ 1,5) 0	5,0	
16	+ 0,3 (+ 0,3) 0	1,2	1,0	280	+ 2,5 0	9,8	
20	+ 0,3 (+ 0,3) 0	1,2	1,2	315	+ 2,5 0	11,1	
25	+ 0,3 (+ 0,3) 0	1,2	1,5	355	+ 3,2 0	12,5	
32	+ 0,3 (+ 0,3) 0	1,3	2,0	400	+ 3,5 0	14,0	
40	+ 0,4 (+ 0,3) 0	1,4	2,4	450	+ 3,8 0	15,8	
50	+ 0,5 (+ 0,3) 0	1,4	3,0	500	+ 4,0 0	17,5	
63	+ 0,6 (+ 0,4) 0	1,6	3,8	560	+ 4,3 0	19,6	
75	+ 0,7 (+ 0,5) 0	1,6		630	+ 4,6 0	22,1	
90	+ 0,9 (+ 0,6) 0	1,8		710	+ 4,9 0	24,9	
110	+ 0,9 (+ 0,5) 0	2,2		800	+ 5,0 0	28,0	
125	+ 1,2 (+ 0,8) 0	2,5		1 000	+ 5,0 0	25,0	
140	+ 1,3 (+ 0,9) 0	2,8		1 200	+ 6,0 0	42,0	
160	+ 1,5 (+ 1,0) 0	3,2		1 400	+ 6,0 0	49,0	
180	+ 1,7 (+ 1,1) 0	3,6		1 600	+ 6,0 0	56,0	
200	+ 1,8 (+ 1,2) 0	4,0					

1) The given values have been calculated as follows:
for $d \leq 400$ mm: $+0,009 d$, rounded up to the nearest 0,1 mm, at least 0,3 mm;
for $d = 450$ to 710 mm: $+0,004 d + 2$ mm, rounded up to the nearest 0,1 mm;
for $d = 800$ to 1 000 mm: $+5,0$ mm;
for $d = 1 200$ to 1 600 mm: $+6,0$ mm.

2) The bracketed values apply in cases where pipes are manufactured by heating coil welding. Here, the limit deviations are equal to $+0,006 d$, but at least 0,3 mm (rounded up to the nearest 0,1 mm).

3) The given values have been calculated as follows:
Straight pipes:
for $d \leq 75$ mm: $0,008 \times d + 1$ mm, rounded up to the nearest 0,1 mm;
for d from 90 mm to 250 mm: $0,02 \times d$, rounded up to the nearest 0,1 mm;
for d greater than 250 mm: $0,035 \times d$, rounded up to the nearest 0,1 mm.
Coiled pipes, with $d \leq 63$ mm: $0,06 \times d$, rounded up to the nearest 0,1 mm, at least 1 mm.
Coiled pipes, with $d \geq 75$ mm: subject to agreement.

Table 5: Wall thickness tolerances

Wall thickness, s	Limit deviations ¹⁾	Wall thickness, s	Limit deviations ¹⁾	Wall thickness, s	Limit deviations ¹⁾
Up to 2	+0.4 0	Over 22 up to 23	+2.5 0	Over 43 up to 44	+4.6 0
Over 2 up to 3	+0.5 0	Over 23 up to 24	+2.6 0	Over 44 up to 45	+4.7 0
Over 3 up to 4	+0.6 0	Over 24 up to 25	+2.7 0	Over 45 up to 46	+4.8 0
Over 4 up to 5	+0.7 0	Over 25 up to 26	+2.8 0	Over 46 up to 47	+4.9 0
Over 5 up to 6	+0.8 0	Over 26 up to 27	+2.9 0	Over 47 up to 48	+5 0
Over 6 up to 7	+0.9 0	Over 27 up to 28	+3 0	Over 48 up to 49	+5.1 0
Over 7 up to 8	+1 0	Over 28 up to 29	+3.1 0	Over 49 up to 50	+5.2 0
Over 8 up to 9	+1.1 0	Over 29 up to 30	+3.2 0	Over 50 up to 51	+5.3 0
Over 9 up to 10	+1.2 0	Over 30 up to 31	+3.3 0	Over 51 up to 52	+5.4 0
Over 10 up to 11	+1.3 0	Over 31 up to 32	+3.4 0	Over 52 up to 53	+5.5 0
Over 11 up to 12	+1.4 0	Over 32 up to 33	+3.5 0	Over 53 up to 54	+5.6 0
Over 12 up to 13	+1.5 0	Over 33 up to 34	+3.6 0	Over 54 up to 55	+5.7 0
Over 13 up to 14	+1.6 0	Over 34 up to 35	+3.7 0	Over 55 up to 56	+5.8 0
Over 14 up to 15	+1.7 0	Over 35 up to 36	+3.8 0	Over 56 up to 57	+5.9 0
Over 15 up to 16	+1.8 0	Over 36 up to 37	+3.9 0	Over 57 up to 58	+6 0
Over 16 up to 17	+1.9 0	Over 37 up to 38	+4 0	Over 58 up to 59	+6.1 0
Over 17 up to 18	+2 0	Over 38 up to 39	+4.1 0	Over 59 up to 60	+6.2 0
Over 18 up to 19	+2.1 0	Over 39 up to 40	+4.2 0	Over 60 up to 61	+6.3 0
Over 19 up to 20	+2.2 0	Over 40 up to 41	+4.3 0	Over 61 up to 62	+6.4 0
Over 20 up to 21	+2.3 0	Over 41 up to 42	+4.4 0	Over 62 up to 63	+6.5 0
Over 21 up to 22	+2.4 0	Over 42 up to 43	+4.5 0		

¹⁾ The given values have been calculated on the following basis: Limit deviation = $0.1 s + 0.2\text{mm}$, rounded up to the nearest 0.1mm.

A local increase in wall thickness of up to $+0.2s$ is permissible for s up to 10mm, and of up to $0.15 s$ for s greater than 10mm. The mean of the measurements shall, however, still lie within the given limit deviations.

7 Allowable working pressure

7.1 Pipes conveying water

Table 6: Allowable working pressure for pipes made from PP-H 100, with $SF= 1.25, 1.4, \text{ or } 1.6$

Temperature in °C	Years of service	Pipe series (S)							
		20	16	12.5	8.3	5	3.2	2.5	2
		Standard dimension ratio (SDR)							
		41	33	26	17.6	11	7.4	6	5
		Allowable working pressure, in bar							
10	1	4.5	5.7	7.2	10.9	18.1	28.7	36.1	45.4
	5	4.2	5.2	6.6	10.0	16.6	26.3	33.1	41.7
	10	4.0	5.0	6.4	9.6	16.0	25.3	31.8	40.1
	25	3.8	4.8	6.1	9.2	15.2	24.1	30.4	38.2
	50	3.7	4.6	5.8	8.8	14.6	23.1	29.1	36.6
	100	3.5	4.5	5.6	8.5	14.1	22.3	28.1	35.4
20	1	3.9	4.9	6.2	9.4	15.6	24.7	31.1	39.2
	5	3.6	4.5	5.7	8.6	14.2	22.5	28.4	35.7
	10	3.4	4.3	5.5	8.3	13.7	21.7	27.4	34.5
	25	3.3	4.1	5.2	7.8	13.0	20.6	25.9	32.6
	50	3.1	3.9	5.0	7.5	12.5	19.8	24.9	31.3
	100	3.0	3.8	4.8	7.2	12.0	19.0	23.9	30.1
30	1	3.4	4.2	5.3	8.0	13.3	21.1	26.6	33.5
	5	3.0	3.8	4.8	7.3	12.1	19.2	24.1	30.4
	10	2.9	3.7	4.6	7.0	11.6	18.4	23.1	29.1
	25	2.8	3.5	4.4	6.6	11.0	17.4	21.9	27.6
	50	2.6	3.3	4.2	6.3	10.5	16.6	20.9	26.3
	100	2.5	3.2	4.0	6.1	10.1	16.0	20.2	25.4
40	1	3.3	4.1	5.2	7.8	13.0	20.6	25.9	32.6
	5	2.9	3.7	4.7	7.0	11.7	18.5	23.3	29.4
	10	2.8	3.5	4.4	6.7	11.1	17.6	22.2	27.9
	25	2.6	3.3	4.2	6.3	10.5	16.7	21.0	26.5
	50	2.5	3.2	4.0	6.0	10.0	15.8	19.9	25.1
	100	2.4	3.0	3.8	5.7	9.5	15.1	19.1	24.0

Temperature in °C	Years of service	Pipe series (S)							
		20	16	12.5	8.3	5	3.2	2.5	2
		Standard dimension ratio (SDR)							
		41	33	26	17.6	11	7.4	6	5
		Allowable working pressure, in bar							
50	1	2.7	3.4	4.3	6.5	10.8	17.2	21.6	27.2
	5	2.4	3.1	3.9	5.8	9.7	15.4	19.3	24.3
	10	2.3	2.9	3.7	5.6	9.3	14.7	18.5	23.3
	25	2.2	2.7	3.5	5.2	8.7	13.8	17.3	21.8
	50	2.1	2.6	3.3	5.0	8.3	13.1	16.5	20.8
	100	2.0	2.5	3.1	4.7	7.8	12.4	15.6	19.7
60	1	2.5	2.3	4.0	6.0	10.1	15.9	20.1	25.3
	5	2.2	2.8	3.6	5.4	8.9	14.2	17.8	22.5
	10	2.2	2.7	3.4	5.2	8.6	13.7	17.2	21.7
	25	2.0	2.5	3.2	4.8	8.0	12.6	15.9	20.0
	50	1.9	2.4	3.0	4.5	7.5	11.9	15.0	18.8
70	1	2.0	2.6	3.2	4.9	8.1	12.9	16.2	20.4
	5	1.8	2.3	2.9	4.3	7.2	11.4	14.3	18.0
	10	1.7	2.2	2.7	4.1	6.9	10.9	13.7	17.2
	25	1.4	1.8	2.2	3.4	5.6	8.9	11.1	14.0
	50	1.2	1.5	1.9	2.9	4.8	7.6	9.6	12.0
80	1	1.6	2.1	2.6	3.9	6.5	10.4	13.1	16.4
	5	1.4	1.8	2.2	3.4	5.6	8.9	11.1	14.0
	10	1.2	1.5	1.8	2.8	4.6	7.3	9.2	11.6
	25	-	1.2	1.5	2.2	3.7	5.8	7.3	9.2
95	1	1.2	1.5	1.8	2.8	4.6	7.3	9.2	11.6
	5	-	1.0	1.2	1.8	3.0	4.8	6.1	7.6
	(10) ¹	-	-	-	(1.5) ¹	(2.6) ¹	(4.0) ¹	(5.1) ¹	(6.4) ¹
1) The bracketed values apply where testing can be shown to have been carried out for longer than one year at 110°C.									

Table 7: Allowable working pressure for pipes made from PP-H 100, with SF = 1.7

Temperature in °C	Years of service	Pipe series (S)							
		20	16	12.5	8.3	5	3.2	2.5	2
		Standard dimension ratio (SDR)							
		41	33	26	17.6	11	7.4	6	5
Allowable working pressure, in bar									
10	1	4.3	5.4	6.8	10.2	17.0	27.0	34.0	42.7
	5	3.9	4.9	6.2	9.4	15.6	24.7	31.1	39.2
	10	3.8	4.8	6.0	9.0	15.0	23.8	30.0	37.7
	25	3.6	4.5	5.7	8.6	14.3	22.7	28.6	36.0
	50	3.4	4.3	5.5	8.3	13.7	21.8	27.4	34.5
	100	3.3	4.2	5.3	8.0	13.3	21.0	26.5	33.3
20	1	3.7	4.6	5.8	8.8	14.7	23.3	29.3	36.9
	5	3.4	4.2	5.3	8.0	13.4	21.2	26.7	33.6
	10	3.2	4.1	5.1	7.8	12.9	20.5	25.8	32.4
	25	3.1	3.9	4.9	7.3	12.2	19.7	24.4	30.7
	50	2.9	3.7	4.7	7.1	11.7	18.6	23.4	29.5
	100	2.8	3.6	4.5	6.8	11.3	17.9	22.5	28.3
30	1	3.2	4.0	5.0	7.6	12.8	19.9	25.1	31.5
	5	2.9	3.6	4.5	6.8	11.4	18.0	22.7	28.6
	10	2.7	3.5	4.3	6.6	10.9	17.3	21.8	27.4
	25	2.6	3.3	4.1	6.2	10.3	16.4	20.6	25.9
	50	2.5	3.1	3.9	5.9	9.9	15.6	19.7	24.8
	100	2.4	3.0	3.8	5.7	9.5	15.1	19.0	23.9
40	1	2.7	3.4	4.3	6.4	10.7	16.9	21.3	26.8
	5	2.4	3.0	3.8	5.8	9.6	15.3	19.2	24.2
	10	2.3	2.9	3.6	5.5	9.2	14.5	18.3	23.0
	25	2.2	2.7	3.5	5.2	8.7	13.8	17.3	21.8
	50	2.1	2.6	3.3	4.9	8.2	13.0	16.4	20.6
	100	2.0	2.5	3.1	4.7	7.9	12.5	15.7	19.8
50	1	2.2	2.8	3.6	5.4	8.9	14.1	17.8	22.4
	5	2.0	2.5	3.2	4.8	8.0	12.6	15.9	20.0
	10	1.9	2.4	3.0	4.6	7.6	12.1	15.2	19.2
	25	1.8	2.3	2.9	4.3	7.2	11.3	14.3	18.0
	50	1.7	2.2	2.7	4.1	6.8	10.8	13.6	17.1
	100	1.6	2.0	2.6	3.9	6.5	10.2	12.9	16.2
60	1	1.9	2.3	2.9	4.4	7.4	11.7	14.8	18.6
	5	1.7	2.1	2.6	4.0	6.6	10.4	13.1	16.5
	10	1.6	2.0	2.5	3.8	6.3	10.0	12.6	15.9
	25	1.5	1.9	2.3	3.5	5.9	9.3	11.7	14.7
	50	1.4	1.7	2.2	3.3	5.5	8.7	11.0	13.9
70	1	1.5	1.9	2.4	3.6	6.0	9.5	11.9	15.0
	5	1.3	1.7	2.1	3.2	5.3	8.4	10.5	13.3
	10	1.3	1.6	2.0	3.0	5.0	8.0	10.1	12.7
	25	1.0	1.3	1.6	2.5	4.1	6.5	8.2	10.3
	50	-	1.1	1.4	2.1	3.5	5.6	7.0	8.8
80	1	1.2	1.5	1.9	2.9	4.8	7.6	9.6	12.1
	5	1.0	1.3	1.6	2.5	4.1	6.5	8.2	10.3
	10	-	1.1	1.4	2.0	3.4	5.4	6.8	8.5
	25	-	-	1.1	1.6	2.7	4.3	5.4	6.5
95	1	-	1.1	1.4	2.0	3.4	5.4	6.8	8.5
	5	-	-	-	1.3	2.2	3.5	4.4	5.6
	(10) ¹	-	-	-	(1.1) ¹	(1.9) ¹	(3.0) ¹	(3.7) ¹	(4.7)

¹) The bracketed values apply where testing can be shown to have been carried out for longer than one year at 110°C.

Table 8: Allowable working pressure for pipes made from PP-B 80, with SF = 1.25

Temperature in °C	Years of service	Pipe series (S)							
		20	16	12.5	8.3	5	3.2	2.5	2
		Standard dimension ratio (SDR)							
		41	33	26	17.6	11	7.4	6	5
Allowable working pressure, in bar									
10	1	4.9	6.2	7.8	11.8	19.6	31.1	39.2	49.3
	5	4.6	5.8	7.3	11.1	18.4	29.1	36.6	46.1
	10	4.5	5.6	7.1	10.7	17.7	28.1	35.4	44.5
	25	4.3	5.4	6.8	10.3	17.1	27.1	34.1	42.9
	50	4.2	5.2	6.6	10.0	16.6	26.3	33.1	41.7
	100	4.0	5.1	6.4	9.7	16.1	25.6	32.2	40.5
20	1	4.2	5.2	6.6	10.0	16.6	26.3	33.1	41.7
	5	3.9	4.9	6.2	9.3	15.5	24.5	30.9	38.9
	10	3.8	4.7	6.0	9.0	15.0	23.8	29.9	37.7
	25	3.6	4.5	5.7	8.6	14.4	22.8	28.7	36.1
	50	3.5	4.4	5.5	8.4	13.9	22.0	27.7	34.9
	100	3.4	4.2	5.3	8.1	13.4	21.3	26.8	33.7
30	1	3.5	4.4	5.6	8.4	14.0	22.3	28.0	35.3
	5	3.2	4.1	5.1	7.8	12.9	20.5	25.8	32.5
	10	3.1	3.9	5.0	7.5	12.5	19.7	24.8	31.3
	25	3.0	3.8	4.8	7.2	12.0	19.0	23.9	30.1
	50	2.9	3.6	4.6	6.9	11.5	18.2	22.9	28.9
	100	2.8	3.5	4.4	6.7	11.2	17.7	22.3	28.1
40	1	2.9	3.7	4.6	7.0	11.7	18.5	23.2	29.3
	5	2.7	3.4	4.3	6.4	10.7	16.9	21.3	26.9
	10	2.6	3.3	4.1	6.2	10.4	16.4	20.7	26.1
	25	2.5	3.1	3.9	6.0	9.9	15.7	19.7	24.9
	50	2.3	2.9	3.7	5.6	9.3	14.7	18.5	23.3
	100	1.9	2.4	3.1	4.6	7.7	12.1	15.3	19.2
50	1	2.4	3.9	3.8	5.8	9.6	15.2	19.1	24.1
	5	2.2	2.8	3.5	5.3	8.8	13.9	17.5	22.1
	10	2.1	2.7	3.4	5.1	8.5	13.4	16.9	21.2
	25	1.8	2.3	2.9	4.4	7.3	11.6	14.7	18.4
	50	1.5	1.9	2.4	3.6	6.1	9.6	12.1	15.2
	100	1.3	1.6	2.0	3.1	5.1	8.1	10.2	12.8
60	1	2.0	2.5	3.1	4.7	7.8	12.4	15.6	19.6
	5	1.8	2.3	2.9	4.3	7.2	11.4	14.3	18.0
	10	1.6	2.0	2.5	3.7	6.2	9.9	12.4	15.6
	25	1.2	1.6	2.0	3.0	4.9	7.8	9.9	12.4
	50	1.0	1.3	1.7	2.5	4.2	6.6	8.3	10.4
70	1	1.6	2.0	2.5	3.8	6.4	10.1	12.7	16.0
	5	1.3	1.7	2.1	3.2	5.3	8.3	10.5	13.2
	10	1.1	1.4	1.7	2.6	4.3	6.8	8.6	10.8
	25	-	1.1	1.3	2.0	3.4	5.3	6.7	8.4
	50	-	-	1.1	1.7	2.9	4.6	5.7	7.2
80	1	1.3	1.6	2.0	3.1	5.1	8.1	10.2	12.8
	5	-	1.2	1.5	2.2	3.7	5.8	7.3	9.2
	10	-	1.0	1.2	1.8	3.0	4.8	6.1	7.6
	25	-	-	1.0	1.4	2.4	3.8	4.8	6.0
95	1	-	1.1	1.3	2.0	3.4	5.3	6.7	8.4
	5	-	-	-	1.3	2.2	3.5	4.5	5.6
	(10) ¹⁾	-	-	-	(1.2) ¹⁾	(1.9) ¹⁾	(3.0) ¹⁾	(3.8) ¹⁾	(4.8) ¹⁾

¹⁾ The bracketed values apply where testing can be shown to have been carried out for longer than one year at 110°C.

Table 9: Allowable working pressure for pipes made from PP-B 80 propylene, with SF=1.5

Temperature in °C	Years of service	Pipe series (S)							
		20	16	12.5	8.3	5	3.2	2.5	2
		Standard dimension ratio (SDR)							
		41	33	26	17.6	11	7.4	6	5
Allowable working pressure, in bar									
10	1	4.1	5.2	6.5	9.8	16.4	25.9	32.6	41.1
	5	3.8	4.8	6.1	9.2	15.3	24.2	30.5	38.4
	10	3.7	4.7	5.9	8.9	14.8	23.4	29.5	37.1
	25	3.6	4.5	5.7	8.6	14.2	22.6	28.4	35.8
	50	3.5	4.4	5.5	8.3	13.8	21.9	27.6	34.7
	100	3.4	4.2	5.3	8.1	13.4	21.3	26.8	33.7
20	1	3.5	4.4	5.5	8.3	13.8	21.9	27.6	34.7
	5	3.2	4.1	5.1	7.8	12.9	20.4	25.7	32.4
	10	3.1	4.0	5.0	7.5	12.5	19.8	24.9	31.4
	25	3.0	3.8	4.8	7.2	12.0	19.0	23.9	30.1
	50	2.9	3.7	4.6	7.0	11.6	18.3	23.1	29.1
	100	2.8	3.5	4.4	6.7	11.2	17.7	22.3	28.1
30	1	2.9	3.7	4.7	7.8	11.7	18.6	23.4	29.4
	5	2.7	3.4	4.3	7.5	10.8	17.1	21.5	27.1
	10	2.6	3.3	4.1	7.2	10.4	16.4	20.7	26.1
	25	2.5	3.2	4.0	7.0	10.0	15.8	19.9	25.1
	50	2.4	3.0	3.8	6.8	9.6	15.2	19.1	24.1
	100	2.3	2.9	3.7	6.5	9.3	14.8	18.6	23.4
40	1	2.4	3.1	3.9	6.5	9.7	15.4	19.4	24.4
	5	2.2	2.8	3.5	6.2	8.9	14.1	17.8	22.4
	10	2.1	2.7	3.4	6.0	8.6	13.7	17.3	21.7
	25	2.1	2.6	3.3	5.8	8.2	13.1	16.5	20.7
	50	1.9	2.4	3.1	5.6	7.7	12.2	15.4	19.4
	100	1.6	2.0	2.5	5.3	6.4	10.1	12.7	16.0
50	1	2.0	2.5	3.2	5.8	8.0	12.6	15.9	20.0
	5	1.8	2.3	2.9	5.4	7.3	11.6	14.6	18.4
	10	1.8	2.2	2.8	5.2	7.0	11.2	14.1	17.7
	25	1.5	1.9	2.4	4.8	6.1	9.7	12.2	15.4
	50	1.3	1.6	2.0	4.5	5.1	8.0	10.1	12.7
	100	1.1	1.3	1.7	4.2	4.3	6.7	8.5	10.7
60	1	1.6	2.1	2.6	4.8	6.5	10.3	13.0	16.4
	5	1.5	1.9	2.4	4.4	6.0	9.5	11.9	15.0
	10	1.3	1.6	2.1	4.0	5.2	8.2	10.4	13.0
	25	1.0	1.3	1.6	3.6	4.1	6.5	8.2	10.4
	50	-	1.1	1.4	3.2	3.5	5.5	6.9	8.7
70	1	1.3	1.7	2.1	4.0	5.3	8.4	10.6	13.4
	5	1.1	1.4	1.7	3.6	4.4	7.0	8.8	11.0
	10	-	1.1	1.4	3.2	3.6	5.7	7.2	9.0
	25	-	-	1.1	2.8	2.8	4.4	5.6	7.0
	50	-	-	1.0	2.4	2.4	3.8	4.8	6.0
80	1	1.1	1.3	1.7	3.2	4.3	6.7	8.5	10.7
	5	-	1.0	1.2	2.8	3.1	4.8	6.1	7.7
	10	-	-	1.0	2.4	2.5	4.0	5.0	6.3
	25	-	-	-	2.0	2.0	3.2	4.0	5.0
95	1	-	-	1.1	2.4	2.8	4.4	5.6	7.0
	5	-	-	-	2.0	1.9	3.0	3.7	4.7
	(10) ¹⁾	-	-	-	(1.0) ¹⁾	(1.6) ¹⁾	(2.5) ¹⁾	(3.2) ¹⁾	(4.0) ¹⁾

¹⁾ The bracketed values apply where testing can be shown to have been carried out for longer than one year at 110°C.

Table 10: Allowable working pressure for pipes made from PP-R 80, with SF=1.25

Temperature in °C	Years of service	Pipe series (S)							
		20	16	12.5	8.3	5	3.2	2.5	2
		Standard dimension ratio (SDR)							
		41	33	26	17.6	11	7.4	6	5
Allowable working pressure, in bar									
10	1	5.3	6.7	8.4	12.7	21.1	33.4	42.0	52.9
	5	5.0	6.3	7.9	12.0	20.0	31.6	39.8	50.1
	10	4.9	6.1	7.7	11.6	19.3	30.6	38.5	48.5
	25	4.7	5.9	7.4	11.2	18.7	29.6	37.3	46.9
	50	4.6	5.8	7.2	10.9	18.2	28.8	36.3	45.7
	100	4.5	5.6	7.1	10.7	17.7	28.1	35.4	44.5
20	1	4.5	5.7	7.2	10.8	18.0	28.6	36.0	45.3
	5	4.2	5.4	6.7	10.2	16.9	26.8	33.8	42.5
	10	4.1	5.2	6.5	9.9	16.4	26.1	32.8	41.3
	25	4.0	5.0	6.4	9.6	16.0	25.3	31.8	40.1
	50	3.9	4.9	6.2	9.3	15.5	24.5	30.9	38.9
	100	3.8	4.7	6.0	9.0	15.0	23.8	29.9	37.7
30	1	3.8	4.8	6.1	9.2	15.3	24.3	30.6	38.5
	5	3.6	4.5	5.7	8.6	14.4	22.8	28.7	36.1
	10	3.5	4.4	5.5	8.4	13.9	22.0	27.7	34.9
	25	3.4	4.2	5.3	8.1	13.4	21.3	26.8	33.7
	50	3.3	4.1	5.2	7.9	13.1	20.7	26.1	32.9
	100	3.2	4.0	5.1	7.7	12.8	20.2	25.5	32.1
40	1	3.2	4.1	5.1	7.8	12.9	20.5	25.8	32.5
	5	3.0	3.8	4.8	7.3	12.1	19.2	24.2	30.5
	10	3.0	3.7	4.7	7.1	11.8	18.7	23.6	29.7
	25	2.8	3.6	4.5	6.8	11.3	18.0	22.6	28.5
	50	2.8	3.5	4.4	6.6	11.0	17.5	22.0	27.7
	100	2.7	3.4	4.3	6.4	10.7	16.9	21.3	26.9
50	1	2.8	3.5	4.4	6.6	11.0	17.5	22.0	27.7
	5	2.6	3.2	4.1	6.1	10.2	16.2	20.4	25.7
	10	2.5	3.1	3.9	6.0	9.9	15.7	19.7	24.9
	25	2.4	3.0	3.8	5.8	9.6	15.2	19.1	24.1
	50	2.3	2.9	3.7	5.6	9.3	14.7	18.5	23.3
	100	2.2	2.8	3.6	5.4	8.9	14.2	17.8	22.5
60	1	2.3	2.9	3.7	5.6	9.3	14.7	18.5	23.3
	5	2.2	2.7	3.4	5.2	8.6	13.7	17.2	21.7
	10	2.1	2.6	3.3	5.0	8.3	13.2	16.6	20.8
	25	2.0	2.5	3.2	4.8	8.0	12.6	15.9	20.0
	50	1.9	2.4	3.1	4.6	7.7	12.1	15.3	19.2
70	1	2.0	2.5	3.1	4.7	7.8	12.4	15.6	19.6
	5	1.8	2.3	2.9	4.3	7.2	11.4	14.3	18.0
	10	1.8	2.2	2.8	4.2	7.0	11.1	14.0	17.6
	25	1.5	1.9	2.4	3.6	6.1	9.6	12.1	15.2
	50	1.3	1.6	2.0	3.1	5.1	8.1	10.2	12.8
80	1	1.6	2.1	2.6	3.9	6.5	10.4	13.1	16.4
	5	1.4	1.8	2.3	3.5	5.7	9.1	11.5	14.4
	10	1.2	1.5	1.9	2.9	4.8	7.6	9.6	12.0
	25	1.0	1.2	1.5	2.3	3.8	6.1	7.6	9.6
95	1	1.2	1.5	1.8	2.8	4.6	7.3	9.2	11.6
	5	-	1.0	1.2	1.8	3.0	4.8	6.1	7.6
	(10) ¹	-	-	(1.0) ¹	(1.5) ¹	(2.6) ¹	(4.0) ¹	(5.1) ¹	(6.4) ¹

¹) The bracketed values apply where testing can be shown to have been carried out for longer than one year at 110°C.

Table 11: Allowable working pressure for pipes made from PP-R 80, with SF=1.5

Temperature in °C	Years of service	Pipe series (S)							
		20	16	12.5	8.3	5	3.2	2.5	2
		Standard dimension ratio (SDR)							
		41	33	26	17.6	11	7.4	6	5
Allowable working pressure, in bar									
10	1	4.4	5.6	7.0	10.6	17.6	27.8	35.0	44.2
	5	4.2	5.3	6.6	10.0	16.6	26.4	33.2	41.8
	10	4.0	3.1	6.4	9.7	16.1	25.5	32.1	40.4
	25	3.9	4.9	6.2	9.4	15.6	24.7	31.1	39.1
	50	3.8	4.8	6.0	9.1	15.2	24.0	30.3	38.1
	100	3.7	4.7	5.9	8.9	14.8	23.4	29.5	37.1
20	1	3.8	4.8	6.0	9.0	15.0	23.8	30.0	37.8
	5	3.5	4.5	5.6	8.5	14.1	22.7	28.1	35.4
	10	3.4	4.3	5.5	8.2	13.7	21.7	27.3	34.4
	25	3.3	4.2	5.3	8.0	13.3	21.1	26.5	33.4
	50	3.2	4.1	5.1	7.8	12.9	20.4	25.7	32.4
	100	3.1	4.0	5.0	7.5	12.5	19.8	24.9	31.4
30	1	3.2	4.0	5.1	7.7	12.8	20.2	25.5	32.1
	5	3.0	3.8	4.8	7.2	12.0	19.0	23.9	30.1
	10	2.9	3.7	4.6	7.0	11.6	18.3	23.1	29.1
	25	2.8	3.5	4.4	6.7	11.2	17.7	22.3	28.1
	50	2.7	3.4	4.3	6.6	10.9	17.3	21.8	27.4
	100	2.7	3.4	4.2	6.4	10.6	16.9	21.2	26.4
40	1	2.7	3.4	4.3	6.5	10.8	17.1	21.5	27.1
	5	2.5	3.2	4.0	6.1	10.1	16.0	20.0	25.4
	10	2.5	3.1	3.9	5.9	9.8	15.6	19.6	24.7
	25	2.4	3.0	3.8	5.7	9.4	15.0	18.8	23.7
	50	2.3	2.9	3.7	5.5	9.2	14.5	18.3	23.1
	100	2.2	2.8	3.5	5.4	8.9	14.1	17.8	22.4
50	1	2.3	2.9	3.7	5.5	9.2	14.5	18.3	23.1
	5	2.1	2.7	3.4	5.1	8.5	13.5	17.0	21.4
	10	2.1	2.6	3.3	5.0	8.2	13.1	16.5	20.7
	25	2.0	2.5	3.2	4.8	8.0	12.6	15.9	20.0
	50	1.9	2.4	3.1	4.6	7.7	12.2	15.4	19.4
	100	1.9	2.4	3.0	4.5	7.4	11.8	14.9	18.7
60	1	1.9	2.4	3.1	4.6	7.7	12.2	15.4	19.4
	5	1.8	2.3	2.9	4.3	7.2	11.4	14.3	18.0
	10	1.7	2.2	2.8	4.2	6.9	11.0	13.8	17.4
	25	1.7	2.1	2.6	4.0	6.7	10.5	13.3	16.7
	50	1.6	2.0	2.5	3.8	6.4	10.1	12.7	16.0
70	1	1.6	2.1	2.6	3.9	6.5	10.3	13.0	16.4
	5	1.5	1.9	2.4	3.6	6.0	9.5	11.9	15.0
	10	1.5	1.9	2.3	3.5	5.9	9.3	11.7	14.7
	25	1.3	1.6	2.0	3.0	5.1	8.0	10.1	12.7
	50	1.1	1.3	1.7	2.6	4.3	6.7	8.5	10.7
80	1	1.4	1.7	2.2	3.3	5.5	8.6	10.9	13.7
	5	1.2	1.5	1.9	2.9	4.8	7.6	9.6	12.0
	10	1.0	1.3	1.6	2.4	4.0	6.3	8.0	10.0
	25	-	1.0	1.3	1.9	3.2	5.1	6.4	8.0
95	1	1.0	1.2	1.5	2.3	3.9	6.1	7.7	9.7
	5	-	-	1.0	1.5	2.5	4.0	5.0	6.3
	(10) ¹⁾	-	-	-	(1.3) ¹⁾	(2.1) ¹⁾	(3.4) ¹⁾	(4.2) ¹⁾	(5.3) ¹⁾

¹⁾ The bracketed values apply where testing can be shown to have been carried out for longer than one year at 110°C.

7.2 Pipes conveying other fluids

Pipes which come in contact with aqueous fluids or fluids which are particularly hazardous are recommended to have a lower S or SDR number.

8 Form supplied

Pipes are to be supplied in specified lengths or coils, complying with the tolerances specified in table 12.

Table 12: Limit deviations for nominal lengths

Form (supplied)		Limit deviations
Coils, unwound length		Actual length not less than nominal length
Straight Pipes lengths specified	Up to 12m	± 10m
	Over 12m	By agreement

9 Marking

Pipes conforming to this standard shall bear the following information, marked indelibly at 1m intervals:

Example:

- Manufacturer's identification xyz
- Quality or inspection mark RKL
- Material designation PP-H 100
- DIN number DIN 8077/DIN 8078
- S or SDR value S5
- Outside diameter x wall thickness 32 x 2,9
- Date of manufacture 040996
- Machine number 7

This marking is only to be used for pipes which are not covered in other product standards or other technical rules.

Appendix A

Explanatory notes

With regard to the specifications for outside diameters, this standard conforms to ISO 161-1, with regard to the specifications for wall thickness, it conforms to ISO 4065, and with regard to tolerances on outside diameter, circularity and wall thickness, it conforms to ISO 11922-1.

The pressure rating (PN) is no longer used for pipe designation in basic standards for plastics pipes. However, for the purpose of comparison, table A.1 correlates the old PN values with the S and SDR values. It should be noted that the pipe outside diameters were selected from a preferred number series. The service life of polypropylene pipes at operating temperatures of up to 50°C, previously given as fifty years, may now be assumed to be at least one hundred years. The nominal sizes and allowable working pressure to be used in particular applications will have to be included in the appropriate product

standards or other applicable technical rules. According to current knowledge of the long-term stability of polypropylene it can be assumed that pipes conveying water are capable of resisting the pressures given in tables 6 to 11. Where fluids are to be conveyed which could be hazardous if handled incorrectly, the pipe manufacturer should be consulted.

Table A.1: Comparison of pipe series, standard dimension ratio and nominal pressure (PN)

Pipe series (S)	Standard dimension ratio (SDR)	Nominal pressure (PN)
20	41	2,5
16	33	(3,2) ¹⁾
12,5	26	4
8,3	17,6	6
5	11	10
3,2	7,4	16
2,5	6	20
2	5	25
¹⁾ Not included in 1989 edition of DIN 8077		

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