POLYGON PIPE

TECHNICAL BOOK

PP-R PIPE SYSTEM

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Group Profile

AKAN ENTERPRISE GROUP, established in 2000, is a professional manufacturer engaged in the research, development, production, sale and service of plastic pipes and fittings such as PPR, PEX, PERT, HDPE,UPVC, PB pipes and fittings, which covers fields of water supply, drainage, floor heating, etc. Selling well in all cities and provinces around China, our products are also exported to clients in such countries and regions as Asia, Africa, and South America. AKAN, with development of over 15 years, is widely known as providing quality products and attentive service, which has won recognition and praise of both domestic and foreign customers, peers and experts.

POLYGON PIPE

Scale of Company

We have 4 production bases, located in Shanghai, Liuyang, Xinxiang and Tianjin city, total construction area upto 300,000 square meters. From our beginning of our establishment, our company has introduced a series of advanced equipment including NOKIA-Maillefer and Krauss-Maffei to produce plastic pipes.

Research and Development

Dedicated to strict quality control and thoughtful customer service, our experienced staff members are always available to discuss your requirements and ensure full customer satisfaction. Our test R&D center own completed testing equipment such as IPT hydraulic testing machine, DSC machine. We are also one of the editor of PPR national standard. In addition, we have passed ISO9001, 14001, 18001 and obtained certificates of AENOR, WRAS and CE. And test center achieved CNAS certificate which makes it be National Recognized Testing Laboratory.

POLYGON PIPE

◎CNAS National Laboratory Accreditation Certificate.
◎Spanish AENOR Product Certificate
◎SGS ISO 9001 International Quality Certificate
◎SGS ISO 14001 Environmental Management System Certificate
◎British WRAS Sanitary Requirement Certificate
◎Adopting International Standard Product Marketing Certificate
◎Europe CE Certificate
◎Russian Gost Quality Certificate
◎Russian Sanitary Certificate

POLYGON PIPE

Feature

Product Range

Welding

Installation Principles

Installation Principles

Planning

Good Property

-Extremely long life of at least 50 years
-Taste and odour neutral
-Unique and unrivaled connection technique with security for a life-time
-Good chemical resistance
-Good impact strength
-Physiologically harmless
-Heat-preservation and energy-saving
-Resistance to high temperature(100⊥)
-Convenient and reliable installation
-No pipe furring
-Sound insulation
-Recyclable-for the benefit of environment!

Fields of Application

-Potable water pipe networks for cold and warm water installations.i.e.in residential bulidings, hospitals, hotels,office and school buildings, shipbuilding,etc.
-Pipe networks for rainwater utilization systems
-Pipe networks for compressed-air plants
-Pipe networks for swimming pool facilities
-Pipe networks for solar plants
-Pipe networks in agriculture and horticulture
-Heating pipes for residential house
-Pipe networks for industry,i.e. transport of aggressive fluids(acids,leys,etc.)
-Transport of liquid foods

Contrast of Property for Some Pipe Systems.

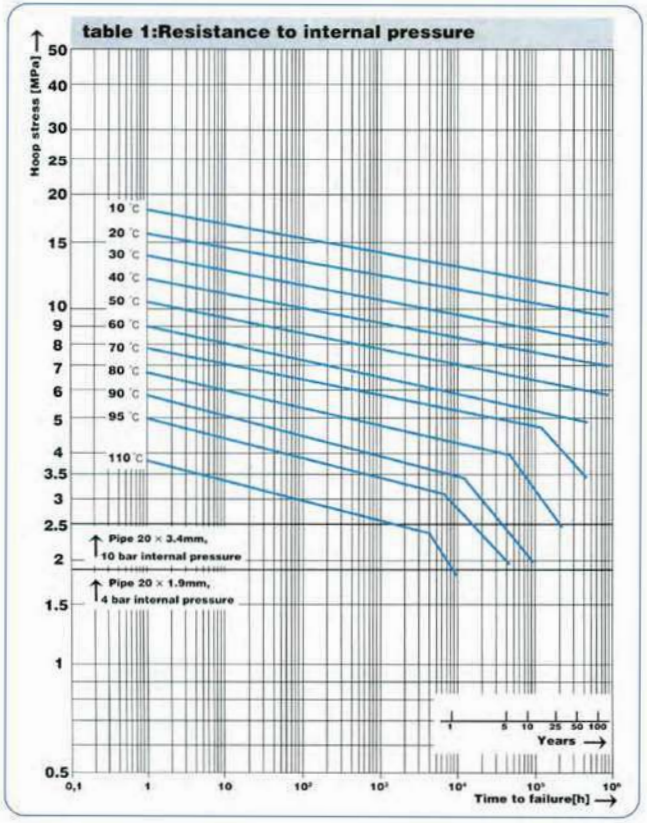
Property \ Pipe Style	Iron Pipe	Copper Pipe	Upvc Pipe	Cpvc Pipe	Pex-Al-Pex Pipe	PB Pipe	Polygon® PP-R Pipe
Service life	5-10years	50years	30years	50years	50years	50years	50years
Resistance to High Temperature	Good	Good	Bad	Good	Good	Good	Good
Hygienic property	Bad	Common	Bad	Common	Good	Good	Good
Recylable and No Pollution	No	No	No	No	Yes	Yes	Yes
Pipe Furring	Yes	Yes	No	No	No	No	No
Corrosion-Resistant	Bad	Bad	Good	Good	Good	Good	Good
Installation	Hard	Hard	Easy	Easy	Easy	Easy	Easy
Price	Low	High	Low	High	High	High	Common
Reliability	Common	Common	Common	Common	Common	Common	Common

Hydrostatic Pressure Performance

To plot the hydrosatatic pressure performance graph(table1) indepe-ndently of dimensions, the hoop st-ress(δ) is calculated accroding to the formula: $\delta = \frac{P(de-e)}{2e}$

P=internal pressure
de=the external pipe diameter of pipe(mm)
e=the wall thickness of the pipe(mm)

With all water carrying pipes, resistance to internal pressure is an important factor, which affects long life characteristics. To therefore assure the optimumin in long life performance, straight and curved Polygon® pipes have beensubjected to extensive hydrostatic pressure testing at a variety of different temperat ures,The results, and the success of these tests can be seen in the table 1.



Permissible Working Pressure

The table lists the permissible working pressure for pipes with different pressure class under specific temperature and work life. The data is calculated from formula and table 1.

Under normal work pressure and Condition, the life of Polygon® pipe system can reach 50 years at least!

temperature	Service life (year)	Pipe S 5		Pipe S 3.2		Pipe S 2.5	
		Pipe SDR 11		Pipe SDR 7.4		Pipe SDR 6	
		Pipe PN 10		Pipe PN 16		Pipe PN 20	
		permissible working pressure, in bar					
		SF=1.25	SF=1.5	SF=1.25	SF=1.5	SF=1.25	SF=1.25
10°C	1	21.1	17.6	33.4	27.8	42.0	35.0
	5	20.0	16.6	31.6	26.4	39.8	33.2
	10	19.3	16.1	30.6	25.5	38.5	32.1
	25	18.7	15.6	29.6	24.7	37.3	31.1
	50	18.2	15.2	28.8	24.0	36.3	30.3
	100	17.7	14.8	28.1	23.4	35.4	29.5
20°C	1	18.0	15.0	28.6	23.8	36.0	30.0
	5	16.9	14.1	26.8	22.3	33.8	28.1
	10	16.4	13.7	26.1	21.7	32.8	27.3
	25	16.0	13.3	25.3	21.1	31.8	26.5
	50	15.5	12.9	24.5	20.4	30.9	25.7
	100	15.0	12.5	23.8	19.8	29.9	24.9
30°C	1	15.3	12.8	24.3	20.2	30.6	25.5
	5	14.4	12.0	22.8	19.0	28.7	23.9
	10	13.9	11.6	22.0	18.3	27.7	23.1
	25	13.4	11.2	21.3	17.1	26.8	22.3
	50	13.1	10.9	20.7	17.3	26.1	21.8
	100	12.8	10.6	20.2	16.9	25.5	21.2
40°C	1	12.9	10.8	20.5	17.1	25.8	21.5
	5	12.1	10.1	19.2	16.0	24.2	20.2
	10	11.8	9.8	18.7	15.6	23.6	19.6
	25	11.3	9.4	18.0	15.0	22.6	18.8
	50	11.0	9.2	17.5	14.5	22.0	18.3
	100	10.7	8.9	16.9	14.1	21.3	17.8
50°C	1	11.0	9.2	17.5	14.5	22.0	18.3
	5	10.2	8.5	16.2	13.5	20.4	17.0
	10	9.9	8.2	15.7	13.1	19.7	16.5
	25	9.6	8.0	15.2	12.6	19.1	15.9
	50	9.3	7.7	14.7	12.2	18.5	15.4
	100	8.9	7.4	14.2	11.8	17.8	14.9
60°C	1	9.3	7.7	14.7	12.2	18.5	15.4
	5	8.6	7.2	13.7	11.4	17.2	14.3
	10	8.3	6.9	13.2	11.0	16.6	13.8
	25	8.0	6.7	12.8	10.5	15.9	13.3
	50	7.7	6.4	12.1	10.1	15.3	12.7
70°C	1	7.8	6.5	12.4	10.3	15.6	13.0
	5	7.2	6.0	11.4	9.5	14.3	11.9
	10	7.0	5.9	11.1	9.3	14.0	11.7
	25	6.1	5.1	9.6	8.0	12.1	10.1
	50	5.1	4.3	8.1	6.7	10.2	8.5
80°C	1	6.5	5.5	10.4	8.6	13.1	10.9
	5	5.7	4.8	9.1	7.6	11.5	9.6
	10	4.8	4.0	7.6	6.3	9.6	8.0
	25	3.8	3.2	6.1	5.1	7.6	6.4
95°C	1	4.6	3.9	7.3	6.1	9.2	7.7
	5	3.0	2.5	4.8	4.0	6.1	5.0
	10	2.6	2.1	4.0	3.4	5.1	4.2

SDR:Standard Dimension Ratio (diameter/wall thickness radio)
SDR=2 x S + 1＞d/s(S=Pipe series index from ISO4065)
SF=Safety-factor

POLYGON PIPE

UV-Resistance

PP-R pipe and fittings shuld not be installed (without protection) where subject to UV-radiation. If Polygon® pipe system must be installed outside of building and exposed under sunlight, one UV-resistant foam pipe can be applied to protect Polygon® pipe system.

Hygienic Harmlessness

⊕DIN 1998 T2

Stipulates, that all parts of an installion coming directly in contact with potable water are commodity goods acc.to the spirit of the Law for Food and Commodity Goods. Plastic pipes have to comply with follows:

⊕KTW-recommendations of the Federal Public Health Department

⊕DVGW-working sheet W 270

Increase of Microorganism on Materials used for potable Water Applications-Test and Evaluation

⊕BS 6920 Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of water

Materials:

The hygienic harmlessness of the materials used for the Polygon® pipe system is indepen dently verified through test certificates from the Hygiene Institute Genlsenkirchen. The suitability for potable water pipes in the field of cold and hot water is confirmed by current tests.

Processing:

The joining method requires no additives such as fluxes or solder. The conncetion is exclusively made by coupling welding

Potable water-our most precious commodity good:

The increasing use of PP-R in the fleld of food-packing confirms the hygienic qualities of the material.

This make Polygon® pipe system the optimal packing for one of our must precious commodity goods-our potable water.

Sound Insulation

The sound insulation qualities of PP-R and the Polygon® pipe system, when related to water flow and hydraulic shock within a building, provide a sound proofing effect on noise transmission. Therefore the sound transmission is much lower compared to metallic pipes.

Fire Protection

Polygon® pipes and fittings comply with the requirements of the fire classification B2 (normai inflammable).Compared to natural products like wood, cork or wool,Polygon® pipes do not show an increased brand gas toxicity. Therefore,in case of fire, there is no risk of the development of dioxin.

Measures against fire and smoke transmission with pipes are fire retardant seals.They are fixed at the passage through a building,which demands fire resistance.The fire resistance period is the minimum period in minutes needed during the fire test to take precautionary measures for the prevention of fire and smoke transmission.The extent of the preventive measures depends on the kind of the installation. The determining of fire areas and fire calssification has to be made in acc.with the law of the country. Information is given by the planning Department and Building Control Office or the Fire Protection Representative.

Basically fire walls and ceilings with pipe passages have to be furnished to be the same fire resistance classification. All fire protection system with a corresponding classification are suitable for Polygon® pipes.

Fire Load

The values required for determining the fire load within a fire section are calculated from the total of all flammable materials located within this area such as electric cables, pipe systems, insulating and heat relief materials.

The calculation for establishing the combustion heat V(KWh/m) for a fire section in the event of an outbreak is dependent on dimensions and materials.

The basis uesd for the calculation of Polygon® pipes made of PP-R is the lower calorific value Hu=12.2kw/kg(as per DIN V 18230 T1)in conjunction with the mass of material mpipe (kg/m).Depending on the calculation procedure, the fire load is worked out with reference to the burn-up factor. This value is designated as m_{factor} and is taken as 0.8 for PP-R.

Combustion values v (kwh/m) for Polygon® pipes

External ∮	SDR 11	SDR 7.4	SDR 6
mm	PN10	PN16	PN20
20	1.31	1.82	2.10
25	2.00	2.78	2.76
32	3.25	4.58	5.30
40	5.03	7.02	8.19
50	7.78	10.52	12.81
63	12.32	16.82	20.13
75	17.32	23.96	28.55
90	24.77	34.45	41.00
110	36.72	52.70	61.49

Chemical Resistance

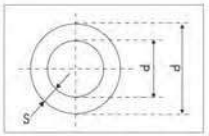
Chemical resistance is one of the remarkable properties of the Polygon® pipe system. However the chemical resistance of the nickel-plated brass inserts may not be comparable with the chemical resistance of a pure PP-R pipe system. As these metal compound fittings may not be suitable for all industry application of the Polygon® system, it is advisable to use Polygon® flange socket.

Compliance with the System Standard

The quality of Polygon® pipe system compliants with the requirements of various national and national and international independent authorities and institutions.

Argentina		Kuwait	
Australia		Malaysia	SIRIM
Austria	ÖVGW GEPRÜFT	Netherlands	kiwa
Belgium		Poland	
Canada		Quatar	
France	CSTB	Spain	AENOR
Germany	DVGW DVGW TZW	Switzerland	SVGW SSIGE
Greece	ΕΛΟΤ	Turkey	TSE
Italy		USA	NSF

PP-R Pipe



† PIPE SERIE:SDR 11/S5/PN 10
† COLOR:WHITE, GRAY,GREEN,DARK GREEN
† FORM SUPPLIED:4M STRAIGHT LENGTHS

† GERMANY STANDARD:DIN8077 18078
† SAFETY COEFFICIENT:C=1.5

Pipe			Diameter	Wall Thickness	Internal Diameter
Code Number	Dimension	Packing unit	d	s	dj
			mm	mm	mm
10020	20mm	120m	20	1.9	16.2
10025	25mm	80m	25	2.3	20.4
10032	32mm	48m	32	2.9	26.0
10040	40mm	32m	40	3.7	32.6
10050	50mm	20m	50	4.6	40.8
10063	63mm	12m	63	5.8	51.4
10075	75mm	8m	75	6.8	61.2
10090	90mm	4m	90	8.2	73.6
10110	110mm	4m	110	10.0	90.0
10160	160mm	4m	160	14.6	130.8

† PIPE SERIE:SDR 9/S4/PN 12.5
† COLOR:WHITE, GRAY,GREEN,DARK GREEN
† FORM SUPPLIED:4M STRAIGHT LENGTHS

† GERMANY STANDARD:DIN8077 18078
† SAFETY COEFFICIENT:C=1.5

Pipe			Diameter	Wall Thickness	Internal Diameter
Code Number	Dimension	Packing unit	d	s	d
			mm	mm	mm
11020	20mm	120m	20	2.3	15.4
11025	25mm	80m	25	2.8	19.4
11032	32mm	48m	32	3.6	24.8
11040	40mm	32m	40	4.5	31.0
11050	50mm	20m	50	5.6	38.8
11063	63mm	12m	63	7.1	48.8
11075	75mm	8m	75	8.4	58.2
11090	90mm	4m	90	10.1	69.8
11110	110mm	4m	110	12.3	85.4
11160	160mm	4m	160	17.9	124.2

POLYGON PIPE

PP-R Pipe

† PIPE SERIE:SDR 7.4/S3.2/PN 16
† COLOR:WHITE, GRAY,GREEN,DARK GREEN
† FORM SUPPLIED:4M STRAIGHT LENGTHS

† GERMANY STANDARD:DIN8077 18078
† SAFETY COEFFICIENT:C=1.5

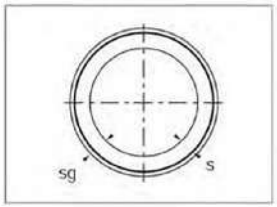
Pipe			Diameter	Wall Thickness	Internal Diameter
Code Number	Dimension	Packing unit	d	s	dj
			mm	mm	mm
12020	20mm	120m	20	2.8	14.4
12025	25mm	80m	25	3.5	18.0
12032	32mm	48m	32	4.4	23.0
12040	40mm	32m	40	5.5	28.8
12050	50mm	20m	50	6.9	36.2
12063	63mm	12m	63	8.6	45.6
12075	75mm	8m	75	10.3	54.2
12090	90mm	4m	90	12.3	65.0
12110	110mm	4m	110	15.1	79.6

† PIPE SERIE:SDR 6/S2.5/PN 20
† COLOR:WHITE, GRAY,GREEN,DARK GREEN
† FORM SUPPLIED:4M STRAIGHT LENGTHS

† GERMANY STANDARD:DIN8077 18078
† SAFETY COEFFICIENT:C=1.5

Pipe			Diameter	Wall Thickness	Internal Diameter
Code Number	Dimension	Packing unit	d	s	dj
			mm	mm	mm
13020	20mm	120m	20	3.4	13.2
13025	25mm	80m	25	4.2	16.6
13032	32mm	48m	32	5.4	21.2
13040	40mm	32m	40	6.7	26.6
13050	50mm	20m	50	8.3	33.2
13063	63mm	12m	63	10.5	42.0
13075	75mm	8m	75	12.5	50.0
13090	90mm	4m	90	15.0	60.0
13110	110mm	4m	110	18.3	73.2

PP-R Stabi Composite Pipe



† PIPE SERIE:SDR 9/S4/PN16
† COLOR:WHITE, GRAY,GREEN
† FORM SUPPLIED:4M STRAIGHT LENGTHS

Code Number	Nominal Outer Diameter	Diamter	Wall Thickness	Inner diamter	Overal wall thickness	Overal Outer Dismter
14020	20mm	20	2.3	15.4	3.4	21.9
14025	25mm	25	2.8	19.4	4.0	27.1
14032	32mm	32	3.6	24.8	4.8	34.1
14040	40mm	40	4.5	31.0	5.8	42.3
14050	50mm	50	5.6	38.8	6.9	52.3
14063	63mm	63	7.1	48.8	8.4	65.3
14075	75mm	75	8.4	58.3	9.6	77.8
14090	90mm	90	10.1	70.0	11.5	93.3
14110	110mm	110	13.7	85.8	13.7	1140

† PIPE SERIE:SDR 7.4/S3.2/PN20
† COLOR:WHITE, GRAY,GREEN
† FORM SUPPLIED:4M STRAIGHT LENGTHS

Code Number	Nominal Outer Diameter	Diamter	Wall Thickness	Inner diamter	Overal wall thickness	Overal Outer Dismter
15020	20mm	20	2.8	14.4	3.9	21.9
15025	25mm	25	3.5	18.0	4.7	27.1
15032	32mm	32	4.5	23.0	5.7	34.1
15040	40mm	40	5.8	28.8	6.8	42.3
15050	50mm	50	6.9	36.2	8.2	52.3
15063	63mm	63	8.6	45.6	10.0	65.3
15075	75mm	75	10.3	54.4	11.5	77.8
15090	90mm	90	12.3	65.4	13.7	93.3
15110	110mm	110	15.1	79.9	16.6	114.0

POLYGON PIPE

PP-R Stabi Composite Pipe

† PIPE SERIE:SDR 6/S2.5/PN25
† COLOR:WHITE, GRAY,GREEN
† FORM SUPPLIED 4M STRAIGHT LENGTHS

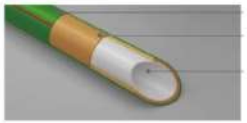
Code Number	Nominal Outer Diameter	Diamter	Wall Thickness	Inner diamter	Overal wall thickness	Overal Outer Dismter
16020	20mm	20	3.4	13.2	4.5	219
16025	25mm	25	4.2	16.6	5.4	27.1
16032	32mm	32	5.4	21.2	6 7	34.1
16040	40mm	40	6.7	26.6	8.0	42.3
16050	50mm	50	8.3	33.2	9.6	52.3
16063	63mm	63	10.5	42.0	11.8	65.3
16075	75mm	75	12.5	49.8	13.8	77.8
16090	90mm	90	15.0	59.8	16.4	93.3
16110	110mm	110	18.3	73.2	19.8	114.0

PP-R Antibacterial Pipe

Construction of anti-bacterial pipe

PP-R Layer
Anti-bacterial Layer

- Food transportation
- Drinking water supply
- Medical products' transportation
- All the other pp-r pipes field



High Impact Layer
PP-R Layer
Anti-bacterial Layer

Specifications

Pipe Series SDR7.4/S3.2/PN16	
Code Number	Dimension(mm)
40020	20 × 2.8
40025	25 × 3.5
40032	32 × 4.4
40040	40 × 5.5
40050	50 × 6.9
40063	63 × 8.6

Pipe Series SDR6/S2.5/PN20	
Code Number	Dimension(mm)
41020	20 × 3.4
41025	25 × 4.2
41032	32 × 5.4
41040	40 × 6.7
41050	50 × 8.3
41063	63 × 10.5

Fittings and Tools

Couping

Art-No.	Diameter	Art-No.	Diameter
20020	20	20063	63
20025	25	20075	75
20032	32	20090	90
20040	40	20110	110
20050	50	20160	160

90° Elbow

Art-No.	Diameter	Art-No.	Diameter
21020	20	21063	63
21025	25	21075	75
21032	32	21090	90
21040	40	21110	110
21050	50	21160	160

45° Elbow

Art-No.	Diameter	Art-No.	Diameter
22020	20	22063	63
22025	25	22075	75
22032	32	22090	90
22040	40	22110	110
22050	50	22160	160

Tee

Art-No.	Diameter	Art-No.	Diameter
23020	20	23063	63
23025	25	23075	75
23032	32	23090	90
23040	40	23110	110
23050	50	23160	160

Cap

Art-No.	Diameter	Art-No.	Diameter
24020	20	24063	63
24025	25	24075	75
24032	32	24090	90
24040	40	24110	110
24050	50	24160	160

Cross

Art-No.	Diameter	Art-No.	Diameter
25020	20	25032	32
25025	25		

Flange core

Art-No.	Diameter	Art-No.	Diameter
26032	32	26090	90
26040	40	26110	110
26050	50	26160	160

Flange

Art-No.	Diameter	Art-No.	Diameter
27032	32	27090	90
27040	40	27110	110
27050	50	27160	160

Plastic Union

Art-No.	Diameter	Art-No.	Diameter
28020	20	28032	32
28025	25		

Over Bridge Bow(C)

Art-No.	Diameter	Art-No.	Diameter
29020(C)	20	29032(B)	32
29025(C)	25		

Over Bridge Bow

Art-No.	Diameter	Art-No.	Diameter
29020	20	29032	32
29025	25		

Long Plug

Art-No.	Diameter	Art-No.	Diameter
30020B	20	30025B	25
	25		

Weld in Saddle

Art-No.	Diameter	Art-No.	Diameter
55020	50/20	56332	63/32
55025	50/25	57520	75/20
55032	50/32	57525	75/25
56320	63/20	57532	75/32

POLYGON PIPE

Fittings and Tools

Pipe Plug

Art-No.	Diameter	Art-No.	Diameter
30020	20	30025	25

Reducing

Art-No.	Diameter	Art-No.	Diameter
32520	25/20	37532	75/32
33220	32/20	37540	75/40
33225	32/25	37550	75/50
34020	40/20	37563	75/63
34025	40/25	39040	90/40
34032	40/32	39050	90/50
35020	50/20	39063	90/63
35025	50/25	39075	90/75
35032	50/32	31150	110/50
35040	50/40	31163	110/63
36320	63/20	31175	110/75
36325	63/25	31190	110/90
36332	63/32	31611	160/110
36340	63/40		
36350	63/50		

Reducing Tee

Art-No.	Diameter	Art-No.	Diameter
62520	25/20	67532	75/32
63220	32/20	67540	75/40
63225	32/25	67550	75/50
64020	40/20	67563	75/63
64025	40/25	69040	90/40
64032	40/32	69050	90/50
65020	50/20	69063	90/63
65025	50/25	69075	90/75
65032	50/32	61150	110/50
65040	50/40	61163	110/63
66320	63/20	61175	110/75
66325	63/25	61190	110/90
66332	63/32	61611	160/110
66340	63/40		
66350	63/50		

Reducing 90° Elbow

Art-No.	Diameter	Art-No.	Diameter
42520	25/20	43225	32/25
43220	32/20		

C-Type Clip

Art-No.	Diameter
90020-C	20
90025-C	25
90032-C	32

D-Type Clip

Art-No.	Diameter	Art-No.	Diameter
90020-D	20	90025-D	32
90032-D	25	90040-D	40

Pipe Clip (short)

Art-No.	Diameter	Art-No.	Diameter
90020 - S	20		
90025 - S	25		
90032 - S	32		

Pipe Clip (high)

Art-No.	Diameter
90020-H	20
90025-H	25
90032-H	32

Plastic Pipe clamp

Art-No.	Diameter	Art-No.	Diameter
90040	40	90090	90
90050	50	90110	110
90063	63	Seal nail	M8
90075	75	Seal nail	M10

Metal Pipe Clamp

Art-No.	Diameter	Art-No.	Diameter
91020	20	91063	63
91025	25	91075	75
91032	32	91090	90
91040	40	91110	110
91050	50		

Fittings and Tools

Water Meter Connecting Union

Art-No.	Diameter	Art-No.	Diameter
792012A	20×1/2"F		
792512A	25×1/2"F		

Water Meter Connecting Elbow

Art-No.	Diameter	Art-No.	Diameter
792012B	20×1/2"F		
792512B	25×1/2"F		

Male Threaded Coupling

Art-No.	Diameter	Art-No.	Diameter
712012	20×1/2"M	714014	40×11/4"M
712034	20×3/4"M	715012	50×11/2"M
712512	25×1/2"M	716320	63×2"M
712534	25×3/4"M		
713234	32×3/4"M		
713210	32×1"M		

Male Threaded Union

Art-No.	Diameter	Art-No.	Diameter
772012	20×1/2"M	774014	40×11/4"M
772534	25×3/4"M	775012	50×11/2"M
773210	32×1"M	776320	63×2"M

Male Threaded Tee

Art-No.	Diameter	Art-No.	Diameter
762012	20×1/2"M	763234	32×3/4"M
762512	25×1/2"M	763210	32×1"M
762534	25×3/4"M		

Male Thread Elbow

Art-No.	Diameter	Art-No.	Diameter
732012	20x1/2"M	733212	32x1/2"M
732034	20x3/4"M	733234	32x3/4"M
732512	25x1/2"M	733210	32x1"M
732534	25x3/4"M		

Double Union Ball Cock

Art-No.	Diameter	Art-No.	Diameter
82020	20/20	82040	40/40
82025	25/25	82050	50/50
82032	32/32	82063	63/63

Elbow With Disk

Art-No.	Diameter	Art-No.	Diameter
742012	20×1/2"F		
742512	25×1/2"F		

Female Threaded Coupling

Art-No.	Diameter	Art-No.	Diameter
702012	20×1/2"F	704014	40×11/4"F
702034	20×3/4"F	705012	50×11/2"F
702512	25×1/2"F	706320	63×2"F
702534	25×3/4"F		
703234	32×3/4"F		
703210	32×1"F		

Female Threaded Union

Art-No.	Diameter	Art-No.	Diameter
782012	20×1/2"F	784014	40×1-1/4"F
782534	25×3/4"F	785012	50×1-1/2"F
783210	32×1"F	786320	63×2"F

Female Threaded Tee

Art-No.	Diameter	Art-No.	Diameter
752012	20×1/2"F	753212	32×1/2"F
752512	25×1/2"F	753234	32×3/4"F
752534	25×3/4"F	753210	32×1"F

Female Threaded Elbow

Art-No.	Diameter	Art-No.	Diameter
722012	20x1/2"F	723212	32x1/2"F
722034	20x3/4"F	723234	32x3/4"F
722512	25x1/2"F	723210	32x1"F
722534	25x3/4"F		

Single Union Ball Cock (Female)

Art-No.	Diameter	Art-No.	Diameter
832012	20×1/2"F		
832534	25×3/4"F		
833210	32×1"F		

POLYGON PIPE

Fittings and Tools

Single Union Ball Cock (Male)

Art-No.	Diameter	Art-No.	Diameter
842012	20×1/2"M	843210	32×1"M
842532	25×1/2"M		

Electric Welding Coupling

Art-No.	Diameter	Art-No.	Diameter
97020	20	97063	63
97025	25	97075	75
97032	32	97090	90
97040	40	97110	110
97050	50		

Cutter

Art-No.	Diameter
93040	20-40

Cutter

Art-No.	Diameter
93063	16-50
93025	50-125

Peeling Tool

Art-No.	Diameter
942025	20+25mm
943240	32+40mm
945063	50+63mm

Electric Peeling Machine

Art-No.	Diameter	Art-No.	Diameter
99020	20	99040	40
99025	25	99050	50
99032	32	99063	63

Welding machine

Art-No.	Diameter
98160	75-160

Hole Repair Bar

Art-No.	Diameter
96711	7-11mm

Stop Valve

Art-No.	Diameter	Art-No.	Diameter
80020A	20	80040A	40
80025A	25	80050A	50
80032A	32	80063A	63

Concealed Stop Valve

Art-No.	Diameter	Art-No.	Diameter
80020B	20	80032B	32
80025B	25		

Stop Valve

Art-No.	Diameter	Art-No.	Diameter
85020	20	85032	32
85025	25		

Stop Valve

Art-No.	Diameter	Art-No.	Diameter
85020B	20	85032B	32
85025B	25		

Welding Machine

Art-No.	Diameter
98032	20-32mm
98063	20-63mm
98110	75-110mm
98160	160mm

Welding Die

Art-No.	Diameter	Art-No.	Diameter
92020	20	92063	63
92025	25	92075	75
92032	32	92090	90
92040	40	92110	110
92050	50	92160	160

Hole Repair Die

Art-No	Diameter
95007	7mm
95011	11mm

New Fittings

Orthodrome Elbow

Art-No.	Diameter	Art-No.	Diameter
101020	20		
101025	25		

C-Type Clip (long)

Art-No.	Diameter	Art-No.	Diameter
90025-L	25		
90032-L	32		

Climb Coupling

Art-No.	Diameter	Art-No.	Diameter
102020	20		
102025	25		

Pipe Plug (with O ring)

Art-No.	Diameter	Art-No.	Diameter
30020a	20x1/2		

New Pipe Clamp

Art-No.	Diameter	Art-No.	Diameter
90020-N	20	90032-N	32
90025-N	25		

U-Type Clip (with nail)

Art-No.	Diameter	Art-No.	Diameter
90025-U	25		

Plastic PPR Manifold

Art-No.	Diameter	Art-No.	Diameter
1034025	40x25		

Plastic Joint for Manifold

Art-No.	Diameter	Art-No.	Diameter
1034025a	40x25		

Female Thread Manifold

Art-No.	Diameter	Art-No.	Diameter
1044012	40x1/2		

Female Joint for Manifold

Art-No.	Diameter	Art-No.	Diameter
1044012a	40x1/2		

Male Thread Manifold

Art-No.	Diameter	Art-No.	Diameter
1054012	40x1/2		

Male Joint for Manifold

Art-No.	Diameter	Art-No.	Diameter
1054012a	40x1/2		

POLYGON PIPE

New Fittings

Female thread elbow (long)

Art-No.	Diameter	Art-No.	Diameter
722012-L	20x1/2		
722512-L	25x1/2		

Double Female Tee with Tap Connector

Art-No.	Diameter	Art-No.	Diameter
1062012	20x1/2		
1062512	25x1/2		

Double Female Elbow with Tap Connector

Art-No.	Diameter	Art-No.	Diameter
7332012	20x1/2		
7332512	25x1/2		

Shower Fixer

Art-No.	Diameter	Art-No.	Diameter
1072012	20x1/2		

Water Heater Connecting Elbow (long)

Art-No.	Diameter	Art-No.	Diameter
792012-L	20		

PPR Welding Marker

Art-No.	Diameter	Art-No.	Diameter
916160	16-160		

Pipe Welding

1.Preparing the welding machine
Fit the welding machine with the dies of the diameters to be processed and connect the plug to the 220V power supply socket. Wait until the green light on the machine goes out, indicating that.the welding machine has reached the working temperature (260°C).
2.Cut the pipe at right angles to the pipe axis. Take care that the pipe axis is free from burrs or cutting chips and remove if necessary.
3.Mark the welding depth at the end of the pipe and fitting.
4.Push the end of the pipe, without turning, up to the marked welding depth into the welding tool. At same time push the fitting, without turning, right down to the welding tool. It is essential to observe the mentioned heating times (refer to the following table).
5.After the stipulated heating time quickly, remove pipe and fitting from the welding dies. Join them immediately, and without turning, until the marked welding depth is covered by the bead of PP-R from the fitting.
6.The joint elements have to be fixed during the specified assembly time. Use this time to correct the connection. The correction is only restricted to the alignment of pipe and fitting. Never turn the elements or align the connection after the processing time.
7.After the cooling period the welded joint is ready for use.

Table: processing time

Diameter D	Welding depth	Heating time	Welding time	Cooling time
mm	mm	Sec.	Sec.	min
20	14.0	5	4	2
25	15.0	7	4	2
32	16.5	8	6	4
40	18.0	12	6	4
50	20.0	18	6	4
63	24.0	24	8	6
75	26.0	30	8	8
90	29.0	40	8	8
110	32.5	50	10	8

N.B.: The heating time is calculated from the moment when the pipe and fitting make cntact on the dies.

POLYGON PIPE

Electric Welding

The electric coupling can be used for repairs or welds after installation of the pipes, using the electric welder.

Sequence of operations

1.Prepare the pipes to be welded so that they can cut perpendicular to their length, using the special pipe cutter.
2.Clean the joint area.
3.After marking the connection depth on the pipes, fit them into the coupling, ensuring that the ends of the pipes are close to each other as possible and properly aligned.
4.Prepare the welder, making sure that it is connected to a main power supply of 220V 50Hz, and that the power supply lead is completely extended.
5.Connect the wire terminals to the terminals on the coupling, ensuring that the weight of the wires does not rest on the joint.
6.Start welding, following the instructions on the welder.
7.Make sure that no stresses are applied to the pipes during welding and the subsequent cooling phase (at least 10 minutes).
8.Wait at least 1 hour before pressurizing the system.

Repair

If a hole is accidentally made in the pipe (with a drill bit, for example) and if the hole is in only one side of the pipe. It can be repaired using the hole repairer die, bearing in mind that the pipe size must be compatible with the die diameter.

1.Clean and dry the part to be repaired.
2.Fit the male part of the hole repair die into the hole; It must metal the surface to be welded. The die has a metal bush which can be adjusted be the operator to suit the pipe thickness, to ensure that the die cannot be inserted too far and melt the other side of the pipe. To make this adjustment. Undo the screw whicΔfixes the bush and then move it along the die.
3.At the same time as the male part of the die melts the area around the hole, the female part melts the repair bar.
4.Once the heating time has passed (5 sec.) the repair bar must be inserted in the hole. When this operation is complete, wait for everything t o cool and then cut off the excess part of the repair bar.

If the diameter of the hole to be repaired is greater than that of the die, or both sides of theare punctured,the piece of pipe must be cut out and the repair made using normal pipe fittings, or more easily using the electric couplings.

Fastening Technique

Pipe clamps for Polygon® pipes have to correspond to the external diameter of the plastic pipe Furthermore it is important, that the fastening material does not damage the surface of the pipe mechanically.

The ideal fastening material Polygon® pipes are rubber lined pipe clamps. The rubber compound is specially made for applications with plastic pipes.The selection of the fastening material and its application has to be determined as a

-fixed point or

-sliding point.

Fixed Points

sured and installed in a way, that the forces of expansion of Polygon® pipes as well as probable additional loads are absorbed.

On using threaded rods or threaded screws the drop from the ceiling should be as short as possible. Rocker supports should not be used as fixed points.

It is always possible to install vertical distributions rigidly. Risers do not require expansion loops, provided that fixed points are located immediately before or after a branch.

To compensate the forces arising from the linear expansion of the pipe there must be sufficient and stable and stable clamps and mountings.

Polygon® pipe clamps meet all mentioned requirements and when considering the following installation instructions are perfect for fixed point installations.

This special type of rubber lined pipe clamps ensures that no mechanical damage of the pipe surface can occur.

Sliding Points

Sliding clamps have to allow axial movements of the pipe without damage.

On locating a sliding clamp it has to be observed that movements of the pipelines are not hindered by fittings or armatures installed next to them.

The special characteristics of Polygon®pipe clamps makes them the most suited for noise insulation and, when installed in accordance with the below instructions , they are perfect for sliding point installations.

Installation Advice

Polygon® pipe clamps are perfectly suifed for fixed point and sliding point installations. The application of distance rings depends on the type of pipe.

Fastening	Polygon® pipe
Sliding point	1 distance ring
Fixed point	no distance ring

POLYGON PIPE

Linear Expansion

The linear expansion of the pipes depends on the heat subjected to the pipe material.

Therefore cold water pipes have no practically no linear expansion and consequently expansion need not be considered.

Because of the heat dependent expansion of the material, the linear expansion must be specially considered in case of warm wag installations. This requires a distinction of the types of installation. i.e

-concealed installation

-installation in duct

-open installation.

Concealed Installation

Concealed installations generally do not require a consideration of the expansion of Polygon® pipes.

The insulation acc.to DIN1998 or the Decree for the Installation or Heating Systems gives enough expansion space for the pipe. In case that the expansion is greater than the room to move in the insulation, the material absorbs every stress arising from a residuaexpansion.

The same applies to pipes, which do not have to be insulated acc.to current regulations. A temperature dependent linear expansion is prevented through the embedding in the floor, concrete or plaster. The compressive strain and tensile stress arising form this are not critical as they are absorbed through the material.

Installation in Duct

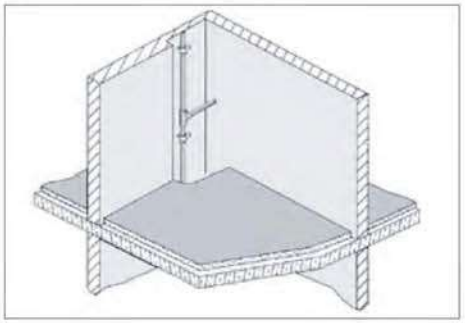
The installation of the risers of Polygon® pipes requires a branch pipe, which is elastic enough to take the linear expansion of the riser.

-This can be ensured by a favourable fixing of the riser in the duct.

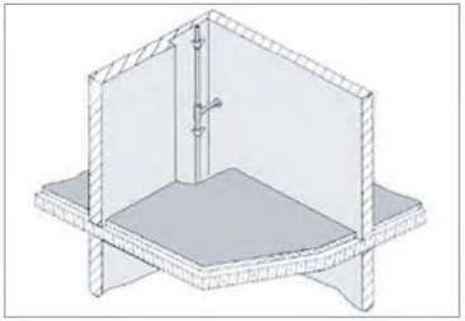
-An adequate pipe liner also gives sufficient elasticity to the branch-off pipe.

-Furthermore the installation of a spring leg gives the appropriate elasticity.

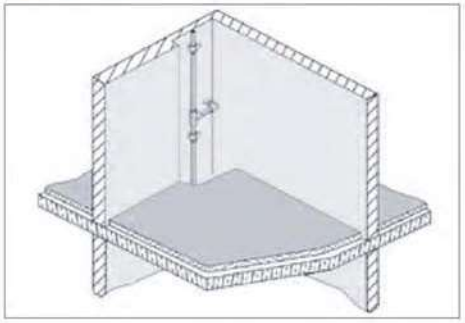
Favourable Fixing



Large Diameter Pipe Line



Installation of a Spring Leg



POLYGON PIPE

Open Installation

In case of open installed pipes (i.e. the cellar), its presentation is important and there is no deformation. Polygon® pipes make this possible.

The coefficient of linear expansion of Polygon® pipes is a=15.00×10¯5(k¯1). Therefore if is recommended to plan and insall visible Polygon® pipes, where linear expansion has to be considered.

The following calculation examples and diagrams are of help for the practical determination of linear expansion. Essential for the calculation of linear expansion is the difference between working temperature and maximum or minimum installation temperature.

Calculation Example: Linear Expansion

Calculation of the Linear Expansion

Given and required values.

Designation	Meaning	Value	Measuring unit
ΔI	Linear expansion	?	mm
a	Coefficient of linear expansion	0.15	mm/kg
L	Pipe length	25.0	m
t_w	Working temperature	60	°C
t_m	Installation temperature	20	°C
Δ t	Temperature difference between working and installation temperature (Δ I= tw-tm)	40	k

The linear expansion Δ I is calculated according to the following formula:

$$\Delta I = a \times L \times \Delta t$$

$$\Delta I = 0.15 mm/mk \times 4.0 m \times 40 k$$

$$\Delta I = 24.0 mm$$

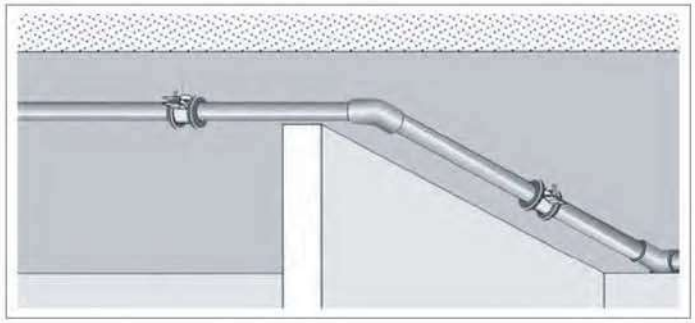
◎Expansion Bellows

Like metal pipes, Polygon® pipes have to be installed in suitable pipe clamps.

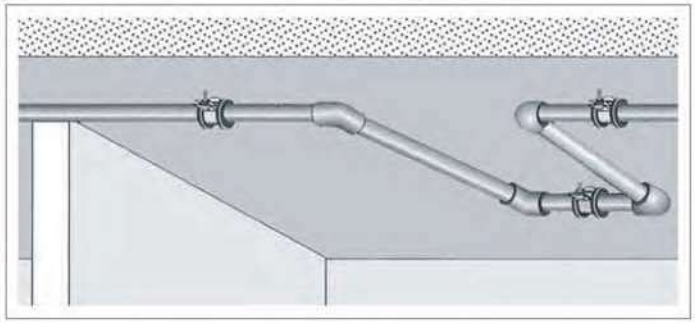
In case of open installed Polygon® pipes the linear expansion Δl has to be taken into consideration on planning. The pipe route has to be planned and installed in a way that the pipe is free moving within the determined expansion.

The following possibilities are considered to compensate the linear expansion:

-Bending loop



-Expansion loop



◎Bellow Expansion Coupling and Support Shell

All bellow expansion couplings for corrugated pipes for metal materials are unsuitable for Polygon® pipes. When using toggle lever-bellow expansion coupling to control pipe expansion observe the manufacturers instructions.

Of course, the support shell can be used to reduce pipe expansion, too.

◎Bending Side

In most cases,direction changes can be used to compensate linear expansion in pipes. The length of bending side has to be calculated according.to the following example.

Calculation example: Length of the bending side
Given and required values

Designation	Meaning	Value	Measuring unit
Ls	Length of the bending side	?	mm
k	Material specific constant	15	-
d	Outside diameter	40.0	mm
Δl	Linear expansion	24.0	mm

The bending side length is calculated according to the following formula:

$$Ls = K \times (d \times \Delta l)^{\cdot 2}$$

$$Ls = 15 \times (40.0mm \times 24.0mm)^{\cdot 2}$$

$$Ls = 465.0mm$$

Considering the values given above, the calculated bending side Ls comes up to 465mm

SP = Sliding point
FP = Fixed point

◎Expansion loop

If the linear expansion can not be compensated through change in direction, it becomes necessary to install an expansion loop. Its construction requires the necessary length of pipes and four further angles 90° .

Consider the length of the bending side Ls as well as the breadth of the pipe bend Amin on constructing an expansion loop.

Calculation example: Breadth of the expansion loop.
Given and required values

Designation	Meaning	Value	Measuring unit
Amin	Breadth of the expansion loop	?	mm
DI	Linear expansion	24.0	mm
POLYGON	Safe distance	150.0	mm

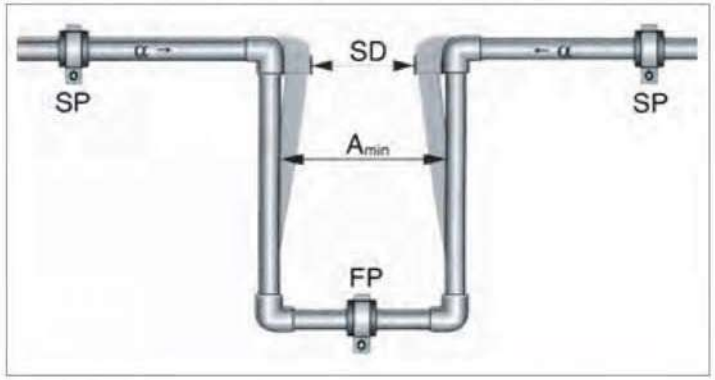
The pipe Amin is calculated acc.to to the following formula:

$$Amin = 2 \times \Delta I + POLYGON$$

$$Amin = 2 \times 24.0mm + 50.0mm$$

$$Amin = 198.0mm$$

The breadth of the expansion loop Amin should be at least 198 mm.



SP=Sliding point
FP=Fixed point

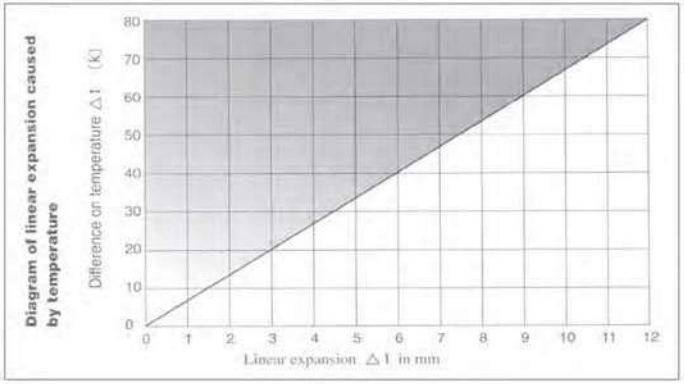
POLYGON PIPE

◎Linear Expansion Chart

The linear expansion, fully described on the last pages, can be taken from the following tables. This facilitates a simple and quick reference of linear expansion and the expansion bellow.

Linear expansion: Polygon® pipe								
Pipe-length in meter l (m)	Difference in temperature Δt [k]							
	10	20	30	40	50	60	70	80
0.1	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20
0.2	0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40
0.3	0.45	0.90	1.35	1.80	2.25	2.70	3.15	3.60
0.4	0.60	1.20	1.80	2.40	3.00	3.60	4.20	4.80
0.5	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00
0.6	0.90	1.80	2.70	3.60	4.50	5.40	6.30	7.20
0.7	1.05	2.10	3.15	4.20	5.25	6.30	7.35	8.40
0.8	1.20	2.40	3.60	4.80	6.00	7.20	8.40	9.60
0.9	1.35	2.70	4.05	5.40	6.75	8.10	9.45	10.80
1.0	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00
2.0	3.00	6.00	9.00	12.00	15.00	18.00	21.00	24.00
3.0	4.50	9.00	13.50	18.00	22.50	27.00	31.50	36.00
4.0	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00
5.0	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00
6.0	9.00	18.00	27.00	36.00	45.00	54.00	63.00	72.00
7.0	10.50	21.00	31.50	42.00	52.50	63.00	73.50	84.00
8.0	12.00	24.00	36.00	48.00	60.00	72.00	84.00	96.00
9.0	13.50	27.00	40.50	54.00	67.50	81.00	94.50	108.00
10.0	15.00	30.00	45.00	60.00	75.00	90.00	105.00	120.00

Linear expansion ΔI in mm



Support Intervals

Table to determine support intervals for Polygon® pipe in conjunction with temperature and outside diameter.

Difference in temperature Δt [K]	Pipe diameter d (mm)								
	20	25	32	40	50	63	75	90	110
	Support intervals in cm								
0	85	105	125	140	165	190	205	220	250
20	60	75	90	100	120	140	150	160	180
30	60	75	90	100	120	140	150	160	180
40	60	70	80	90	110	130	140	150	170
50	60	70	80	90	110	130	140	150	170
60	55	65	75	85	100	115	125	140	160
70	50	60	70	80	95	105	115	125	140

Apply the support intervals of the blue-marked column to Polygon® pipe PN10.

Thermal Insulation Warm Water Pipes

The Decree for Energy Saving Requirements for Heating Installations and Industrial Water Plants regulates the thermal insulation of pipe and fittings.

Acc.to this decree Polygon® pipes and fittings have to be insulated against loss of heat. The insulation thickness depends on the respective installation.

The heat conductivity figure of pipes made from PP-R is 0.15W/mk.This means that in terms of heat transfer Polygon® pipes and fittings offer a significantly higher degrees of self-insnlation compared to metal pipes.

For the purposes of calculating insulating material thickness for pipes, which nominal width is not stipulated by standards, the external diameter must be taken as the criteria for determin ing the level of insulation thickness(Decree for the Installation of Heating Systems). Due to the high proper insulation values of the Polygon® pipe system, the level of insulation thickness-compared to metallic pipe systems-can be reduced acc.to the following minimum insulation thickness.

POLYGON PIPE

Thermal Insulation Warm Water Pipes

Insulation thickness calculated on a basis of the Decree for the Installation of Heating Systems.

Thermal conductivity	0.030 w/mk		0.035 w/mk		0.040 w/mk	
Dimension	Mimimum Insulation Thickness in mm					
	50%	100%	50%	100%	50%	100%
20mm	6.1	12.9	7.8	18.8	9.7	21.6
25mm	6.0	13.0	7.6	18.7	9.3	21.0
32mm	9.4	19.9	11.8	25.5	14.4	32.2
40mm	9.3	19.8	11.5	25.1	13.9	31.2
50mm	9.0	19.7	11.0	24.7	13.2	30.2
63mm	13.1	27.9	15.9	35.0	19.0	42.9
75mm	15.6	33.4	19.0	41.7	22.6	51.1
90mm	18.8	40.2	22.8	50.1	27.1	61.3
110mm	23.1	49.1	27.9	61.1	33.1	74.7

Thermal Insulation Cold Water Pipes

As stipulated in

*DIN 1988, Part 2

Potable water plants have to be protected against heat gain and the formation of condens ation. Standard values for the minimum insulation thicknesses have to be taken from the follo wing table.The given insulation thicknesses are applicable to all pipe materials and also to Polygon® pipes.

Standard values for the minimum insulation thicknesses for theinsulation of potable water plants (cold)	
Tyle of the installation	Insulation thickness at λ=0.040w/
Open installed pipe, In a not heated room (i.e.celler)	4mm
Open installed pipe,In a heated room	9mm
Open in a duct, In a heated room	4mm
Pipe in a duct, Without warm water pipes	13mm
Pipe in a pipe chase riser	4mm
Pipe in a pipe chase, Beside warm water pipes	13mm
Pipe on a concrete floor	4mm
dingly.	

The above values are corresponding to the German Industry Standard (DIN) and have to be adapted to the respective national regulations.

Pressure Test/Test Control

Acc.to the
Technical Rules for Potable Water Installation DIN 1988 all pipelines have to be (while still visible) hydraulically pressure tested. The test pressure has to be 1.5 time of the operating pressure.

When carrying out the pressure test the material properties of Polygon® pipe lead to an ex pansion of the pipe. This influences the test result. A further influence of the test result can be caused by the coefficient of thermal expansion of Polygon® pipes. Different temperatures of pipe and test medium lead to alterations of pressure. A temperature change of 10 K corresp-onds to a pressure difference of 0.5 to 1.bar. Therefore the highest possible constant temper-ature of the test medium has to be assertained at the hydraulic pressure test of installation with Polygon® pipes.

The hydraulic pressure test requires a preliminary, principal and final test.

For the preliminary test a test pressure of 1.5 times of the highest possible operating pres-sure has to be produced. This test pressure has to be re-established twice within 30 minutes within an interval of 10 minutes. After a test time of a further 30 minutes the test pressure mu-st not drop more than 0.6 bar and no leakage should have appeared.

The preliminary test is to be followed directly by the principal test. Test time is 2 hours. On doing so the test pressure taken from the preliminary test may not fall more than 0.2 bar.

After completion of the preliminary and principal tests the final test must be conducted, w-hich has to be effected with a test pressure of alternate 10 and 1 bar in a rhythm of at least 5 minutes. Between each test course course the pressure has to be removed.

No leakage must appear at any point of the tested installation.

Measuring of the Test Pressure

Measuring has to be done with a manometer allowing a perfect reading of a pressure cha-nge of 0.1 bar. The manometer has to be placed at the deepest point of the installation.

Test Record

A record of the hydraulic pressure teat has to be prepared and signed by the client and c-ontractor stating place and date.

POLYGON PIPE

Test Record Polygon® pipe installation

Description of the installation

Place: _____

Object: _____

_____

_____

Pipe-lengths:

Φ 20mm _____ m
Φ 25mm _____ m
Φ 32mm _____ m
Φ 40mm _____ m
Φ 50mm _____ m
Φ 63mm _____ m
Φ 75mm _____ m
Φ 90mm _____ m
Φ110mm _____ m
Highest point: _____ m
(over manometer)

Start of the test: _____

End of the test: _____

Test periond: _____

Client: _____

_____

_____

Contractor: _____

Place: _____

Date: _____

_____

Stamp/signature

Preliminary test

Test pressure: _____ 15bar

Pressure after 1.re-establishment: ___ bar
(start of the test)

Pressure after 2.re-establishment: ___ bar

Pressure drop after 30 minutes: _____ bar
(max.0.6 bar)

Result preliminary test: _____

Principal test

Principal test

Working pressure: _____ bar
(Result preliminary test)

Pressure after 1 hour: _____ bar
(start of the test)

Pressure after 2 hour: _____ bar

Pressure drop: _____ bar
(max.0.2 bar)

Result principal test: _____

Final test *

1. Working pressure 10 bar: _____ bar
at least 5 minutes, then
Working pressure 1 bar: _____ bar
at least 5 minutes
2. Working pressure 10 bar: _____ bar
at least 5 minutes, then
Working pressure 1 bar: _____ bar
at least 5 minutes
3. Working pressure 10 bar: _____ bar
at least 5 minutes
Working pressure 1 bar: _____ bar
at least 5 minutes
4. Working pressure 10 bar: _____ bar
at least 5 minutes, then
Working pressure 1 bar: _____ bar
at least 5 minutes

*Unpressurize the pipe between each cycle.

Flushing of pipes

The techincal rule for potable water installations (TRWI).
*** DIN 1998, Part 2**

Includes a paragraph about the flushing of pipes, which has to be carried aut with an air-water-mixture under pressure.

Basically all potable water plants, independent of their material, have to be flushed thoroughly after their installation. The following requirements has to be coplied with before the insta-`llation can be put into service:

- protection of the potable water quality
- avoidance of corrosion damage
- avoidance of malfunctions of armatures and apparatus
- cleanliness of the inner surface of the pipe.

These requirements are met by:

1.flushing with water
2.flushing with air-water-mixture

On choosing the type of fushing required, the experiences of the installer, the requirements of the client and the instructions of the system manufacturer have to be observed.

For potable water installations acc.to DIN1998, which the Polygon® pipe system complies with,"1-flsuhing with water " is sufficient.

The installation of the Polygon® pipe system requires no additives i.e. glu, solvent mixtures, etc.; the joining method is welding. This system is pure material and remained even after welding.

For this reason it is sufficient to flush the installation with water acc.to procedure.

Transport and Storage

Polygon® pipes can be stored outside at any temperature. A solid base for the pipe is very important, to avoid a deformation of the pipe while in transport and storage.

At temperature below 0ºC it is possible to damage the pipe though hard blows.The pipe has to be treated with caution at low temperatures.

Although Polygon® pipes are extremely robust,it is recommended to treat the pipe with care.

UV-radiation has effects on all high polymer plastics. Do not store in the open air for long periods.

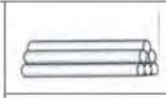
POLYGON PIPE

Commandments for Handing

You must not.....

				
	subject the pipe ends to shock or impact	use pipes that are damaged or cracked at the interfaces	twist pipe or mouldings after joining	expose pipe to uv radiation for a long period
				
use metal plugs as connect	subject pipe to heavy shocks or falling stones	use excessive amounts of hemp when sealing in fittings	heat with a naked flame	bind up ontaminated pipes or fittings

You must.....

				
	handle pipe withcare	only use sharp tools to cut the pipe	not correct by more than 5 after joining	store pipe sheltered from sun and rain
				
use plastic plugs	protect exposedpipes from damage	only heat with hot air for bending, max.bending temperature140	use sealing tape or sealing compound; apply hemp moderately	only install clean pipes and fittings

◎Principles of calculation

To determine the pipe diameter in potable water network of buildings numerous principles of calculation are necessary.

The revised version of DIN 1988 provides a simplified and differentiated method of calculation.

The simplified method is suitable for clear arranged pipes i.e. in residential buildings.

The differentiated method includes all pipes and local resistances and offers the highest a ccuracy as well as the most accurate approximation of real operating condition.

The determining of the pipe diameter requires the following data:

-minimum gauge pressure of supply or pressure in flow direction behind pressure reducing or boosting valve

-head variations

-loss of pressure due to apparatus i.e. water meter, filter,softening installations.etc.

-minimum pressure of loss fittings and pipe connections

-coefficients of loss fittings and pipe connections.

◎DIN 1988 T3

Part 3 of the DIN 1988 (Technical Rules for Potable Water Installations) stipulates the calc ulation principles for the determining the pipe diameter.

The determining of the pipe diameter is based on the calculation of the loss of the loss of pressure in pipes.

Beside the diameter, the loss of pressure depends on the length of the pipe and the pipe material and on the flow rate,that means on quantity and size of the water points to which the pipe is connected .the basis for determining the maximum flow rate should be calculated on the desired flow rate of each water point .the simultaneous use resp. the peak pressure of flow of an installation part resulting from it has to be determined by taking the calculation val- ues from DIN 1988 T3 as a basis.

◎Maximum Flow Rate

A further criterion for the selection of the pipe diameter is the maximum permissible flow rate.

Because of sonic reasons and for limitation of water hammer, the calculated flow rate man not exceed the values of the table below.

Part of the installation	Max. calculated Flow Rate at Run	
	≤15 min.m/s	≥15 min.m/s
Connecting pipes	2	2
Service pipes :parts with Poor drag reducing Passage armature (<2.5)*)	5	2
Parts with Passage armature with Ahigher correction value of loss**)	2.5	2
*) i.e. ball cocks acc.to DIN 3502 **) i.e. stop valves acc.to DIN 3512		

◎Minimum Flow Pressure/Calculated Flows

Calculated flows of common water points

Minimum flow pressure P_{min} Fl	Type of water point		Calculated Flow on Taking:		
			mixed water [1]		only cold or heated potable water
			V_R cold	V_R warm	V_R
bar	Designation		l/s	l/s	l/s
	Taps:				
0.5	without air inlet(perlator)[2]	DN15	-	-	0.30
0.5	without air inlet(perlator)[2]	DN20	-	-	0.50
0.5	without air inlet(perlator)[2]	DN25	-	-	1.00
1.0	with air inlet(perlator)	DN10	-	-	0.15
1.0	with air inlet(perlator)	DN15	-	-	0.15
1.0	Shower heads for purification showers	DN15	0.10	0.10	0.20
1.2	Flush valves	DN15	-	-	0.70
1.2	acc. to DIN 3265 Part,1	DN20	-	-	1.00
0.4		DN25	-	-	1.00
1.0	Flush valves urindls	DN15	-	-	0.30
1.0	Domestic dish washers	DN15	-	-	0.15
1.0	Domestic washing machine	DN15	-	-	0.25
	Mixing battery for:				
1.0	Shower-bathes	DN15	0.15	0.15	-
1.0	Bath-tubs	DN15	0.15	0.15	-
1.0	Kitchen sinks	DN15	0.07	0.07	-
1.0	Washstands	DN15	0.07	0.07	-
1.0	Bidets	DN15	0.07	0.07	-
1.0	Mixing battery	DN20	0.30	0.30	-
0.5	Flushing-box(DIN 19542)	DN15	-	-	0.13
1.0	Electro boiler	DN15	-	-	0.10[3]

Comment: All other water points and apparatus of the above type with larger armature passages or minimum pressures of flow have to be considered on determining the pipe diameter acc. to the manufatuerers instructions.

1) The calculated fo mixed water points are based on 15°C for cold potable water and 60°C for warm potable water.

2) In case of taps without air inlet (perlator) and with hose screw, the loss of pressure in the hose pipe (up to 10 m length) and in the connected apparatus(i.e.lawn sprinkler) is considered over the minimum pressure of flow. The minimum pressure of flow is increased by 1.0 bar to 1.5 bar.

3) In case of fully opened flow control valve.

◎Maximum Flow Rate

Determination of the maximum flow rate Vs acc.to DIN 1988 Part 3

from the total flow ΣV_R of building $Vs=0.682\cdot(\Sigma V_R)^{0.45}-0.14(l/s)$

This table is valid, if the calculated flow V_R of the respective water points is less 0.5l/s.

ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs
0.03	0.00	1.02	0.55	2.02	0.80	3.02	0.98	4.02	1.14	5.10	1.28	10.10	1.79	15.10	2.17
0.04	0.02	1.04	0.55	2.04	0.80	3.04	0.98	4.04	1.14	5.20	1.29	10.20	1.80	15.20	2.18
0.06	0.05	1.06	0.56	2.06	0.80	3.06	0.99	4.06	1.14	5.30	1.30	10.30	1.81	15.30	2.19
0.07	0.07	1.08	0.57	2.08	0.81	3.08	0.99	4.08	1.14	5.40	1.32	10.40	1.82	15.40	2.19
0.08	0.08	1.10	0.57	2.10	0.81	3.10	0.99	4.10	1.15	5.50	1.33	10.50	1.82	15.50	2.20
0.09	0.09	1.12	0.58	2.12	0.82	3.12	1.00	4.12	1.15	5.60	1.34	10.60	1.83	15.60	2.21
0.10	0.10	1.14	0.58	2.14	0.82	3.14	1.00	4.14	1.15	5.70	1.35	10.70	1.84	15.70	2.21
0.13	0.13	1.16	0.59	2.16	0.82	3.16	1.00	4.16	1.16	5.80	1.36	10.80	1.85	15.80	2.22
0.15	0.15	1.18	0.59	2.18	0.83	3.18	1.01	4.18	1.16	5.90	1.38	10.90	1.86	15.90	2.23
0.20	0.19	1.20	0.60	2.20	0.83	3.20	1.01	4.20	1.16	6.00	1.39	11.00	1.87	16.00	2.23
0.22	0.21	1.22	0.61	2.22	0.84	3.22	1.01	4.22	1.16	6.10	1.40	11.10	1.87	16.10	2.24
0.24	0.22	1.24	0.61	2.24	0.84	3.24	1.02	4.24	1.17	6.20	1.41	11.20	1.88	16.20	2.25
0.26	0.23	1.26	0.62	2.26	0.84	3.26	1.02	4.26	1.17	6.30	1.42	11.30	1.89	16.30	2.25
0.28	0.24	1.28	0.62	2.28	0.85	3.28	1.02	4.28	1.17	6.40	1.43	11.40	1.90	16.40	2.26
0.30	0.26	1.30	0.63	2.30	0.85	3.30	1.03	4.30	1.17	6.50	1.44	11.50	1.91	16.50	2.27
0.32	0.27	1.32	0.63	2.32	0.86	3.32	1.03	4.32	1.18	6.60	1.45	11.60	1.91	16.60	2.27
0.34	0.28	1.34	0.64	2.34	0.86	3.34	1.03	4.34	1.18	6.70	1.47	11.70	1.92	16.70	2.28
0.36	0.29	1.36	0.64	2.36	0.86	3.36	1.04	4.36	1.18	6.80	1.48	11.80	1.93	16.80	2.29
0.38	0.30	1.38	0.65	2.38	0.87	3.38	1.04	4.38	1.19	6.90	1.49	11.90	1.94	16.90	2.29
0.40	0.31	1.40	0.65	2.40	0.87	3.40	1.04	4.40	1.19	7.00	1.50	12.00	1.95	17.00	2.30
0.42	0.32	1.42	0.66	2.42	0.88	3.42	1.05	4.42	1.19	7.10	1.51	12.10	1.95	17.10	2.31
0.44	0.33	1.44	0.66	2.44	0.88	3.44	1.05	4.44	1.19	7.20	1.52	12.20	1.96	17.20	2.31
0.46	0.34	1.46	0.67	2.46	0.88	3.46	1.05	4.46	1.20	7.30	1.53	12.30	1.97	17.30	2.32
0.48	0.35	1.48	0.67	2.48	0.89	3.48	1.06	4.48	1.20	7.40	1.54	12.40	1.98	17.40	2.33
0.50	0.36	1.50	0.68	2.50	0.89	3.50	1.06	4.50	1.20	7.50	1.55	12.50	1.99	17.50	2.33
0.52	0.37	1.52	0.68	2.52	0.89	3.52	1.06	4.52	1.20	7.60	1.56	12.60	1.99	17.60	2.34
0.54	0.38	1.54	0.69	2.54	0.90	3.54	1.06	4.54	1.21	7.70	1.57	12.70	2.00	17.70	2.35
0.56	0.39	1.56	0.69	2.56	0.90	3.56	1.07	4.56	1.21	7.80	1.58	12.80	2.01	17.80	2.35
0.58	0.39	1.58	0.70	2.58	0.90	3.58	1.07	4.58	1.21	7.90	1.59	12.90	2.02	17.90	2.36
0.60	0.40	1.60	0.70	2.60	0.91	3.60	1.07	4.60	1.22	8.00	1.60	13.00	2.02	18.00	2.36
0.62	0.41	1.62	0.71	2.62	0.91	3.62	1.08	4.62	1.22	8.10	1.61	13.10	2.03	18.10	2.37
0.64	0.42	1.64	0.71	2.64	0.92	3.64	1.08	4.64	1.22	8.20	1.62	13.20	2.04	18.20	2.38
0.66	0.43	1.66	0.72	2.66	0.92	3.66	1.08	4.66	1.22	8.30	1.63	13.30	2.05	18.30	2.38
0.68	0.43	1.68	0.72	2.68	0.92	3.68	1.09	4.68	1.23	8.40	1.64	13.40	2.05	18.40	2.39
0.70	0.44	1.70	0.73	2.70	0.93	3.70	1.09	4.70	1.23	8.50	1.65	13.50	2.06	18.50	2.40
0.72	0.45	1.72	0.73	2.72	0.93	3.72	1.09	4.72	1.23	8.60	1.66	13.60	2.07	18.60	2.40
0.74	0.46	1.74	0.74	2.74	0.93	3.74	1.09	4.74	1.23	8.70	1.67	13.70	2.07	18.70	2.41
0.76	0.46	1.76	0.74	2.76	0.94	3.76	1.10	4.76	1.24	8.80	1.67	13.80	2.08	18.80	2.41
0.78	0.47	1.78	0.74	2.78	0.94	3.78	1.10	4.78	1.24	8.90	1.68	13.90	2.09	18.90	2.42
0.80	0.48	1.80	0.75	2.80	0.94	3.80	1.10	4.80	1.24	9.00	1.69	14.00	2.10	19.00	2.43
0.82	0.48	1.82	0.75	2.82	0.95	3.82	1.11	4.82	1.24	9.10	1.70	14.10	2.10	19.10	2.43
0.84	0.49	1.84	0.76	2.84	0.95	3.84	1.11	4.84	1.25	9.20	1.71	14.20	2.11	19.20	2.44
0.86	0.50	1.86	0.76	2.86	0.95	3.86	1.11	4.86	1.25	9.30	1.72	14.30	2.12	19.30	2.44
0.88	0.50	1.88	0.77	2.88	0.96	3.88	1.12	4.88	1.25	9.40	1.73	14.40	2.12	19.40	2.45
0.90	0.51	1.90	0.77	2.90	0.96	3.90	1.12	4.90	1.25	9.50	1.74	14.50	2.13	19.50	2.46
0.92	0.52	1.92	0.77	2.92	0.96	3.92	1.12	4.92	1.26	9.60	1.75	14.60	2.14	19.60	2.46
0.94	0.52	1.94	0.78	2.94	0.97	3.94	1.12	4.94	1.26	9.70	1.76	14.70	2.15	19.70	2.47
0.96	0.53	1.96	0.78	2.96	0.97	3.96	1.13	4.96	1.26	9.80	1.76	14.80	2.15	19.80	2.47
0.98	0.54	1.98	0.79	2.98	0.97	3.98	1.13	4.98	1.26	9.90	1.77	14.90	2.16	19.90	2.48
1.00	0.54	2.00	0.79	3.00	0.98	4.00	1.13	5.00	1.27	10.00	1.78	15.00	2.17	20.00	2.49

POLYGON PIPE

◎Maximum Flow Rate

Determination of the maximum flow rate Vs acc.to DIN 1988 Part 3

from the total flow ΣV_R of buildigs $Vs=1.7\cdot(\Sigma V_R)^{0.21}-0.7(l/s)$

This table is valid, if the calculated flow V_R of the respective water points is less 0.5l/s.

ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs	ΣVR	Vs
1.00	1.00	5.10	1.69	10.10	2.06	15.10	2.31	22.40	2.57	142.40	4.12	262.40	4.78	382.40	5.23
1.05	1.02	5.20	1.70	10.20	2.07	15.20	2.31	24.80	2.64	144.80	4.13	264.80	4.79	384.80	5.23
1.10	1.03	5.30	1.71	10.30	2.07	15.30	2.31	27.20	2.70	147.20	4.15	267.20	4.80	387.20	5.24
1.15	1.05	5.40	1.72	10.40	2.08	15.40	2.32	29.60	2.76	149.60	4.17	269.60	4.81	389.60	5.25
1.20	1.07	5.50	1.73	10.50	2.09	15.50	2.32	32.00	2.82	152.00	4.18	272.00	4.82	392.00	5.26
1.25	1.08	5.60	1.74	10.60	2.09	15.60	2.33	34.40	2.87	154.40	4.20	274.40	4.83	394.40	5.26
1.30	1.10	5.70	1.75	10.70	2.10	15.70	2.33	36.80	2.92	156.80	4.21	276.80	4.84	396.80	5.27
1.35	1.11	5.80	1.76	10.80	2.10	15.80	2.34	39.20	2.97	159.20	4.23	279.20	4.85	399.20	5.28
1.40	1.12	5.90	1.77	10.90	2.11	15.90	2.34	41.60	3.02	161.60	4.25	281.60	4.86	401.60	5.29
1.45	1.14	6.00	1.78	11.00	2.11	16.00	2.34	44.00	3.06	164.00	4.26	284.00	4.87	404.00	5.29
1.50	1.15	6.10	1.79	11.10	2.12	16.10	2.35	46.40	3.11	166.40	4.28	286.40	4.88	406.40	5.30
1.55	1.16	6.20	1.79	11.20	2.12	16.20	2.35	48.80	3.15	168.80	4.29	288.80	4.89	408.80	5.31
1.60	1.18	6.30	1.80	11.30	2.13	16.30	2.35	51.20	3.19	171.20	4.31	291.20	4.90	411.20	5.32
1.65	1.19	6.40	1.81	11.40	2.13	16.40	2.36	53.60	3.22	173.60	4.32	293.60	4.91	413.60	5.32
1.70	1.20	6.50	1.82	11.50	2.14	16.50	2.36	56.00	3.26	176.00	4.34	296.00	4.92	416.00	5.33
1.75	1.21	6.60	1.83	11.60	2.14	16.60	2.37	58.40	3.29	178.40	4.35	298.40	4.93	418.40	5.34
1.80	1.22	6.70	1.83	11.70	2.15	16.70	2.37	60.80	3.33	180.80	4.36	300.80	4.93	420.80	5.35
1.85	1.23	6.80	1.84	11.80	2.15	16.80	2.37	63.20	3.36	183.20	4.38	303.20	4.94	423.20	5.35
1.90	1.25	6.90	1.85	11.90	2.16	16.90	2.38	65.60	3.39	185.60	4.39	305.60	4.95	425.60	5.36
2.00	1.27	7.00	1.86	12.00	2.16	17.00	2.38	68.00	3.42	188.00	4.41	308.00	4.96	428.00	5.37
2.10	1.29	7.10	1.87	12.10	2.17	17.10	2.39	70.40	3.45	190.40	4.42	310.40	4.97	430.40	5.38
2.20	1.31	7.20	1.87	12.20	2.17	17.20	2.39	72.80	3.48	192.80	4.43	312.80	4.98	432.80	5.38
2.30	1.32	7.30	1.88	12.30	2.18	17.30	2.39	75.20	3.51	195.20	4.45	315.20	4.99	435.20	5.39
2.40	1.34	7.40	1.89	12.40	2.18	17.40	2.40	77.60	3.54	197.60	4.46	317.60	5.00	437.60	5.40
2.50	1.36	7.50	1.90	12.50	2.19	17.50	2.40	80.00	3.57	200.00	4.47	320.00	5.01	440.00	5.40
2.60	1.38	7.60	1.90	12.60	2.19	17.60	2.40	82.40	3.59	202.40	4.49	322.40	5.02	442.40	5.41
2.70	1.39	7.70	1.91	12.70	2.20	17.70	2.41	84.80	3.62	204.80	4.50	324.80	5.03	444.80	5.42
2.80	1.41	7.80	1.92	12.80	2.20	17.80	2.41	87.20	3.64	207.20	4.51	327.20	5.04	447.20	5.42
2.90	1.43	7.90	1.92	12.90	2.21	17.90	2.42	89.60	3.67	209.60	4.52	329.60	5.04	452.00	5.43
3.00	1.44	8.00	1.93	13.00	2.21	18.00	2.42	92.00	3.69	212.00	4.54	332.00	5.05	454.40	5.44
3.10	1.46	8.10	1.94	13.10	2.22	18.10	2.42	94.40	3.72	214.40	4.55	334.40	5.06	456.80	5.44
3.20	1.47	8.20	1.94	13.20	2.22	18.20	2.43	96.80	3.74	216.80	4.56	336.80	5.07	459.20	5.45
3.30	1.48	8.30	1.95	13.30	2.23	18.30	2.43	99.20	3.76	219.20	4.57	339.20	5.08	461.60	5.46
3.40	1.50	8.40	1.96	13.40	2.23	18.40	2.43	101.60	3.79	221.60	4.58	341.60	5.09	464.00	5.47
3.50	1.51	8.50	1.96	13.50	2.24	18.50	2.44	104.00	3.81	224.00	4.60	344.00	5.10	466.40	5.47
3.60	1.52	8.60	1.97	13.60	2.24	18.60	2.44	106.40	3.83	226.40	4.61	346.40	5.10	468.80	5.48
3.70	1.54	8.70	1.98	13.70	2.25	18.70	2.44	108.80	3.85	228.80	4.62	348.80	5.11	471.20	5.49
3.80	1.55	8.80	1.98	13.80	2.25	18.80	2.45	111.20	3.87	231.20	4.63	351.20	5.12	473.60	5.49
3.90	1.56	8.90	1.99	13.90	2.25	18.90	2.45	113.60	3.89	233.60	4.64	353.60	5.13	476.00	5.50
4.00	1.57	9.00	2.00	14.00	2.26	19.00	2.45	116.00	3.91	236.00	4.66	356.00	5.14	478.40	5.51
4.10	1.59	9.10	2.00	14.10	2.26	19.10	2.46	118.40	3.93	238.40	4.67	358.40	5.15	480.80	5.51
4.20	1.60	9.20	2.01	14.20	2.27	19.20	2.46	120.80	3.95	240.80	4.68	360.80	5.15	483.20	5.52
4.30	1.61	9.30	2.02	14.30	2.27	19.30	2.47	123.20	3.97	243.20	4.69	363.20	5.16	485.60	5.52
4.40	1.62	9.40	2.02	14.40	2.28	19.40	2.47	125.60	3.99	245.60	4.70	365.00	5.17	488.00	5.53
4.50	1.63	9.50	2.03	14.50	2.28	19.50	2.47	128.00	4.01	248.00	4.71	368.00	5.18	490.40	5.54
4.60	1.64	9.60	2.03	14.60	2.29	19.60	2.48	130.40	4.03	250.40	4.72	370.40	5.19	492.40	5.54
4.70	1.65	9.70	2.04	14.70	2.29	19.70	2.48	132.80	4.05	252.80	4.73	372.80	5.19	492.80	5.55
4.80	1.66	9.80	2.05	14.80	2.29	19.80	2.48	135.20	4.06	255.20	4.74	375.20	5.20	495.20	5.56
4.90	1.67	9.90	2.05	14.90	2.30	19.90	2.49	137.60	4.08	257.60	4.75	377.60	5.21	497.60	5.56
5.00	1.68	10.00	2.06	15.00	2.30	20.00	2.49	140.00	4.10	260.00	4.77	380.00	5.22	500.00	5.57

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 5/SDR 11/PN 10

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : $1.02 \times 10^{-6} m^2/s$

$\dot{V}$=circulatory (l/s) R=pressure gradient (mbar/m) v=flow rate (m/s)

d x s ►		20x1.9	25x2.3	32x2.9	40x3.7	50x4.6	63x5.8	75x6.8	90x8.2	110x10.0
$\dot{V}$	d_i ►	16.2mm	20.4mm	26.0mm	32.6mm	40.8mm	51.4mm	61.2mm	73.6mm	90.0mm
0.01	R	0.06	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	V	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00
0.02	R	0.12	0.05	0.02	0.01	000	0.00	0.00	0.00	0.00
	V	0.10	0.06	0.04	0.02	0.02	0.01	0.01	0.00	0.00
0.03	R	0.18	0.07	0.03	0.01	0.00	0.00	0.00	0.00	0.00
	V	0.15	0.09	0.06	0.04	0.02	0.01	0.01	0.01	0.00
0.04	R	0.50	0.17	0.04	0.01	0.01	0.00	0.00	0.00	0.00
	V	0.19	0.12	0.08	0.05	0.03	0.02	0.01	0.01	0.00
0.05	R	0.74	0.25	0.08	0.02	0.01	0.00	0.00	0.00	0.00
	V	0.24	0.15	0.09	0.06	0.04	0.02	0.02	0.01	0.00
0.06	R	1.01	0.34	0.11	0.02	0.01	0.00	0.00	0.00	0.00
	V	0.29	0.18	0.11	0.07	0.05	0.03	0.02	0.01	0.00
0.07	R	1.32	0.44	0.14	0.05	0.01	0.00	0.00	0.00	0.00
	V	0.34	0.21	0.13	0.08	0.05	0.03	0.02	0.02	0.00
0.08	R	1.66	0.56	0.18	0.06	0.02	0.00	0.00	0.00	0.00
	V	0.39	0.24	0.15	0.10	0.06	0.04	0.03	0.02	0.00
0.09	R	2.03	0.68	0.22	0.07	0.03	0.01	0.00	0.00	0.00
	V	0.44	0.28	0.17	0.11	0.07	0.04	0.03	0.02	0.00
0.10	R	2.44	0.82	0.26	0.09	0.03	0.01	0.00	0.00	0.00
	V	0.49	0.31	0.19	0.12	0.08	0.05	0.03	0.02	0.00
0.12	R	3.35	1.12	0.35	0.12	0.04	0.01	0.01	0.00	0.00
	V	0.58	0.37	0.23	0.14	0.09	0.06	0.04	0.03	0.00
0.14	R	4.39	1.46	0.46	0.16	0.06	0.02	0.01	0.00	0.00
	V	0.68	0.43	0.26	0.17	0.11	0.07	0.05	0.03	0.00
0.16	R	5.55	1.85	0.58	0.20	0.07	0.02	0.01	0.00	0.00
	V	0.78	0.49	0.30	0.19	0.12	0.08	0.05	0.04	0.00
0.18	R	6.84	2.27	0.72	0.24	0.08	0.03	0.01	0.01	0.00
	V	0.87	0.55	0.34	0.22	0.14	0.09	0.06	0.04	0.00
0.20	R	8.23	2.73	0.86	0.29	0.10	0.03	0.01	0.01	0.00
	V	0.97	0.61	0.38	0.24	0.15	0.10	0.07	0.05	0.00
0.30	R	16.93	5.59	1.75	0.59	0.20	0.07	0.03	0.01	0.00
	V	1.46	0.92	0.57	0.36	0.23	0.14	0.10	0.07	0.00
0.40	R	28.37	9.32	2.91	0.99	0.34	0.11	0.05	0.02	0.01
	V	1.94	1.22	0.75	0.48	0.31	0.19	0.14	0.09	0.06
0.50	R	42.45	13.89	4.32	1.46	0.50	0.17	0.07	0.03	0.01
	V	2.43	1.53	0.94	0.60	0.38	0.24	0.17	0.12	0.08
0.60	R	59.11	19.28	5.98	2.02	0.69	0.23	0.10	0.04	0.02
	V	2.91	1.84	1.13	0.72	0.46	0.29	0.20	0.14	0.09
0.70	R	78.31	25.46	7.87	2.65	0.90	0.30	0.13	0.05	0.02
	V	3.40	2.14	1.32	0.84	0.54	0.34	0.24	0.16	0.11

POLYGON PIPE

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 5/SDR 11/PN 10

Roughness : 0.0070mm
Temperature : 20°C
Density :898kg/m³
Viscosity : $1.02 \times 10^{-6} m^2/s$

$\dot{V}$=circulatory (l/S) R=pressure gradient (mbar/m) v=flow rate (m/s)

d x s ►		20x1.9	25x2.3	32x2.9	40x3.7	50x4.6	63x5.8	75x6.8	90x8.2	110x10.0
$\dot{V}$	d_i ►	16.2mm	20.4mm	26.0mm	32.6mm	40.8mm	51.4mm	61.2mm	73.6mm	90.0mm
0.80	R	100.01	32.43	10.01	3.36	1.15	0.38	0.17	0.07	0.03
	V	3.88	2.45	1.51	0.96	0.61	0.39	0.27	0.19	0.13
0.90	R	124.19	40.18	12.37	4.15	1.41	0.47	0.20	0.08	0.03
	V	4.37	2.75	1.70	1.08	0.69	0.43	0.31	0.21	0.14
1.00	R	150.84	48.69	14.96	5.01	1.70	0.56	0.24	0.10	0.04
	V	4.85	3.06	1.88	1.20	0.76	0.48	0.34	0.24	0.16
1.20	R	211.46	67.99	20.81	6.95	2.36	0.78	0.34	0.14	0.05
	V	5.82	3.67	2.26	1.44	0.92	0.58	0.41	0.28	0.19
1.40	R	281.77	90.28	27.55	9.18	3.11	1.02	0.44	0.18	0.07
	V	6.79	4.28	2.64	1.68	1.07	0.67	0.48	0.33	0.22
1.60	R	361.70	115.54	35.16	11.69	3.95	1.30	0.56	0.23	0.09
	V	7.76	4.90	3.01	1.92	1.22	0.77	0.54	0.38	0.25
1.80	R	451.22	143.73	43.63	14.48	4.88	1.60	0.69	0.29	0.11
	V	8.73	5.51	3.39	2.16	1.38	0.87	0.61	0.42	0.28
2.00	R	552.07	174.84	52.94	17.54	5.90	1.94	0.84	0.35	0.13
	V	9.70	6.12	3.77	2.40	1.53	0.96	0.68	0.47	0.31
2.20	R	660.78	208.86	63.11	20.87	7.02	2.30	0.99	0.41	0.16
	V	10.67	6.73	4.14	2.64	1.68	1.06	0.75	0.52	0.35
2.40	R	778.98	245.77	74.11	24.47	8.21	2.69	1.16	0.48	0.18
	V	11.64	7.34	4.52	2.88	1.84	1.16	0.82	0.56	0.38
2.60	R	906.64	285.56	85.94	28.33	9.50	3.10	1.34	0.55	0.21
	V	12.61	7.95	4.90	3.11	1.99	1.25	0.88	0.61	0.41
2.80	R	1043.75	328.23	98.61	32.46	10.87	3.55	1.53	0.63	0.24
	V	13.58	8.57	5.27	3.35	2.14	1.35	0.95	0.66	0.44
3.00	R	1190.30	373.77	112.10	36.85	12.32	4.02	1.73	0.71	0.27
	V	14.55	9.18	5.65	3.59	2.29	1.45	1.02	0.71	0.47
3.20	R	1346.28	423.56	126.42	41.50	13.86	4.52	1.94	0.80	0.30
	V	15.52	9.79	6.03	3.83	2.45	1.54	1.09	0.75	0.50
3.40	R	1511.68	474.89	141.56	46.41	15.49	5.04	2.17	0.89	0.34
	V	16.50	10.40	6.40	4.07	2.60	1.64	1.16	0.80	0.53
3.60	R	1686.50	529.07	157.51	51.59	17.19	5.59	2.40	0.99	0.38
	V	17.47	11.01	6.78	4.31	2.75	1.73	1.22	0.85	0.57
3.80	R	1870.73	586.10	174.29	57.00	18.98	6.17	2.65	1.09	0.41
	V	18.44	11.63	7.16	4.55	2.91	1.83	1.29	0.89	0.60
4.00	R	2064.37	645.97	191.88	62.69	20.86	6.77	2.91	1.19	0.45
	V	19.41	12.24	7.53	4.79	3.06	1.93	1.36	0.94	0.63
4.20	R	2267.41	708.68	210.28	68.63	22.81	7.40	3.18	1.30	0.49
	V	20.38	12.85	7.91	5.03	3.21	2.02	1.43	0.99	0.66
4.40	R	2479.85	774.22	229.50	74.82	24.85	8.06	3.46	1.42	0.54
	V	21.35	13.46	8.29	5.27	3.37	2.12	1.50	1.03	0.69

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 5/SDR 11/PN 10

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : $1.02 \times 10^{-6} m^2/s$

$\dot{V}$=circulatory (l/s)				R=pressure gradient (mbar/m)				v=flow rate (m/s)		
d x s ▶		20x1.9	25x2.3	32x2.9	40x3.7	50x4.6	63x5.8	75x6.8	90x8.2	110x10.0
$\dot{V}$	d_i ▶	16.2mm	20.4mm	26.0mm	32.6mm	40.8mm	51.4mm	61.2mm	73.6mm	90.0mm
4.60	R	2701.69	842.61	249.53	81.27	26.97	8.74	3.75	1.54	0.58
	V	22.32	14.07	8.66	5.51	3.52	2.22	1.56	1.08	0.72
4.80	R	2932.92	913.82	271.35	87.98	29.17	9.44	4.05	1.66	0.63
	V	23.29	14.69	9.04	5.75	3.67	2.31	1.63	1.13	0.75
5.00	R	3173.54	987.87	293.03	94.93	31.45	10.17	4.36	1.78	0.68
	V	24.26	15.30	9.42	5.99	3.82	2.41	1.70	1.18	0.79
5.20	R	3423.56	1064.75	315.52	102.14	33.81	10.93	4.68	1.92	0.73
	V	25.23	15.91	9.79	6.23	3.98	2.51	1.77	1.22	0.82
5.40	R	3682.96	1144.46	338.82	109.61	36.26	11.71	5.01	2.05	0.78
	V	26.20	16.52	10.17	6.47	4.13	2.60	1.84	1.27	0.85
5.60	R	3951.74	1227.00	362.92	117.32	38.78	12.52	5.36	2.19	0.83
	V	27.17	17.13	10.55	6.71	4.28	2.70	1.90	1.32	0.88
5.80	R	4229.92	1312.37	387.82	125.29	41.39	13.35	5.71	2.33	0.88
	V	28.14	17.75	10.92	6.95	4.44	2.80	1.97	1.36	0.91
6.00	R	4517.48	1400.00	413.53	133.51	44.07	14.21	6.07	2.48	0.94
	V	29.11	18.36	11.30	7.19	4.59	2.89	2.04	1.41	0.94
6.20	R	4814.42	1491.58	440.05	141.98	46.83	15.09	6.45	2.63	1.00
	V	30.08	18.97	11.68	7.43	4.74	2.99	2.11	1.46	0.97
6.40	R	5120.74	1585.42	467.37	150.70	49.68	16.00	6.83	2.79	1.06
	V	31.05	19.58	12.05	7.67	4.90	3.08	2.18	1.50	1.01
6.60	R	5436.44	1682.09	495.48	159.67	52.60	16.93	7.23	2.95	1.12
	V	32.02	20.19	12.43	7.91	5.05	3.18	2.24	1.55	1.04
6.80	R	5761.53	1781.58	524.41	168.89	55.60	17.89	7.63	3.12	1.18
	V	32.99	20.80	12.81	8.15	5.20	3.28	2.31	1.60	1.07
7.00	R	6095.99	1883.89	554.13	178.37	58.69	18.87	8.05	3.28	1.24
	V	33.96	21.42	13.18	8.39	5.35	3.37	2.38	1.65	1.10
7.50	R	6973.19	2152.02	631.95	203.89	66.74	21.43	9.13	3.72	1.41
	V	36.39	22.95	14.13	8.99	5.74	3.61	2.55	1.76	1.18
8.00	R	7908.99	2437.78	714.76	230.26	75.28	24.14	10.28	4.19	1.58
	V	38.81	24.48	15.07	9.58	6.12	3.86	2.72	1.88	1.26
9.00	R	9956.40	3062.18	895.39	287.67	93.85	30.02	12.77	5.19	1.96
	V	43.66	27.54	16.95	10.78	6.88	4.34	3.06	2.12	1.41
10.00	R		3757.04	1095.99	351.27	114.38	36.51	15.50	6.30	2.37
	V		30.59	18.83	11.98	7.65	4.82	3.40	2.35	1.57

POLYGON PIPE

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 2.5/SDR 6/PN 20

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : $1.02 \times 10^{-6} m^2/s$

$\dot{V}$=circulatory (l/S)				R=pressure gradient (mbar/m)						v=flow rate (m/s)
d x s ▶		20x3.4	25x4.2	32x5.4	40x6.7	50x8.3	63x10.5	75x12.5	90x15.0	110x18.3
$\dot{V}$	d_i ▶	13.2mm	16.6mm	21.2mm	26.6mm	33.2mm	42.0mm	50.0mm	60.0mm	73.2mm
0.01	R	0.14	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.00
	V	0.07	0.05	0.03	0.02	0.01	0.01	0.01	0.00	0.00
0.02	R	0.27	0.11	0.04	0.02	0.01	0.00	0.00	0.00	0.00
	V	0.15	0.09	0.06	0.04	0.02	0.01	0.01	0.01	0.00
0.03	R	0.81	0.16	0.06	0.02	0.01	0.00	0.00	0.00	0.00
	V	0.22	0.14	0.08	0.05	0.03	0.02	0.02	0.01	0.00
0.04	R	1.33	0.45	0.14	0.03	0.01	0.01	0.00	0.00	0.00
	V	0.29	0.18	0.11	0.07	0.05	0.03	0.02	0.01	0.00
0.05	R	1.94	0.66	0.21	0.07	0.02	0.01	0.00	0.00	0.00
	V	0.37	0.23	0.14	0.09	0.06	0.04	0.03	0.02	0.00
0.06	R	2.66	0.90	0.28	0.10	0.02	0.01	0.00	0.00	0.00
	V	0.44	0.28	0.17	0.11	0.07	0.04	0.03	0.02	0.00
0.07	R	3.48	1.17	0.37	0.13	0.04	0.01	0.00	0.00	0.00
	V	0.51	0.32	0.20	0.13	0.08	0.05	0.04	0.02	0.00
0.08	R	4.39	1.48	0.46	0.16	0.06	0.02	0.01	0.00	0.00
	V	0.58	0.37	0.23	0.14	0.09	0.06	0.04	0.03	0.00
0.09	R	5.39	1.81	0.57	0.19	0.07	0.02	0.01	0.00	0.00
	V	0.66	0.42	0.25	0.16	0.10	0.06	0.05	0.03	0.00
0.10	R	6.48	2.17	0.68	0.23	0.08	0.03	0.01	0.00	0.00
	V	0.73	0.46	0.28	0.18	0.12	0.07	0.05	0.04	0.00
0.12	R	8.92	2.99	0.93	0.32	0.11	0.04	0.02	0.01	0.00
	V	0.88	0.55	0.34	0.22	0.14	0.09	0.06	0.04	0.00
0.14	R	11.71	3.91	1.22	0.42	0.15	0.05	0.02	0.01	0.00
	V	1.02	0.65	0.40	0.25	0.16	0.10	0.07	0.05	0.00
0.16	R	14.83	4.94	1.54	0.52	0.18	0.06	0.03	0.01	0.00
	V	1.17	0.74	0.45	0.29	0.18	0.12	0.08	0.06	0.00
0.18	R	18.28	6.08	1.89	0.64	0.22	0.07	0.03	0.01	0.01
	V	1.32	0.83	0.51	0.32	0.21	0.13	0.09	0.06	0.04
0.20	R	22.05	7.32	2.27	0.77	0.27	0.09	0.04	0.02	0.01
	V	1.46	0.92	0.57	0.36	0.23	0.14	0.10	0.07	0.05
0.30	R	45.61	15.05	4.64	1.57	0.55	0.18	0.08	0.03	0.01
	V	2.19	1.39	0.85	0.54	0.35	0.22	0.15	0.11	0.07
0.40	R	76.78	25.21	7.74	2.61	0.90	0.29	0.13	0.05	0.02
	V	2.92	1.85	1.13	0.72	0.46	0.29	0.20	0.14	0.10
0.50	R	115.34	37.70	11.53	3.87	1.34	0.44	0.19	0.08	0.03
	V	3.65	2.31	1.42	0.90	0.58	0.36	0.25	0.18	0.12
0.60	R	161.16	52.48	16.00	5.35	1.85	0.60	0.26	0.11	0.04
	V	4.38	2.77	1.70	1.08	0.69	0.43	0.31	0.21	0.14
0.70	R	214.16	69.50	21.13	7.05	2.43	0.79	0.34	0.14	0.06
	V	5.12	3.23	1.98	1.26	0.81	0.51	0.36	0.25	0.17

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 2.5/SDR 6/PN 20

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : $1.02 \times 10^{-6} m^2/s$

$\dot{V}$=circulatory (l/S) R=pressure gradient (mbar/m) v=flow rate (m/s)

d x s ▶		20x3.4	25x4.2	32x5.4	40x6.7	50x8.3	63x10.5	75x12.5	90x15.0	110x18.3
$\dot{V}$	d_i ▶	13.2mm	16.6mm	21.2mm	26.6mm	33.2mm	42.0mm	50.0mm	60.0mm	73.2mm
0.08	R	274.25	88.74	26.90	8.96	3.08	1.00	0.43	0.18	0.07
	V	5.85	3.70	2.27	1.44	0.92	0.58	0.41	0.28	0.19
0.90	R	341.40	110.17	33.31	11.08	3.80	1.23	0.53	0.22	0.09
	V	6.58	4.16	2.55	1.62	1.04	0.65	0.46	0.32	0.21
1.00	R	415.58	133.77	40.36	13.39	4.59	1.48	0.64	0.27	0.10
	V	7.31	4.62	2.83	1.80	1.16	0.72	0.51	0.35	0.24
1.20	R	584.86	187.44	56.32	18.63	6.37	2.05	0.89	0.37	0.14
	V	8.77	5.54	3.40	2.16	1.39	0.87	0.61	0.42	0.29
1.40	R	784.32	249.67	74.74	24.65	8.41	2.70	1.17	0.49	0.19
	V	10.23	6.47	3.97	2.52	1.62	1.01	0.71	0.50	0.33
1.60	R	1009.36	320.39	95.60	31.45	10.70	3.43	1.48	0.62	0.24
	V	11.69	7.39	4.53	2.88	1.85	1.15	0.81	0.57	0.38
1.80	R	1261.97	399.56	118.88	39.02	13.25	4.24	1.83	0.76	0.29
	V	13.15	8.32	5.10	3.24	2.08	1.30	0.92	0.64	0.43
2.00	R	1542.10	487.13	144.56	47.34	16.05	5.13	2.21	0.92	0.35
	V	14.61	9.24	5.67	3.60	2.31	1.44	1.02	0.71	0.48
2.20	R	1849.71	584.92	172.62	56.42	19.09	6.10	2.63	1.09	0.42
	V	16.08	10.17	6.23	3.96	2.54	1.59	1.12	0.78	0.52
2.40	R	2184.77	689.39	203.06	66.24	22.38	7.14	3.07	1.28	0.49
	V	17.54	11.06	6.80	4.32	2.77	1.73	1.22	0.85	0.57
2.60	R	2547.26	802.20	235.86	76.81	25.91	8.25	3.55	1.47	0.57
	V	19.00	12.01	7.37	4.68	3.00	1.88	1.32	0.92	0.62
2.80	R	2937.15	923.33	271.02	88.12	29.69	9.44	4.06	1.68	0.65
	V	20.46	12.94	7.93	5.04	3.23	2.02	1.43	0.99	0.67
3.00	R	3354.43	1052.78	308.54	100.16	33.70	10.70	4.59	1.90	0.73
	V	21.92	13.86	8.50	5.40	3.47	2.17	1.53	1.06	0.71
3.20	R	3799.10	1190.54	348.40	112.93	37.95	12.04	5.16	2.14	0.87
	V	23.38	14.79	9.07	5.76	3.70	2.31	1.63	1.13	0.76
3.40	R	4271.13	1336.61	391.92	126.44	42.43	13.45	5.76	2.39	0.91
	V	24.85	15.71	9.63	6.12	3.93	2.45	1.73	1.20	0.81
3.60	R	4770.53	1490.96	436.53	140.68	47.16	14.93	6.39	2.65	1.01
	V	26.31	16.63	10.20	6.48	4.16	2.60	1.83	1.27	0.86
3.80	R	5297.29	1653.61	483.48	155.64	52.11	16.48	7.06	2.92	1.17
	V	27.77	17.56	10.77	6.84	4.39	2.74	1.94	1.34	0.90
4.00	R	5851.39	1824.55	532.75	171.33	57.30	18.10	7.75	3.20	1.23
	V	29.23	18.48	11.33	7.20	4.62	2.89	2.04	1.41	0.95
4.20	R	6432.84	2003.76	584.35	187.74	62.73	19.80	8.47	3.50	1.34
	V	30.69	19.41	11.90	7.56	4.85	3.03	2.14	1.49	1.00
4.40	R	7041.63	2191.26	638.28	204.87	68.39	21.57	9.22	3.80	1.45
	V	32.15	20.33	12.46	7.92	5.08	3.18	2.24	1.56	1.05

POLYGON PIPE

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 2.5/SDR 6/PN 20

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : $1.02 \times 10^{-6} m^2/s$

$\dot{V}$=circulatory (l/s) R=pressure gradient (mbar/m) v=flow rate (m/s)

d x s ▶		20x3.4	25x4.2	32x5.4	40x6.7	50x8.3	63x10.5	75x12.5	90x15.0	110x18.3
$\dot{V}$	d_i ▶	13.2mm	16.6mm	21.2mm	26.6mm	33.2mm	42.0mm	50.0mm	60.0mm	73.2mm
4.60	R	7677.7 6	2387.03	694.53	222.73	74.28	23.40	9.99	4.12	1.58
	V	33.61	21.25	13.03	8.28	5.31	3.32	2.34	1.63	1.03
4.80	R	8341.23	2591.07	753.10	241.30	80.40	25.31	10.80	4.45	1.70
	V	35.08	22.18	13.60	8.64	5.54	3.46	2.44	1.70	1.09
5.00	R	9032.03	2803.39	813.99	261.55	86.75	27.29	11.64	4.80	1.83
	V	36.54	23.10	14.16	9.00	5.78	3.61	2.55	1.77	1.19
5.20	R	9750.16	3023.97	877.20	281.60	93.33	29.33	12.51	5.15	1.97
	V	38.00	24.03	14.73	9.36	6.01	3.75	2.65	1.84	1.24
5.40	R		3252.82	942.73	302.37	100.15	31.45	13.40	5.52	2.11
	V		24.95	15.30	9.72	6.24	3.90	2.75	1.91	1.28
5.60	R		3489.94	1010.58	323.85	107.19	33.64	14.33	5.90	2.25
	V		25.88	15.86	10.08	6.47	4.04	2.85	1.98	1.33
5.80	R		3735.32	1080.74	346.04	114.46	35.89	15.28	6.29	2.40
	V		26.80	16.43	10.44	6.70	4.19	2.95	2.05	1.38
6.00	R		3988.97	1153.21	368.95	121.96	38.22	16.26	6.69	2.55
	V		27.72	17.00	10.80	6.93	4.33	3.06	2.12	1.43
6.20	R		4250.88	1228.00	392.58	129.69	40.61	17.27	7.10	2.70
	V		28.65	17.56	11.16	7.16	4.48	3.16	2.19	1.47
6.40	R		4521.05	1305.10	416.92	137.65	43.07	18.31	7.52	2.87
	V		29.57	18.13	11.52	7.39	4.62	3.26	2.26	1.52
6.60	R		4799.49	1384.52	441.97	145.84	45.60	19.38	7.96	3.03
	V		30.50	18.70	11.88	7.62	4.76	3.36	2.33	1.57
6.80	R		5086.18	1466.24	467.74	154.25	48.20	20.48	8.41	3.20
	V		31.42	19.26	12.24	7.85	4.91	3.46	2.41	1.62
7.00	R		5381.13	1550.28	494.21	162.90	50.87	21.60	8.86	3.27
	V		32.34	19.83	12.60	8.09	5.05	3.57	2.48	1.66
7.50	R		6154.64	1770.48	563.52	186.21	57.84	24.53	10.06	3.82
	V		34.65	21.25	13.50	8.66	5.41	3.82	2.65	1.78
8.00	R		6979.76	2005.11	637.28	210.27	65.24	27.64	11.32	4.30
	V		36.96	22.66	14.40	9.24	5.77	4.07	2.83	1.90
9.00	R		8784.80	2517.66	798.11	262.63	81.30	34.39	14.06	5.33
	V		41.58	25.50	16.20	10.40	6.50	4.58	3.18	2.14
10.00	R			3087.89	976.68	320.63	99.05	41.83	17.08	6.47
	V			28.33	17.99	11.55	7.22	5.09	3.54	2.38

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory V̇

Polygon® pipe S 2.5/SDR 6/PN 20

Roughness : 0.0070mm
Temperature : 60°C
Density : 885kg/m³
Viscosity : 0.47x10⁻⁶m²/s

V̇=circulatory (l/S)		R=pressure gradient (mbar/m)							v=flow rate (m/s)	
d x s ▶		20x3.4	25x4.2	32x5.4	40x6.7	50x8.3	63x10.5	75x12.5	90x15.0	110x18.3
V̇	d_i ▶	13.2mm	16.6mm	21.2mm	26.6mm	33.2mm	42.0mm	50.0mm	60.0mm	73.2mm
0.01	R	0.06	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	V	0.07	0.05	0.03	0.02	0.01	0.01	0.01	0.00	0.00
0.02	R	0.32	0.11	0.03	0.01	0.00	0.00	0.00	0.00	0.00
	V	0.15	0.09	0.06	0.04	0.02	0.01	0.01	0.01	0.00
0.03	R	0.64	0.22	0.07	0.02	0.01	0.00	0.00	0.00	0.00
	V	0.22	0.14	0.08	0.05	0.03	0.02	0.02	0.01	0.00
0.04	R	1.06	0.36	0.11	0.04	0.01	0.00	0.00	0.00	0.00
	V	0.29	0.18	0.11	0.07	0.05	0.03	0.02	0.01	0.00
0.05	R	1.56	0.52	0.16	0.06	0.02	0.01	0.00	0.00	0.00
	V	0.37	0.23	0.14	0.09	0.06	0.04	0.03	0.02	0.00
0.06	R	2.15	0.72	0.22	0.08	0.03	0.01	0.00	0.00	0.00
	V	0.44	0.28	0.17	0.11	0.07	0.04	0.03	0.02	0.00
0.07	R	2.83	0.94	0.29	0.10	0.04	0.01	0.01	0.00	0.00
	V	0.51	0.32	0.20	0.13	0.08	0.05	0.04	0.02	0.00
0.08	R	3.59	1.19	0.37	0.13	0.04	0.01	0.01	0.00	0.00
	V	0.58	0.37	0.23	0.14	0.09	0.06	0.04	0.03	0.00
0.09	R	4.42	1.47	0.46	0.15	0.05	0.02	0.01	0.00	0.00
	V	0.66	0.42	0.25	0.16	0.10	0.06	0.05	0.03	0.00
0.10	R	5.34	1.77	0.55	0.19	0.06	0.02	0.01	0.00	0.00
	V	0.73	0.46	0.28	0.18	0.12	0.07	0.05	0.04	0.00
0.12	R	7.40	2.45	0.76	0.26	0.09	0.03	0.01	0.01	0.00
	V	0.88	0.55	0.34	0.22	0.14	0.09	0.06	0.04	0.00
0.14	R	9.76	3.22	0.99	0.34	0.12	0.04	0.02	0.01	0.00
	V	1.02	0.65	0.40	0.25	0.16	0.10	0.07	0.05	0.00
0.16	R	12.43	4.09	1.26	0.42	0.15	0.05	0.02		
	V									
0.18	R	15.38	5.05	1.55	0.52	0.18	0.06	0.03	0.01	0.00
	V	1.32	0.83	0.51	0.32	0.21	0.13	0.09	0.06	0.00
0.20	R	18.63	6.11	1.87	0.63	0.22	0.07	0.03	0.01	0.01
	V	1.46	0.92	0.57	0.36	0.23	0.14	0.10	0.07	0.05
0.30	R	39.19	12.74	3.88	1.30	0.45	0.14	0.06	0.03	0.01
	V	2.19	1.39	0.85	0.54	0.35	0.22	0.15	0.11	0.07
0.40	R	66.77	21.56	6.53	2.17	0.75	0.24	0.10	0.04	0.07
	V	2.92	1.85	1.13	0.72	0.46	0.29	0.20	0.14	0.10
0.50	R	101.28	32.54	9.80	3.25	1.11	0.36	0.16	0.06	0.03
	V	3.65	2.31	1.42	0.90	0.58	0.36	0.25	0.18	0.12
0.60	R	142.66	45.63	13.68	4.52	1.54	0.50	0.21	0.09	0.03
	V	4.38	2.77	1.70	1.08	0.69	0.43	0.31	0.21	0.14
0.70	R	191.41	60.82	18.17	5.98	2.04	0.65	0.28	0.12	0.05
	V	5.12	3.23	1.98	1.26	0.81	0.51	0.36	0.25	0.17

POLYGON PIPE

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory V̇

Polygon® pipeS 2.5/SDR 6/PN 20

Roughness : 0.0070mm
Temperature : 60°C
Density : 885kg/m³
Viscosity : 0.47x10⁻⁶m²/s

V̇=circulatory (l/S)		R=pressure gradient (mbar/m)							v=flow rate (m/s)	
d x s ▶		20x3.4	25x4.2	32x5.4	40x6.7	50x8.3	63x10.5	75x12.5	90x15.0	110x18.3
V̇	d_i ▶	13.2mm	16.6mm	21.2mm	26.6mm	33.2mm	42.0mm	50.0mm	60.0mm	73.2mm
0.80	R	246.48	78.10	23.26	7.64	2.60	0.83	0.36	0.15	0.06
	V	5.85	3.70	2.27	1.44	0.92	0.58	0.41	0.28	0.19
0.90	R	308.34	97.45	28.94	9.48	3.22	1.03	0.44	0.18	0.07
	V	6.58	4.16	2.55	1.62	1.04	0.65	0.46	0.32	0.21
1.00	R	376.96	119.25	35.20	11.51	3.90	1.24	0.54	0.22	0.09
	V	7.31	4.62	2.83	1.80	1.16	0.72	0.51	0.35	0.24
1.20	R	534.49	168.32	49.49	16.12	5.44	1.73	0.74	0.31	0.12
	V	8.77	5.54	3.40	2.16	1.39	0.87	0.61	0.42	0.29
1.40	R	719.03	225.60	66.10	21.45	7.21	2.29	0.98	0.41	0.16
	V	10.23	6.47	3.97	2.52	1.62	1.01	0.71	0.50	0.33
1.60	R	930.53	291.06	85.30	27.51	9.23	2.92	1.25	0.52	0.20
	V	11.69	7.39	4.53	2.88	1.85	1.15	0.81	0.57	0.38
1.80	R	1168.99	364.69	106.55	34.28	11.47	3.63	1.55	0.64	0.25
	V	13.15	8.32	5.10	3.24	2.08	1.30	0.92	0.64	0.43
2.00	R	1434.39	446.49	130.10	41.77	13.95	4.40	1.88	0.78	0.30
	V	14.61	9.24	5.67	3.60	2.31	1.44	1.02	0.71	0.48
2.20	R	1726.73	536.44	155.94	49.97	16.65	5.24	2.24	0.92	0.35
	V	16.08	10.17	6.23	3.96	2.54	1.59	1.12	0.78	0.52
2.40	R	2045.99	634.54	184.06	59.09	19.58	6.15	2.62	1.08	0.41
	V	17.54	11.09	6.80	4.32	2.77	1.73	1.22	0.75	0.57
2.60	R	2392.18	740.78	214.47	68.72	22.74	7.13	3.04	1.25	0.48
	V	19.00	12.01	7.37	4.68	3.00	1.88	1.32	0.92	0.62
2.80	R	2765.29	855.16	247.16	79.05	26.13	8.18	3.48	1.43	0.55
	V	20.46	12.94	7.93	5.04	3.23	2.02	1.43	0.99	0.67
3.00	R	3165.32	977.69	282.12	90.09	29.73	9.30	3.95	1.62	0.62
	V	21.92	13.86	8.50	5.40	3.47	2.17	1.53	1.06	0.71
3.20	R	3592.26	1108.35	319.37	101.83	33.57	10.48	4.45	1.83	0.70
	V	23.38	14.79	9.07	5.76	3.70	2.31	1.63	1.13	0.76
3.40	R	4046.11	1247.15	358.89	114.27	37.63	11.74	4.98	2.04	0.78
	V	24.75	15.71	9.63	6.12	3.93	2.45	1.73	1.20	0.81
3.60	R	4526.88	1394.09	400.68	127.42	42.06	13.06	5.53	2.27	0.86
	V	26.31	16.63	10.20	6.48	4.16	2.60	1.83	1.27	0.86
3.80	R	5034.56	1549.16	444.76	141.26	46.58	14.44	6.12	2.50	0.95
	V	27.77	17.56	10.77	6.84	4.39	2.74	1.94	1.34	0.90
4.00	R	5569.15	1712.36	491.10	155.80	51.31	15.89	6.73	2.75	1.04
	V	29.23	18.48	11.33	7.20	4.62	2.89	2.04	1.41	0.95
4.20	R	6130.65	1883.69	539.72	171.05	56.27	17.41	7.36	3.01	1.14
	V	30.69	19.41	11.90	7.56	4.85	3.03	2.14	1.49	1.00
4.40	R	6719.05	2063.16	590.61	186.99	61.45	19.00	8.03	3.28	1.24
	V	32.15	20.33	12.46	7.96	5.08	3.18	2.24	1.56	1.05

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 2.5/SDR 6/PN 20

Roughness : 0.0070mm
Temperature : 60°C
Density : 885kg/m³
Viscosity : 0.47x10⁻⁶m²/s

$\dot{V}$=circulatory (l/S)		R=pressure gradient (mbar/m)								v=flow rate (m/s)
d x s ▶		20x3.4	25x4.2	32x5.4	40x6.7	50x8.3	63x10.5	75x12.5	90x15.0	110x18.3
$\dot{V}$	d_i ▶	13.2mm	16.6mm	21.2mm	26.6mm	33.2mm	42.0mm	50.0mm	60.0mm	73.2mm
4.60	R	7334.37	2250.76	643.77	203.63	66.85	20.65	8.72	3.56	1.35
	V	33.61	21.25	13.03	8.28	5.31	3.32	2.34	1.63	1.09
4.80	R	7976.60	2446.49	699.21	220.97	72.47	22.37	9.44	3.85	1.46
	V	35.08	22.18	13.60	8.64	5.54	3.46	2.44	1.70	1.14
5.00	R	8645.73	2650.35	756.92	239.00	78.32	24.16	10.19	4.15	1.57
	V	36.54	23.10	14.16	9.00	5.78	3.61	2.55	1.77	1.19
5.20	R	9341.77	2862.34	816.90	257.74	84.39	26.01	10.96	4.47	1.69
	V	38.00	24.03	14.73	9.36	6.01	3.75	2.65	1.84	1.24
5.40	R		3082.46	879.14	277.17	90.67	28.03	11.76	4.79	1.81
	V		24.95	15.30	9.72	6.24	3.90	2.75	1.91	1.28
5.60	R		3310.71	943.67	297.30	97.18	30.02	12.59	5.13	1.94
	V		25.88	15.86	10.08	6.47	4.04	2.85	1.98	1.33
5.80	R		3547.09	1010.46	318.13	103.91	32.07	13.44	5.47	2.06
	V		26.80	16.43	10.44	6.70	4.19	2.95	2.05	1.38
6.00	R		3791.60	1079.52	339.65	110.86	34.19	14.33	5.83	2.20
	V		27.72	17.00	10.80	6.93	4.33	3.06	2.12	1.43
6.20	R		4044.24	1150.85	361.87	118.03	36.37	15.23	6.19	2.33
	V		28.65	17.56	11.16	7.16	4.48	3.16	2.19	1.47
6.40	R		4305.1	1224.45	384.79	125.42	38.62	16.17	6.57	2.47
	V		29.57	18.13	11.52	7.39	4.62	3.26	2.26	1.52
6.60	R		4573.91	1300.32	408.40	133.03	40.94	17.13	6.96	2.62
	V		30.50	18.70	11.88	7.62	4.76	3.36	2.33	1.57
6.80	R		4850.94	1378.47	432.71	140.87	43.32	18.12	7.35	2.77
	V		31.42	19.26	12.24	7.85	4.91	3.46	2.41	1.62
7.00	R		5136.09	1458.88	457.72	148.92	45.76	19.14	7.76	2.92
	V		32.34	19.83	12.60	8.09	5.05	3.57	2.48	1.66
7.50	R		5884.55	1669.84	523.29	170.01	52.16	21.88	8.83	3.32
	V		34.65	21.25	13.50	8.66	5.41	3.82	2.65	1.78
8.00	R		6683.80	1894.98	593.20	192.49	58.96	24.71	9.96	3.74
	V		36.96	22.66	14.40	9.24	5.77	4.07	2.83	1.90
9.00	R		8434.72	2387.82	746.09	241.55	73.80	30.86	12.42	4.66
	V		41.58	25.00	16.20	10.40	6.50	4.58	3.18	2.14
10.00	R			2937.39	916.37	296.12	90.26	37.67	15.21	5.66
	V			28.33	17.99	11.55	7.22	5.09	3.54	2.38

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rare v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 3.2/SDR 7.4/PN 16

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : 1.02x10⁻⁶m²/s

$\dot{V}$=circulatory (l/s)		R=pressure gradient (mbar/m)								v=flow rate (m/s)
d x s ▶		20x2.8	25x3.5	32x4.5	40x5.6	50x6.9	63x8.7	75x10.4	90x12.5	110x15.2
$\dot{V}$	d_i ▶	14.4mm	18.0mm	23.0mm	28.8mm	36.2mm	45.6mm	54.2mm	65.0mm	79.6mm
0.01	R	0.10	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
	V	0.06	0.04	0.02	0.02	0.01	0.01	0.00	0.00	0.00
0.02	R	0.19	0.08	0.03	0.01	0.00	0.00	0.00	0.00	0.00
	V	0.12	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.00
0.03	R	0.54	0.12	0.04	0.02	0.01	0.00	0.00	0.00	0.00
	V	0.18	0.12	0.07	0.05	0.03	0.02	0.01	0.01	0.00
0.04	R	0.88	0.31	0.06	0.02	0.01	0.00	0.00	0.00	0.00
	V	0.25	0.16	0.10	0.06	0.04	0.02	0.02	0.01	0.00
0.05	R	1.29	0.45	0.14	0.03	0.01	0.00	0.00	0.00	0.00
	V	0.31	0.20	0.12	0.08	0.05	0.03	0.02	0.02	0.00
0.06	R	1.76	0.61	0.19	0.07	0.01	0.01	0.00	0.00	0.00
	V	0.37	0.24	0.14	0.09	0.06	0.04	0.03	0.02	0.00
0.07	R	2.30	0.80	0.25	0.09	0.03	0.01	0.00	0.00	0.00
	V	0.43	0.28	0.17	0.11	0.07	0.04	0.03	0.02	0.00
0.08	R	2.90	1.01	0.32	0.11	0.04	0.01	0.00	0.00	0.00
	V	0.49	0.31	0.19	0.12	0.08	0.05	0.03	0.02	0.00
0.09	R	3.56	1.23	0.39	0.13	0.05	0.02	0.00	0.00	0.00
	V	0.55	0.35	0.22	0.14	0.09	0.06	0.04	0.03	0.00
0.10	R	4.28	1.48	0.46	0.16	0.05	0.02	0.00	0.00	0.00
	V	0.61	0.39	0.24	0.15	0.10	0.06	0.04	0.03	0.00
0.12	R	5.88	2.03	0.63	0.22	0.07	0.03	0.01	0.00	0.00
	V	0.74	0.47	0.29	0.18	0.12	0.07	0.05	0.04	0.00
0.14	R	7.72	2.66	0.83	0.29	0.10	0.03	0.01	0.01	0.00
	V	0.86	0.55	0.34	0.21	0.14	0.09	0.06	0.04	0.00
0.16	R	9.76	3.36	1.04	0.36	0.12	0.04	0.02	0.01	0.00
	V	0.98	0.63	0.39	0.25	0.16	0.10	0.07	0.05	0.00
0.18	R	12.03	4.13	1.28	0.44	0.15	0.05	0.02	0.01	0.00
	V	1.11	0.71	0.43	0.28	0.17	0.11	0.08	0.05	0.00
0.20	R	14.50	4.97	1.54	0.53	0.18	0.06	0.03	0.01	0.00
	V	1.23	0.79	0.48	0.31	0.19	0.12	0.09	0.06	0.00
0.30	R	29.92	10.19	3.14	1.07	0.36	0.12	0.05	0.02	0.01
	V	1.84	1.18	0.72	0.46	0.29	0.18	0.13	0.09	0.06
0.40	R	50.25	17.04	5.23	1.78	0.60	0.20	0.09	0.04	0.01
	V	2.46	1.57	0.96	0.61	0.39	0.24	0.17	0.12	0.08
0.50	R	75.36	25.45	7.79	2.64	0.88	0.29	0.13	0.05	0.02
	V	3.07	1.96	1.20	0.77	0.49	0.31	0.22	0.15	0.10
0.60	R	105.14	35.38	10.79	3.65	1.22	0.41	0.18	0.08	0.03
	V	3.68	2.36	1.44	0.92	0.58	0.37	0.26	0.18	0.12
0.70	R	139.52	46.81	14.24	4.81	1.60	0.53	0.23	0.10	0.04
	V	4.30	2.75	1.68	1.07	0.68	0.43	0.30	0.21	0.14

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 3.2/SDR 7.4/PN 16

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : 1.02×10^{-6} m²/s

V̇=circulatory (l/s)		R=pressure gradient (mbar/m)								v=flow rate (m/s)
d x s ▶		20x2.8	25x3.5	32x4.5	40x5.6	50x6.9	63x8.7	75x10.4	90x12.5	110x15.2
V̇	d_i ▶	14.4mm	18.0mm	23.0mm	28.8mm	36.2mm	45.6mm	54.2mm	65.0mm	79.6mm
0.80	R	178.47	59.71	18.11	6.11	2.03	0.67	0.29	0.12	0.05
	V	4.91	3.14	1.93	1.23	0.78	0.49	0.35	0.24	0.16
0.90	R	221.93	74.06	22.41	7.54	2.51	0.83	0.36	0.15	0.06
	V	5.53	3.54	2.17	1.38	0.87	0.55	0.39	0.27	0.18
1.00	R	269.88	89.86	27.13	9.12	3.03	1.00	0.44	0.18	0.07
	V	6.14	3.93	2.41	1.54	0.97	0.61	0.43	0.30	0.20
1.20	R	379.18	125.78	37.82	12.67	4.19	1.38	0.60	0.25	0.10
	V	7.37	4.72	2.89	1.84	1.17	0.73	0.52	0.36	0.24
1.40	R	506.22	167.26	50.13	16.75	5.53	1.82	0.79	0.33	0.13
	V	8.60	5.50	3.37	2.15	1.36	0.86	0.61	0.42	0.28
1.60	R	650.91	214.40	64.07	21.35	7.04	2.31	1.01	0.42	0.16
	V	9.82	6.29	3.85	2.46	1.55	0.98	0.69	0.48	0.32
1.80	R	815.49	267.11	79.59	26.47	8.71	2.85	1.24	0.52	0.20
	V	11.05	7.07	4.33	2.76	1.75	1.10	0.78	0.54	0.36
2.00	R	995.51	325.37	96.70	32.09	10.54	3.45	1.50	0.63	0.24
	V	12.28	7.86	4.81	3.07	1.94	1.22	0.87	0.60	0.40
2.20	R	1193.02	389.15	115.39	38.22	12.53	4.10	1.78	0.74	0.28
	V	13.51	8.65	5.30	3.38	2.14	1.35	0.95	0.66	0.44
2.40	R	1407.98	458.44	135.64	44.85	14.68	4.79	2.08	0.87	0.33
	V	14.74	9.43	5.78	3.68	2.33	1.47	1.04	0.72	0.48
2.60	R	1640.39	534.89	157.45	51.98	16.99	5.54	2.40	1.00	0.38
	V	15.96	10.22	6.26	3.99	2.53	1.59	1.13	0.78	0.52
2.80	R	1890.23	615.26	180.82	59.60	19.46	6.33	2.75	1.14	0.43
	V	17.19	11.00	6.74	4.30	2.72	1.71	1.21	0.84	0.56
3.00	R	2157.47	701.10	205.73	67.71	22.08	7.18	3.11	1.29	0.49
	V	18.42	11.79	7.22	4.61	2.91	1.84	1.30	0.90	0.60
3.20	R	2442.11	792.39	232.18	76.31	24.85	8.07	3.50	1.45	0.55
	V	19.65	12.58	7.70	4.91	3.11	1.96	1.39	0.96	0.64
3.40	R	2744.15	889.14	260.18	85.39	27.77	9.01	3.90	1.62	0.61
	V	20.88	13.36	8.18	5.22	3.30	2.08	1.47	1.02	0.68
3.60	R	3063.57	991.34	289.71	94.97	30.85	10.00	4.33	1.80	0.68
	V	22.10	14.15	8.66	5.53	3.50	2.20	1.56	1.08	0.72
3.80	R	3400.36	1098.99	320.78	105.02	34.08	11.04	4.77	1.98	0.75
	V	23.33	14.93	9.15	5.83	3.69	2.33	1.65	1.15	0.76
4.00	R	3754.53	1212.07	354.57	115.56	37.46	12.12	5.24	2.17	0.82
	V	24.56	15.72	9.63	6.14	3.89	2.45	1.73	1.21	0.80
4.20	R	4126.07	1330.59	388.75	126.58	41.00	13.25	5.72	2.37	0.89
	V	25.79	16.50	10.11	6.45	4.08	2.57	1.82	1.27	0.84
4.40	R	4514.97	1454.54	424.46	138.09	44.68	14.43	6.23	2.58	0.97
	V	27.02	17.29	10.59	6.75	4.28	2.69	1.91	1.33	0.88

POLYGON PIPE

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 3.2/SDR 7.4/PN 16

Roughness : 0.0070mm
Temperature : 20°C
Density : 898kg/m³
Viscosity : 1.02×10^{-6} m²/s

V̇=circulatory (l/S)		R=pressure gradient (mbar/m)								v=flow rate (m/s)
d x s ▶		20x2.8	25x3.5	32x4.5	40x5.6	50x6.9	63x8.7	75x10.4	90x12.5	110x15.2
V̇	d_i ▶	14.4mm	18.0mm	23.0mm	28.8mm	36.2mm	45.6mm	54.2mm	65.0mm	79.6mm
4.60	R	4921.23	1583.93	461.69	150.07	48.51	15.66	6.75	2.80	1.05
	V	28.25	18.08	11.07	7.06	4.47	2.82	1.99	1.39	0.92
4.80	R	5344.85	1718.74	500.44	162.53	52.49	16.93	7.30	3.02	1.14
	V	29.47	18.86	11.55	7.37	4.66	2.94	2.08	1.45	0.96
5.00	R	5785.83	1858.98	540.71	175.47	56.62	18.25	7.86	3.25	1.22
	V	30.70	19.65	12.03	7.68	4.86	3.06	2.17	1.51	1.00
5.20	R	6244.16	2004.64	582.51	188.89	60.89	19.61	8.44	3.49	1.31
	V	31.93	20.43	12.52	7.98	5.05	3.18	2.25	1.57	1.04
5.40	R	6719.85	2155.73	625.82	202.78	65.32	21.02	9.05	3.74	1.40
	V	33.16	21.22	13.00	8.29	5.25	3.31	2.34	1.63	1.09
5.60	R	7212.88	2312.24	670.65	217.15	69.89	22.48	9.67	4.00	1.50
	V	34.39	22.01	13.48	8.60	5.44	3.43	2.43	1.69	1.13
5.80	R	7723.26	2474.18	717.00	232.86	74.61	23.98	10.31	4.26	1.60
	V	35.61	22.79	13.96	8.90	5.64	3.55	2.51	1.75	1.17
6.00	R	8250.99	2641.53	764.86	248.61	79.48	25.52	10.97	4.53	1.70
	V	36.84	23.58	14.44	9.21	5.83	3.67	2.60	1.81	1.21
6.20	R	8796.07	2814.30	814.25	264.03	84.50	27.12	11.65	4.81	1.80
	V	38.07	24.36	14.92	9.52	6.02	3.80	2.69	1.87	1.25
6.40	R	9358.49	2992.49	865.14	280.33	89.66	28.76	12.35	5.10	1.91
	V	39.30	25.15	15.40	9.82	6.22	3.92	2.77	1.93	1.29
6.60	R	9938.26	3176.09	917.55	297.09	94.97	30.44	13.07	5.39	2.02
	V	40.53	25.94	15.89	10.13	6.41	4.04	2.86	1.99	1.33
6.80	R		3365.11	971.48	314.34	100.42	32.17	13.80	5.69	2.13
	V		26.72	16.37	10.44	6.61	4.16	2.95	2.05	1.37
7.00	R		3559.55	1026.92	332.05	106.02	33.94	14.56	6.00	2.25
	V		27.51	16.85	10.75	6.80	4.29	3.03	2.11	1.41
7.50	R		4069.34	1172.13	378.40	120.66	38.57	16.53	6.81	2.55
	V		29.47	18.05	11.51	7.29	4.59	3.25	2.26	1.51
8.00	R		4612.96	1326.80	427.70	136.21	43.48	18.62	7.66	2.86
	V		31.44	19.26	12.28	7.77	4.90	3.47	2.41	1.61
9.00	R		5801.69	1664.46	535.13	170.68	54.14	23.14	9.51	3.55
	V		35.37	21.66	13.82	8.74	5.51	3.90	2.71	1.81
10.00	R		7125.70	2039.87	654.31	208.18	65.91	28.13	11.55	4.30
	V		39.30	24.07	15.35	9.72	6.12	4.33	3.01	2.01

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 3.2/SDR 7.4/PN 16

Roughness : 0.0070mm
Temperature : 60°C
Density : 885kg/m³
Viscosity : 0.47x10⁻⁶m²/s

$\dot{V}$=circulatory (l/s)		R=pressure gradient (mbar/m)								v=flow rate (m/s)
d x s ▶		20x2.8	25x3.5	32x4.5	40x5.6	50x6.9	63x8.7	75x10.4	90x12.5	110x15.2
$\dot{V}$	d ▶	14.4mm	18.0mm	23.0mm	28.8mm	36.2mm	45.6mm	54.2mm	65.0mm	79.6mm
0.01	R	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	V	0.06	0.04	0.02	0.02	0.01	0.01	0.00	0.00	0.00
0.02	R	0.21	0.07	0.02	0.01	0.00	0.00	0.00	0.00	0.00
	V	0.12	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.00
0.03	R	0.42	0.15	0.05	0.02	0.00	0.00	0.00	0.00	0.00
	V	0.18	0.12	0.07	0.05	0.03	0.02	0.01	0.01	0.00
0.04	R	0.70	0.24	0.08	0.03	0.01	0.00	0.00	0.00	0.00
	V	0.25	0.16	0.10	0.06	0.04	0.02	0.02	0.01	0.00
0.05	R	1.03	0.36	0.11	0.04	0.01	0.00	0.00	0.00	0.00
	V	0.31	0.20	0.12	0.08	0.05	0.03	0.02	0.02	0.00
0.06	R	1.42	0.49	0.15	0.05	0.02	0.01	0.00	0.00	0.00
	V	0.37	0.24	0.14	0.09	0.06	0.04	0.03	0.02	0.00
0.07	R	1.86	0.64	0.20	0.07	0.02	0.01	0.00	0.00	0.00
	V	0.43	0.28	0.17	0.11	0.07	0.04	0.03	0.02	0.00
0.08	R	2.36	0.81	0.25	0.09	0.03	0.01	0.00	0.00	0.00
	V	0.49	0.31	0.19	0.12	0.08	0.05	0.03	0.02	0.00
0.09	R	2.91	1.00	0.31	0.11	0.04	0.01	0.01	0.00	0.00
	V	0.55	0.35	0.22	0.14	0.09	0.06	0.04	0.03	0.00
0.10	R	3.51	1.20	0.37	0.13	0.04	0.01	0.01	0.00	0.00
	V	0.61	0.39	0.24	0.15	0.10	0.06	0.04	0.03	0.00
0.12	R	4.86	1.66	0.51	0.18	0.06	0.02	0.01	0.00	0.00
	V	0.74	0.47	0.29	0.18	0.12	0.07	0.05	0.04	0.00
0.14	R	6.40	2.18	0.67	0.23	0.08	0.03	0.01	0.00	0.00
	V	0.86	0.55	0.34	0.21	0.14	0.09	0.06	0.04	0.00
0.16	R	8.14	2.77	0.85	0.29	0.10	0.03	0.01	0.00	0.00
	V	0.98	0.63	0.39	0.25	0.16	0.10	0.07	0.05	0.00
0.18	R	10.07	3.42	1.05	0.36	0.12	0.04	0.02	0.01	0.00
	V	1.11	0.71	0.43	0.28	0.17	0.11	0.08	0.05	0.00
0.20	R	12.19	4.13	1.27	0.43	0.14	0.05	0.02	0.01	0.00
	V	1.23	0.79	0.48	0.31	0.19	0.12	0.09	0.06	0.00
0.30	R	25.55	8.58	2.61	0.88	0.30	0.10	0.04	0.02	0.01
	V	1.84	1.18	0.72	0.46	0.29	0.18	0.13	0.09	0.06
0.40	R	43.42	14.50	4.39	1.48	0.49	0.16	0.07	0.03	0.01
	V	2.46	1.57	0.96	0.61	0.39	0.24	0.17	0.12	0.08
0.50	R	65.73	21.84	6.58	2.21	0.73	0.24	0.11	0.04	0.02
	V	3.07	1.96	1.20	0.77	0.49	0.31	0.22	0.15	0.10
0.60	R	92.42	30.59	9.18	3.07	1.02	0.33	0.15	0.06	0.02
	V	3.68	2.36	1.44	0.92	0.58	0.37	0.26	0.18	0.12
0.70	R	123.47	40.72	12.18	4.06	1.34	0.44	0.19	0.08	0.03
	V	4.30	2.75	1.68	1.07	0.68	0.43	0.30	0.21	0.14

POLYGON PIPE

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory $\dot{V}$

Polygon® pipe S 3.2/SDR 7.4/PN 16

Roughness : 0.0070mm
Temperature : 60°C
Density : 885kg/m³
Viscosity : 0.47x10⁻⁶m²/s

$\dot{V}$=circulatory (l/s)		R=pressure gradient (mbar/m)								v=flow rate (m/s)
d x s ▶		20x2.8	25x3.5	32x4.5	40x5.6	50x6.9	63x8.7	75x10.4	90x12.5	110x15.2
$\dot{V}$	d ▶	14.4mm	18.0mm	23.0mm	28.8mm	36.2mm	45.6mm	54.2mm	65.0mm	79.6mm
0.08	R	159.33	52.23	15.58	5.18	1.71	0.56	0.24	0.10	0.04
	V	4.91	3.14	1.93	1.23	0.78	0.49	0.35	0.24	0.16
0.90	R	199.09	65.10	19.36	6.43	2.11	0.69	0.30	0.13	0.05
	V	5.53	3.54	2.17	1.38	0.87	0.55	0.39	0.27	0.18
1.00	R	243.16	79.34	23.53	7.80	2.56	0.84	0.36	0.15	0.06
	V	6.14	3.93	2.41	1.54	0.97	0.61	0.43	0.30	0.20
1.20	R	344.20	112.23	33.04	10.91	3.57	1.16	0.50	0.21	0.08
	V	7.37	4.72	2.89	1.84	1.17	0.73	0.52	0.36	024
1.40	R	462.41	150.22	44.07	14.50	4.73	1.54	0.67	0.28	0.10
	V	8.60	5.50	3.37	2.15	1.36	0.86	0.61	0.42	0.28
1.60	R	597.75	193.59	56.62	18.57	6.04	1.96	0.85	0.35	0.13
	V	9.82	6.29	3.85	2.46	1.55	0.98	0.69	0.48	0.32
1.80	R	750.22	242.32	70.93	23.13	7.50	2.43	1.05	0.44	0.16
	V	11.05	7.07	4.33	2.76	1.75	1.10	0.78	0.54	0.36
2.00	R	919.80	296.41	86.53	28.16	9.11	2.94	1.27	0.53	0.20
	V	12.28	7.86	4.81	3.07	1.94	1.22	0.87	0.60	0.40
2.20	R	1106.49	355.85	103.63	33.66	10.87	3.51	1.51	0.63	0.24
	V	13.51	8.65	5.30	3.38	2.14	1.35	0.95	0.66	0.44
2.40	R	1310.27	420.64	122.22	39.63	12.78	4.11	1.77	0.73	0.28
	V	14.74	9.43	5.78	3.68	2.33	1.47	1.04	0.72	0.48
2.60	R	1531.15	490.77	142.32	46.07	14.83	4.77	2.05	0.85	0.32
	V	15.96	10.22	6.26	3.99	2.53	1.59	1.13	0.78	0.52
2.80	R	1769.13	566.24	163.91	53.17	17.02	5.47	2.35	0.97	0.36
	V	17.19	11.00	6.74	4.30	2.72	1.71	1.21	0.84	0.56
3.00	R	2024.19	647.05	186.99	60.56	19.36	6.21	2.67	1.10	0.41
	V	18.42	11.79	7.22	4.61	2.91	1.84	1.30	0.96	0.64
3.20	R	2296.33	733.20	211.56	68.42	21.85	7.00	3.00	1.24	0.46
	V	19.65	12.58	7.70	4.91	3.11	1.96	1.39	0.96	0.64
3.40	R	2585.57	824.68	237.63	76.74	24.48	7.83	3.35	1.38	0.52
	V	20.88	13.36	8.18	5.22	3.30	2.08	1.47	1.02	0.68
3.60	R	2891.88	921.50	265.18	86.53	27.25	8.70	3.73	1.54	0.57
	V	22.10	14.15	8.66	5.53	3.50	2.20	1.56	1.08	0.72
3.80	R	3215.28	1023.65	294.23	94.78	30.17	9.62	4.12	1.69	0.63
	V	23.33	14.93	9.15	5.83	3.69	2.33	1.65	1.15	0.76
4.00	R	3555.76	1131.13	324.76	104.50	33.23	10.59	4.53	1.86	0.69
	V	24.56	15.72	9.63	6.14	3.89	2.45	1.73	1.21	0.80
4.20	R	3913.33	1243.94	356.78	114.67	36.57	11.60	4.96	2.04	0.76
	V	25.79	16.50	10.11	6.45	4.08	2.57	1.82	1.27	0.84
4.40	R	4287.97	1362.08	390.29	125.32	39.91	12.65	5.40	2.22	0.83
	V	27.02	17.29	10.59	6.75	4.28	2.69	1.91	1.33	0.88

◎Pipe Friction Factor and Flow Rate

Pipe friction factor R
and calculated flow rate v in dependence on the circulatory V̇

Polygon® pipe S 3.2/SDR 7.4/PN 16

Roughness : 0.0070mm
Temperature : 60°C
Density : 885kg/m³
Viscosity : 0.47x10⁻⁶m²/s

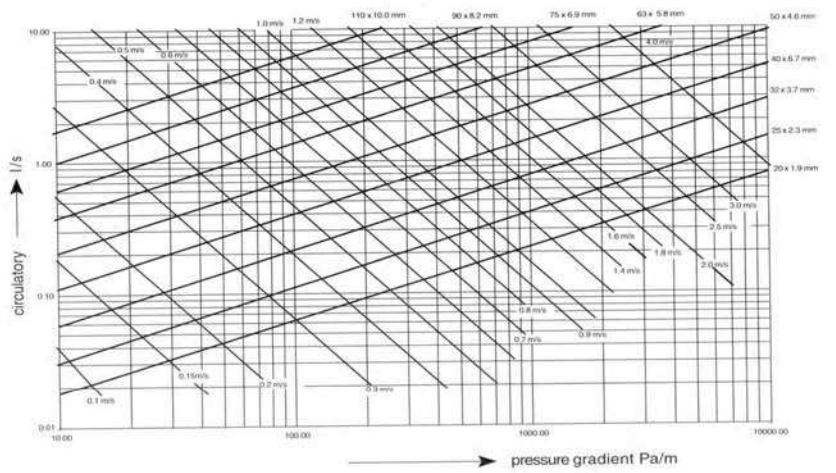
V̇=circulatory (l/s) R=pressure gradient (mbar/m) v=flow rate (m/s)

d x s ▶		20x2.8	25x3.5	32x4.5	40x5.6	50x6.9	63x8.7	75x10.4	90x12.5	110x15.2
V̇	d▶	14.4mm	18.0mm	23.0mm	28.8mm	36.2mm	45.6mm	54.2mm	65.0mm	79.6mm
4.60	R	4679.70	1485.56	425.28	136.42	43.41	13.74	5.86	2.41	0.90
	V	28.25	18.08	11.07	7.06	4.47	2.82	1.99	1.39	0.92
4.80	R	5088.50	1614.36	461.77	147.99	47.04	14.88	6.35	2.60	0.97
	V	29.47	18.86	11.55	7.37	4.66	2.94	2.08	1.45	0.96
5.00	R	5514.38	1748.49	499.73	160.01	50.82	16.06	6.85	2.81	1.04
	V	30.70	19.65	12.03	7.68	4.86	3.06	2.17	1.51	1.00
5.20	R	5957.35	1887.95	539.19	172.50	54.73	17.29	7.36	3.02	1.12
	V	31.93	20.43	12.52	7.98	5.05	3.18	2.25	1.57	1.04
5.40	R	6417.39	2.32.75	580.13	185.46	58.79	18.56	7.90	3.24	1.20
	V	33.16	21.22	13.00	8.29	5.25	3.31	2.34	1.63	1.09
5.60	R	6894.51	2182.78	622.55	198.87	62.99	19.87	8.45	3.46	1.29
	V	34.39	22.01	13.48	8.60	5.44	3.43	2.43	1.69	1.13
5.80	R	7388.70	2338.31	666.46	212.75	67.33	21.23	9.03	3.69	1.37
	V	35.61	22.79	13.96	8.90	5.64	3.55	2.51	1.75	1.17
6.00	R	7899.98	2499.09	711.86	227.08	71.81	22.62	9.61	3.93	1.46
	V	36.84	23.58	14.44	9.21	5.83	3.67	2.60	1.81	1.21
6.20	R	8428.34	2665.19	758.74	241.88	76.44	24.16	10.22	4.18	1.55
	V	38.07	24.36	14.92	9.52	6.02	3.80	2.69	1.87	1.25
6.40	R	8973.77	2836.63	807.11	257.14	81.20	25.65	10.85	4.43	1.64
	V	39.30	25.15	15.40	9.82	6.22	3.92	2.77	1.93	1.29
6.60	R	9536.28	3013.39	856.96	272.86	86.11	27.18	11.49	4.69	1.74
	V	40.53	25.94	15.89	10.13	6.41	4.04	2.86	1.99	1.33
6.80	R		3195.48	908.29	289.04	91.15	28.75	12.15	4.96	1.84
	V		26.72	16.37	10.44	6.61	4.16	2.95	2.05	1.37
7.00	R		3382.89	961.11	305.68	96.34	30.37	12.83	5.23	1.94
	V		27.51	16.85	10.75	6.80	4.29	3.03	2.11	1.41
7.50	R		3874.74	1099.66	349.30	109.92	34.60	14.60	5.95	2.20
	V		29.47	18.05	11.51	7.29	4.59	3.25	2.26	1.51
8.00	R		4399.89	1247.48	395.80	124.38	39.09	16.48	6.71	2.48
	V		31.44	19.26	12.28	7.77	4.90	3.47	2.41	1.61
9.00	R		5550.06	1570.95	497.44	155.94	48.88	20.66	8.36	3.08
	V		35.37	21.66	13.82	8.74	5.51	3.90	2.71	1.81
10.00	R		6833.41	1931.52	610.57	191.01	59.73	25.20	10.19	3.75
	V		39.30	24.07	15.35	9.72	6.12	4.33	3.01	2.01

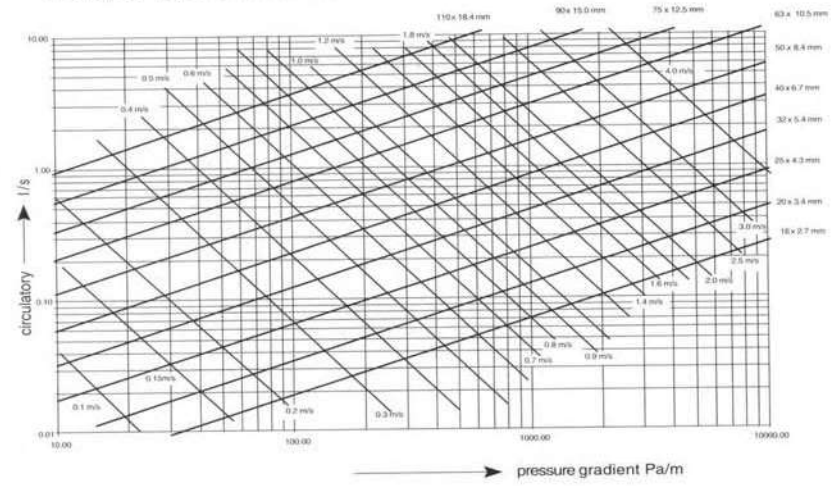
POLYGON PIPE

◎Pipe Gradient Diagrams

Polygon® pipe S 5/SDR 11/PN 10 Temperature 20 °C



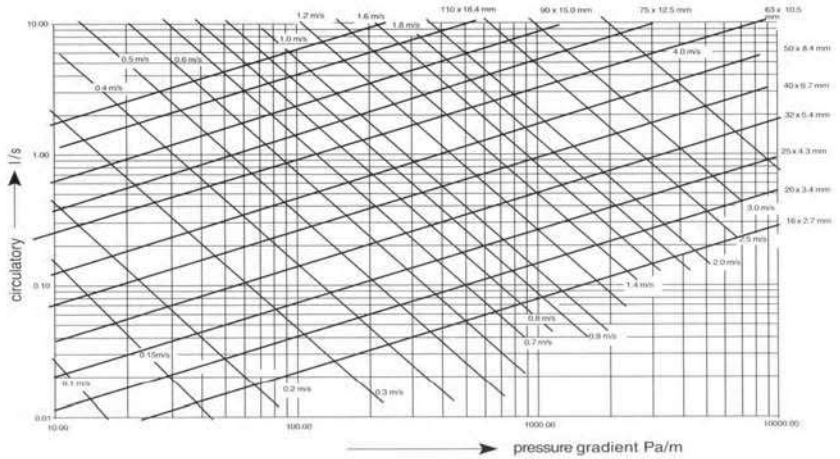
Polygon® pipe S 2.5/SDR 6/PN 20 Temperature 20 °C



◎Pipe Gradient Diagrams

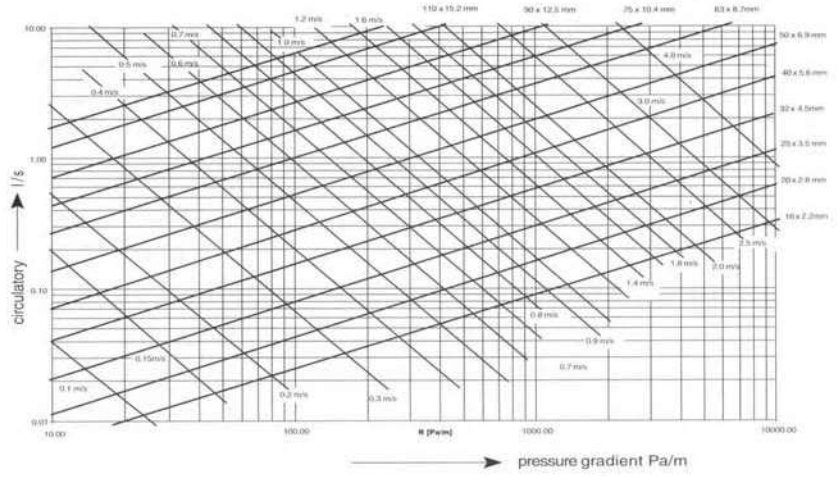
Polygon® pipe S 2.5/SDR 6/PN 20

Temperature 60 °C



Polygon® pipe S 3.2/SDR 7.4/PN 16

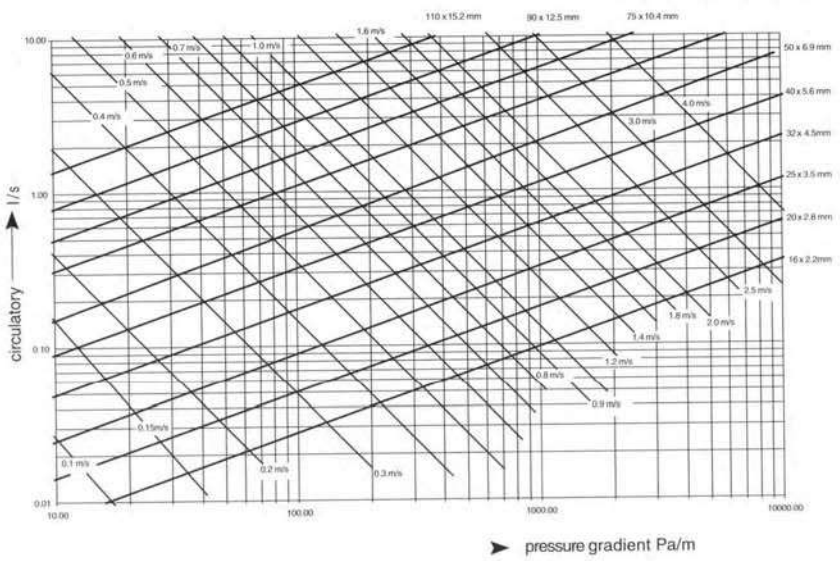
Temperature 20° C



◎Pipe Gradient Diagrams

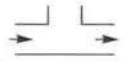
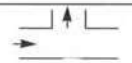
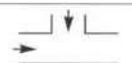
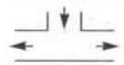
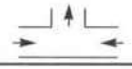
Polygon® pipe S 3.2/SDR 7.4/PN 16

Temperature 60° C



◎Coefficient of Loss Polygon® fittings

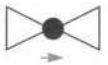
(→ = flow direction)

Fitting	Picture	Symbol	Comment	ζ -Value
Coupling				0.25
Reducer			Reduction...	
			···by 1 dimension	0.40
			···by 2 dimensions	0.50
			...by 3 dimensions	0.60
			...by 4 dimensions	0.70
			...by 5 dimensions	0.80
			...by 6 dimensions	0.90
90° elbow				1.20
45° elbow				0.50
Tee			Passage in case of separation of flow	0.25
			Separation of flow	1.20
			Conjunction of flow	0.80
			Counter current in case of separation of flow	1.80
			Counter current in case of conjunction of flow	3.00
Reducing tee		This -value results from, the addition pf tee and reducer.		
Cross			Separation of flow	2.10
			Conjunction of flow	3.70

POLYGON PIPE

◎Coefficient of Loss Polygon® fittings

(→ = flow direction)

Fitting	Picture	Symbol	Comment	ζ -Value
Female threaded coupling				0.50
Male threaded coupling				0.70
Female threaded elbow				1.40
Male threaded elbow				1.60
Female threaded tee			Separation of flow	
			- 20 x ¾" x 20	1.40
			- 20 x ½" x 20 - 25 x ¾" x 25 - 32 x 1" x 32	1.60
			- 25 x ½" x 25 - 32 x ¾" x 32	1.80
Male threaded tee			Separation of flow - 20 x ½" x 20	1.80
Stop valve			- 20mm	9.50
			- 25mm	8.50
			- 32mm	7.60
Ball cock			- 20mm	9.50
			- 25mm	8.50
			- 32mm	7.60

◎Chemical Resistance

This table described in according with DIN 8078,ISO/TR 7471,DIN 53756 ASTM and BS the chemical resistance of PP-R pipe and fittings.
Please notice:
Not subject to external mechanical stresses and to atmospheric pressure.
Please note that fuels must be transported according to the existing lows.
Symbols

+ = highly resistant
⊕ = resistant
○ = fairly resstant
⊖ = scarely resistant
- = not resistant
sol.sat. = saturated solution
t = all%
S = it loses colour

Examined substances	Concentration %	Temperature(℃) 20	60	100
Acetone	100	+	○	
Acid(see acid name)				
Acetic acid	100	+	+	
Aceti anhydrid	100	+		
Alum	sol.sat.	+	+	
Aluminium salt	t	+	+	+
Amber acid	sol.sat.	+	+	
Ammonia gas	100	+	+	
Ammonia(liquid)	conc.	+	+	
Ammonia acetate	t	+	+	+
Ammonium nitrate	t	+	+	+
Ammonium phosphate	t	+	+	+
Ammonium sulphate	t	+	+	+
Aniline	100	+	⊕	
Antifreeze		+	+	
Apple juice		+	+	
Asphalt		+	○	
Aspirin		+		
Barium Chloride	t	+	+	+
Battery acid		+	+	
Beer		+		
Benzaldehyde	100	+		
Benzaldehyde(liquid)	sol.sat.(0.3)	+		
Benzoid acid	100	+	+	
Benzol	100	⊖	-	
Benzoyl chloride	100	⊖	-	
Borax	sol.sat.	+	+	
Boric acid	100	+	+	
Bromine(liquid)	100	-		
Bromine,dry steam	high conc.	-	-	
Bromine,dry steam	low conc.	○	-	
Butane(liquid)	100	+		
Butane gas	100	⊕	+	
Butyl alcohol		+	+	
Butter	100	+	+	
Buty alcohol	100	+		
Butyl gas	100	⊕		
Calcium chloride	sol.sat.	+	+	+
Calcium nitrate	sol.sat.	+	+	
Carbon tetracheoride	100	⊖	-	
Chlorine(liquid)	100	-		
Chlorine,dry gas	100	-	-	-
Chlorine,wet gas	100	○	-	-

Examined substances	Concentration %	Temperature(℃) 20	60	100
Chlorosulfonic acid	100	-	-	-
Chromic acid		+	○	
Chromium plating bath		+	+	
Chromium plating salt	sol.sat	+	+	
Chromium trioxide	sol.sat	+	-	
Coca Cola		+		
Cocoa		+	+	⊕
Coffee		+	+	+
Copper salt	sol.sat.	+	+	+
Copper nitrate	30%	+	+	+
Cream		+		
Cresol	100	+	○	
Cyclohexan	100	+		
Cyclohexanol	100	+	+	
Diese oil		+	○	
Diethyl ether	100	○		
Dimenthyl formamide	100	+		
Diossano	100	+	○	-
Dixan(liquid)		+	+	+
Dry salt		+	+	
Ethyl acetate	100	○	○	
Ethyl alcohol	100	+		
Ethyl benzol	100	○	-	
Ethyl chloride	100	-		
Ethyl hexanol	100	+		
Flour		+		
Formaldehyde	40	+	+	
Formic acid		+		
Fruit juice		+	+	
Gelatine		+	+	⊕
Gin	40	+		
Glycerine	100	+	+	
Glycerine(liquid)	low conc.	+	+	+
Glyolic acid	100	+	+	
Glucose		+	+	+
Heptane	100	⊕	+	
Hexane	100	+	○	
Hydrocloric acid	high conc.	+	+	
Hydrocloric acid	low conc.	+	+	
Hydrocloric ammonium	t	+	+	+
Hydrogendioxide	10	+	+	
Hydrogendioxide	3	+	+	+
Iodine tincture		+s		
Iron salt	sol.sat.	+	+	+

POLYGON PIPE

◎Chemical Resistance

Examined substances	Concentration %	Temperature(℃) 20	60	100
Iso octane	100	+	○	
Iso propylic alcohol	100	+	+	
Jam		+	+	⊕
Lactic acid		+	+	
Lanolin		+	○	
Lemonades		+		
Lemon juice		+	+	
Limestone		+	+	+
Liquors	t			
Magnesium salt	sol.sat.	+	+	+
Margarine		+	+	
Mayonnaise		+		
Menthol		+		
Mercury	100	+	+	
Methanol	100	+	+	
Methyl chloride	100	○		
Methyl-ethy-ketone	100	+	○	
Milch		+	+	⊕
Muriatic acid	10	+	+	
Mustard		+	+	
Naphtalene(decahydro)	100	⊙	-	-
Naphtalene	100	+		
Naphtalene trachloride	100	○	-	
Nitric acid	10	⊕	-	-
Nickel,salt	sol.sat.	+	+	
Nitrobenzene	100	⊕	○	
Octane		+	○	
Oil	100	+	○	
Oil ether	100	+	○	
Oil of turpenthine		○	-	
Oleic salt	100	+		
Oleum	t	-	-	-
Orange juice		+	+	
Ozone	(0.5ppm.	⊕	⊖	
Oil:				
Almond oil		+	+	
Animal oil		+	⊕	⊖
Camphor oil		+	+	
Coconut oil		+	⊕	
Cod oil		+		
Cloves oil		+		
Corn oil		+	○	
Linseed oil		+	+	
Motor oil		+	○	-
Olive oil		+	+	
Oxalic oil		+	+	+
Paraffin oil		+	○	-
Peanut oil		+	⊕	-
Peppermint oil		+	+	
Rosin oil		+	⊕	
Silicone oil		+	⊕	
Paraffin	100	+	+	-
Petroleum naphta	100	+		
Pepper		+	+	
Perborax	sol.sat.(1.4)	+	+	+
Perfume		+		
Phenol	sol.sat.	+	+	
Phosphurus acid	sol.sat.	+	○	
Phosphuns oxichloride	100	○	-	-
Photographic acid		+	+	
Potassiumm carbonate	sol.sat.	+	+	

Examined substances	Concentration %	Temperature(℃) 20	60	100
Potassium chlorate	sol.sat.(7.3)	+	+	
Potassium chlorite	sol.sat.	+	+	+
Potassium chromate	sol.sat.(12)	+	+	+
Potassium iodide	sol.sat.	+	+	
Potassium nitrate	sol.sat.	+	+	
Potassium permangannate	sol.sat.(6.4)	+	⊕	
Potassium persulfate	sol.sat.(0.5)	+		
Potassium sulfate	sol.sat.	+	+	+
Propane gas	100	+	+	
Propane liquid	100	+		
Pyridine	100	+	○	
Quinine		+		
Silver salt	sol.sat.	+	+	
Soap(liquid)	10	+	+	+
Soda(caustic)	100	+	+	
Sodium bicarbonate	sol.sat.	+	+	+
Sodium Carbonate	sol.sat.	+	+	
Sodium chlorate	25	+	+	
Sodium chloride	sol.sat.	+	+	+
Sodium chlorite	5	+		
Sodium hypochlorite	5	+	+	
Sodium nitrate	sol.sat.	+	+	
Sodium phosphate	sol.sat.	+	+	+
Sodium sulphate	sol.sat.	+	+	+
Sodium sulphite	sol.sat.	+	+	
Sodium thiosulphate	sol.sat.	+	+	
Starch	t	+	+	
Sulphure carbon		○		
Tea		+	+	⊕
Tetracloretilene	100	○	-	
Tetraidrofurano	100	○	-	
Thiophene	100	○	-	
Tin II chloride	sol.sat.	+	+	
Toothpaste		+	+	
Trichlorethylene	100	○	⊙	
Tricresylphosphate		+		
Turpentine	100	-		
Urea	sol.sat.	+	+	
Vanilla		+	+	
Vaseline		+	○	
Vinegar		+	+	
Water:				
Boric water	sol.sat.(4.9)	+	+	
Brackish water		+	+	+
Chlorinated water	sol.sat.	○	-	
Chlorine water	12.5% chlorine	○	○	
Distilled water	100	+	+	+
Drinking water		+	+	+
Lake water		+	+	+
Soda water		+		
Wax		+	○	
Xylene	100	○	-	