



Technical Book

PP-R Plumbing System

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ABOUT RIFENG

RIFENG is a leading multinational corporation, providing one-stop piping solutions applied in residential, commercial, agricultural, industrial, and infrastructural sectors. Persistently reinventing since 1996, with over 8,000 employees, 70 branches & subsidiaries, and 300,000 distributors, we have served customers in more than 100 countries and regions.

With an integrated value chain, from R&D to manufacturing and retail distribution, we strive to fulfill our mission of offering ideal piping products and services for all environments.

8,000

Employees

300,000

Distributors worldwide

100+

Serving over 100
countries & Regions

70

Branches & Subsidiaries

RIFENG PP-R PIPING SYSTEM

RIFENG PP-R piping system, made out of high-quality polypropylene random copolymer, can be applied in both residential and commercial buildings.

Aplications

RIFENG PP-R piping system can be used in following applications:

- Distribution for cool and hot water
- Pipes to connect kinds of low temperature heating system
- Pipes for heating and cooling settings in solar energy system
- Cold water piping for air conditioners

Application areas:

- Potable water, hot and cold water, chemicals, irrigation
- Residential apartments, condominiums, public housing
- Commercial shopping centers, office buildings
- Industrial plants dealing with chemicals, food processing
- Hospitals
- Schools, laboratories and chemical sewerage
- Hotels and resorts

Standards

NSF/ANSI/CAN 61 – Drinking Water System Components - Health Effects
DVGW W 544 – Plastic Pipe Systems for Drinking Water – PP-R Pipe
DVGW W 534 – Plastic Pipe Systems for Drinking Water – PP-R Fitting
KTW-BWGL – Evaluation Criteria For Plastics And Other Organic Materials In Contact With Drinking Water
DIN 8077 – Pipe of Polypropylene - Dimension
DIN 8078 – Pipe of Polypropylene - General Quality Requirement and testing
DIN 16962 – Fittings and Components for Pressure Systems of Polypropylene
ISO 15874 – Plastic Piping System for Hot and Cold Water Installations – Polypropylene

Certificates

RIFENG PP-R piping system

NSF61, U.S.
DVGW, German
KTW-BWGL, German
AENOR, Spain
CE, Europe
ISO 9001,TUV

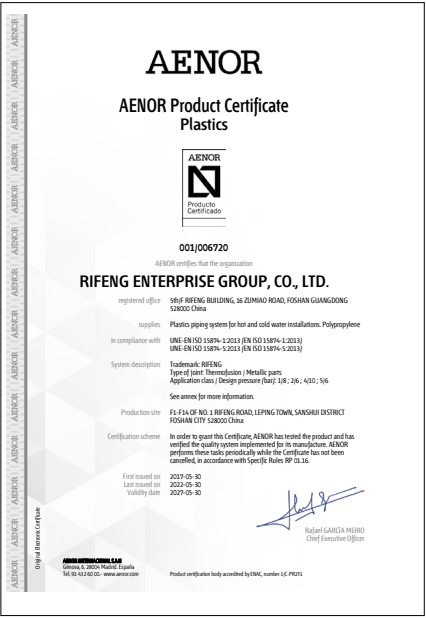
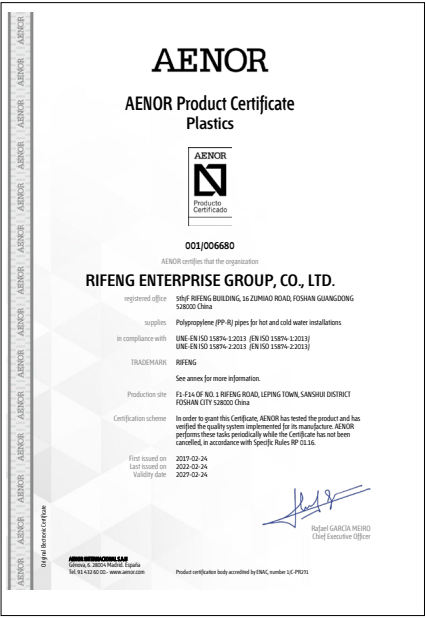
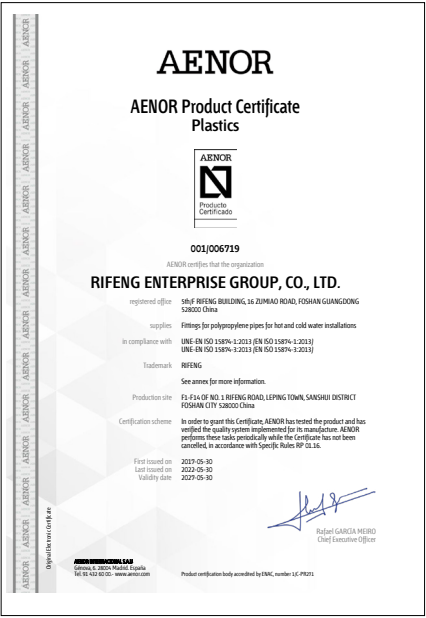
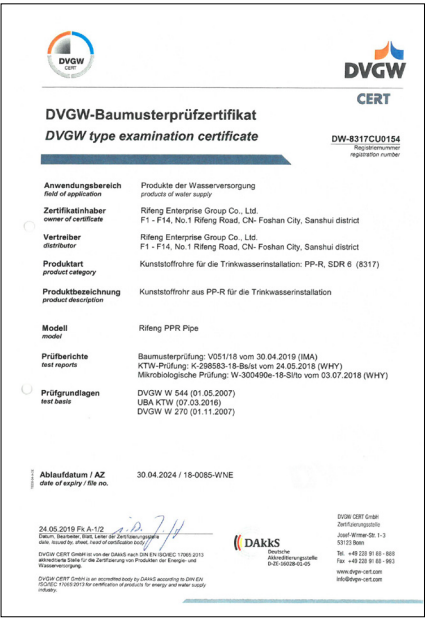
Certificate of Recommended Product for Green Building from BMTC, China
Certificate of Recommended Product of Green & Energy Saving from CECS, China
China Environmental Labelling

RIFENG Enterprise Group Co., Ltd

ISO 9001:2015 – Quality Management System
(Certified by authoritative TÜV Rheinland)
ISO 14001:2015 – Environmental Management System
ISO 45001:2018 – Occupational Health and Safety Management System.

Advatages

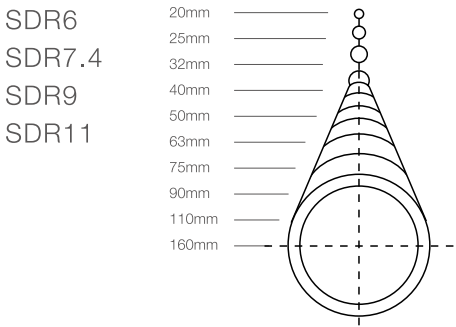
- Corrosion-resistant
- Light in weight
- Hygienic and non-toxic
- Outstanding heat and sound insulation property
- A lifetime up to 50 years under normal conditions (the maximum working temperature of RIFENG PP-R pipes is up to 80°C and the working temperature for long-term use is 70°C)
- Smooth reliable inner wall
- Safe homogeneous connections



PP-R PIPES

Standard Dimension Ratio(SDR)

SDR = Outer Diameter (mm) / Wall Thickness (mm)



Example 1

PP-R pipe with 25mm outer diameter and 4.2mm wall thickness.
SDR = Outer diameter (mm) / Wall thickness (mm) = 25/4.2 = 5.96
Therefore we call PP-R pipe with 25mm outer diameter and 4.2mm wall thickness as being SDR 6.

Example 2

PP-R pipe with 25mm outer diameter and 2.3mm wall thickness.
SDR = Outer diameter (mm)/Wall thickness (mm) = 25/2.3 = 10.87
So we call PP-R pipe with 25mm outer diameter and 2.3mm wall thickness as being SDR 11.

Pipe Series(S)

S = (SDR-1) / 2

Example 1

We can confirm the according serie for SDR 6 by calculation.
S = (SDR-1)/2 = (6-1)/2 = 2.5
Therefore we call SDR 6 as S2.5 in series system.

Example 2

We can confirm the according serie for SDR 11 by calculation.
S = (SDR-1)/2 = (11-1)/2 = 5
Therefore we call SDR 11 as S5 in series system.

From the above examples, we can know that when the pipe has lower standard dimension ratio (SDR) or smaller Pipe series number, the wall thickness is thicker, and thus pressure resistance will be higher accordingly.

PN Rating(PN)

According to DIN 8077:PN, normal pressure, is an expressive method to describe pipes and fittings, with constant temperature of 20°C and a condition of 50 years life time. This method of describing PP-R pipe is still popular but gradually replaced by SDR, since it gives not enough consideration for maximum operating temperature at different temperature.

SDR, S and PN Relations

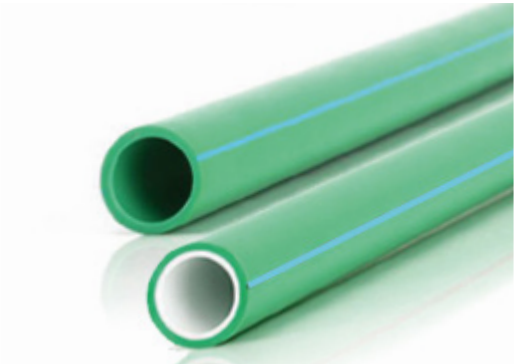
According to the standard, the relation among S, SDR and PN are as followed:
S2.5 3.2 5 is the ISO standard, S4 is the enterprise standard

S	SDR	PN
5	11	12.5
4	9	16
3.2	7.4	20
2.5	6	25

Pipe Series

S5 MONOLAYER & DOUBLE-LAYER PP-R PIPE(SDR11,PN20)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-60°C
Working pressure: 10Bar (SF1.5)/12.5Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two blue lines
Form supplied: 4m (5.8m for customization)



Specification:

Spec.	S5-20	S5-25	S5-32	S5-40	S5-50	S5-63	S5-75	S5-90	S5-110	S5-160
OD	20	25	32	40	50	63	75	90	110	160
Wall	2.0	2.3	2.9	4.0	4.6	5.8	6.8	8.2	10.0	14.6

S3.2 MONOLAYER & DOUBLE-LAYER PP-R PIPE(SDR7.4,PN12.5)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 16Bar (SF1.5)/20Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)



Specification:

Spec.	S3.2-20	S3.2-25	S3.32	S3.2-40	S3.2-50	S3.2-63	S3.2-75	S3.2-90	S3.2-110	S3.2-160
OD	20	25	32	40	50	63	75	90	110	160
Wall	2.8	3.5	4.4	5.5	6.9	8.6	10.3	12.3	15. 1	21.9

S2.5 MONOLAYER & DOUBLE-LAYER PP-R PIPE(SDR6,PN25)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 20Bar (SF1.5)/25Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)



Specification:

Spec.	S2.5-20	S2.5-25	S2.5-32	S2.5-40	S2.5-50	S2.5-63	S2.5-75	S2.5-90	S2.5-110	S2.5-160
OD	20	25	32	40	50	63	75	90	110	160
Wall	3.4	4.2	5.4	6.7	8.3	10.5	12.5	15	18.3	26.6

Antibacterial Ceramic PP-R Pipe

Double & three layers

With non-scaling and smooth inner wall, the multi-layer structure of antibacterial ceramic ppr can effectively insluates from sunlight. Also, the silver ion antibacterial layer can significantly improves the antibacterial ability.

S3.2 ANTIBACTERIAL CERAMIC PP-R PIPE (SDR7.4,PN20)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 16Bar (SF1.5)/20Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)

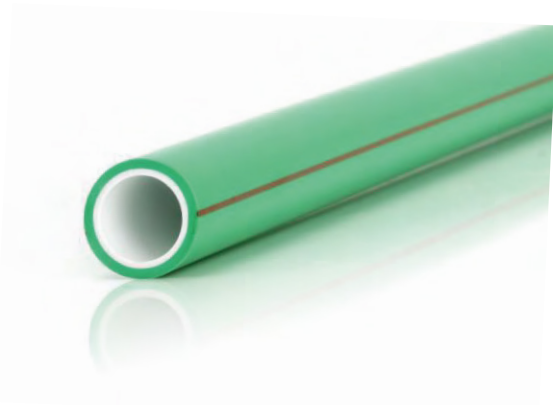


Specification:

Spec.	S3.2-20	S3.2-25	S3.2-32
OD	20	25	32
Wall	2.8	3.5	4.4

S2.5 ANTIBACTERIAL CERAMIC PP-R PIPE(SDR6,PN25)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 20Bar (SF1.5)/25Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)



Specification:

Spec.	S2.5-20	S2.5-25	S2.5-32
OD	20	25	32
Wall	3.4	4.2	5.4

Fiber Composite PP-R Pipe

- Strongly isolate light to ensure clean water
- Low linear expansion coefficient
- Three-layer structure design, stable and reliable
- Upgraded temperature resistance

S3.2 FIBER COMPOSITE PP-R PIPE (SDR7.4,PN20)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 16Bar (SF1.5)/20Bar (SF1.25)
Lifetime: 50 years*
Standard: DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)
Special: Less linear expansion (only 1/3 of normal S3.2 PP-R pipe)



Specification:

Spec.	S3.2-20	S3.2-25	S3.2-32	S3.2-40	S3.2-50	S3.2-63	S3.2-75	S3.2-90	S3.2-110	S3.2-160
OD	20	25	32	40	50	63	75	90	110	160
Wall	2.8	3.5	4.4	5.5	6.9	8.6	10.3	12.3	15.1	21.9

S2.5 FIBER COMPOSITE PP-R PIPE (SDR6,PN25)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 20Bar (SF1.5)/25Bar (SF1.25)
Lifetime: 50 years*
Standard: DIN 8077/78
Physical appearance: Green with four red lines
Form supplied: 4m (5.8m for customization)
Special: Less linear expansion (only 1/3 of normal S2.5 PP-R pipe)



Specification:

Spec.	S2.5-20	S2.5-25	S2.5-32	S2.5-40	S2.5-50	S2.5-63	S2.5-75	S2.5-90	S2.5-110	S2.5-160
OD	20	25	32	40	50	63	75	90	110	160
Wall	3.4	4.2	5.4	6.7	8.3	10.5	12.5	15	18.3	26.6

PP-RCT Pipe

New features were added to PP-R pipes thanks to the modern PP-RCT material. β-nucleation process as the basis greatly improves the crystalline structure of polypropylene random copolymer PP. This process enhances the crystalline structure which enables pipes produced from this material could operate at high stresses and temperatures.

- Greater performance at pressure resistance and temperatures resistance
- Greater flow rate due to lower wall thickness
- Cost saving due to smaller diameters options
- Low temperature impact resistance

S5 PP-RCT PIPE (SDR11,PN12)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-60°C
Working pressure: 12Bar (SF1.5)/16Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)



Specification:

Spec.	S3.2-20	S3.2-25	S3.2-32	S3.2-40	S3.2-50	S3.2-63
OD	20	25	32	40	50	63
Wall	2.8	3.5	4.4	5.5	6.9	8.6

S3.2 PP-RCT PIPE (SDR7.4,PN25)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 19Bar (SF1.5)/25Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)



Specification:

Spec.	S3.2-20	S3.2-25	S3.2 -32	S3.2-40	S3.2 -50	S3.2-63
OD	20	25	32	40	50	63
Wall	2.8	3.5	4.4	5.5	6.9	8.6

S2.5 PP-RCT PP-R PIPE (SDR6,PN32)

Application: potable water, warm water piping system, chilled water piping system or other piping systems
Working temperature: 3-95°C
Working pressure: 24Bar (SF1.5)/32Bar (SF1.25)
Lifetime: 50 years*
Standard: ISO 15874, DIN 8077/78
Physical appearance: Green with two red lines
Form supplied: 4m (5.8m for customization)



Specification:

Spec.	S2.5-20	S2.5-25	S2.5-32	S2.5-40	S2.5-50	S2.5-63
OD	20	25	32	40	50	63
Wall	3.4	4.2	5.4	6.7	8.3	10.5

Dimensional Control

Specification, outer and inner diameter, thickness and tolerance

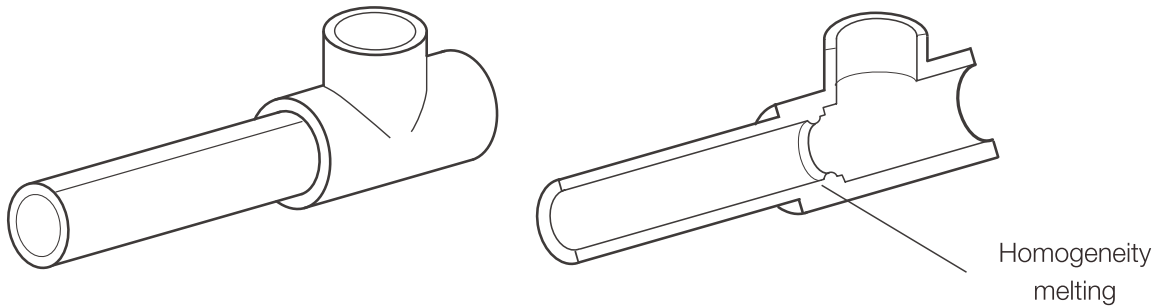
Nominal outside diameter d _n (mm)	Mean Outside Diameter		PPR pipe series				
	d _{em,min} (mm)	d _{em,max} (mm)	S5	S4	S3.2	S2.5	S2
			Wall Thickness (mm)				
12	12.0	12.3	--	--	--	2.0	2.4
16	16.0	16.3	--	2.0	2.2	2.7	3.3
20	20.0	20.3	2.0	2.3	2.8	3.4	4.1
25	25.0	25.3	2.3	2.8	3.5	4.2	5.1
32	32.0	32.3	2.9	3.6	4.4	5.4	6.5
40	40.0	40.4	3.7	4.5	5.5	6.7	8.1
50	50.0	50.5	4.6	5.6	6.9	8.3	10.1
63	63.0	63.5	5.8	7.1	8.6	10.5	12.7
75	75.0	75.7	6.8	8.4	10.3	12.5	15.1
90	90.0	90.9	8.2	10.1	12.3	15.0	18.1
110	110.0	111.0	10.0	12.3	15.1	18.3	22.1
125	125.0	126.2	11.4	14.0	17.1	20.8	25.1
140	140.0	141.3	12.7	15.7	19.2	23.3	28.1
160	160.0	161.5	14.6	17.9	21.9	26.6	32.1



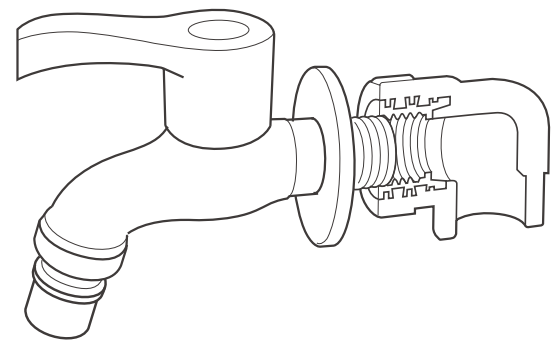
CONNECTION

Reliable Homogeneous Connections

Homogeneity melting provides reliable connection strength and sealing property between PP-R pipes and PP-R fittings.



Metal Thread Connection



RIFENG also provides metal thread connection methods to achieve connection conversion between different scenarios.

RIFENG PP-R fittings have an unique structure - swallow tailed structure on the metal insert, which can eliminate the risk of leakage from gaps caused by different thermal conductivity performances of brass and plastic. RIFENG holds the exclusive patent to manufacture these fittings.



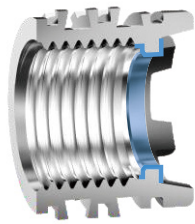
SWALLOW TAILED NOTCH :

Avoid leakage risk caused by different thermal expansions.



36 BITING POINTS :

Anti-axial slip between metal insert and the plastic part.

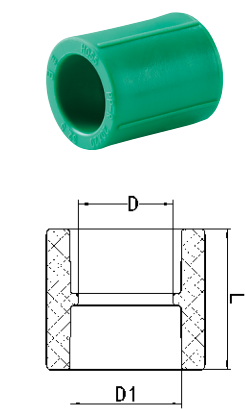


BUTTON SAFETY RING :

Anti-over-twist when installing devices with threads.

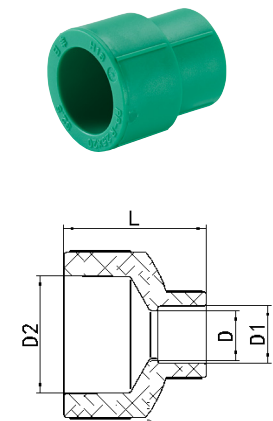


COUPLING



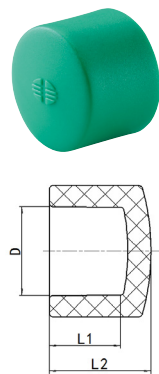
Description	pcs/ctn.	D	D1	L
COUPLING F12-S20x20	1620	16	19.2	34.5
COUPLING F12-S25x25	720	20	24.1	39
COUPLING F12-S32x32	480	26	31.1	44
COUPLING F12-S40x40	210	33	39	48
COUPLING F12-S50x50	112	43	49	55
COUPLING F12-S63x63	64	55	61.9	64
COUPLING F12-S75x75	48	69.7	73.6	70
COUPLING F12-S90x90	20	84.3	88.3	80
COUPLING F12-S110x110	12	103.3	107.9	94

COUPLING REDUCER



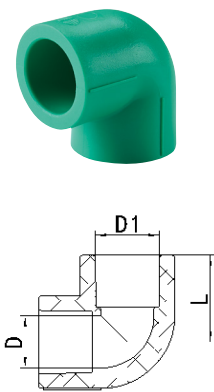
Description	pcs/ctn.	D	D1	D2	L
COUPLING REDUCER F12-S25x20	1080	16	19.2	24.1	39
COUPLING REDUCER F12-S32x20	720	16	19.2	31.1	43
COUPLING REDUCER F12-S32x25	600	20	24.1	31.1	44
COUPLING REDUCER F12-S40x20	300	16	19.2	39	47
COUPLING REDUCER F12-S40x25	300	20	24.1	39	48
COUPLING REDUCER F12-S40x32	200	26	31.1	39	49
COUPLING REDUCER F12-S50x20	160	16	19.2	49	53.5
COUPLING REDUCER F12-S50x25	160	20	24.1	49	55
COUPLING REDUCER F12-S50x32	168	26	31.1	49	55.5
COUPLING REDUCER F12-S50x40	112	33	39	49	56
COUPLING REDUCER F12-S63x20	81	16	19.2	61.9	61
COUPLING REDUCER F12-S63x25	96	20	24.1	61.9	62.5
COUPLING REDUCER F12-S63x32	81	26	31.1	61.9	63
COUPLING REDUCER F12-S63x40	98	33	39	61.9	63
COUPLING REDUCER F12-S63x50	70	43	49	61.9	64
COUPLING REDUCER F12-S75x63	36	58.8	61.9	73.6	86.5
COUPLING REDUCER F12-S90x50	28	46	49	88.3	95
COUPLING REDUCER F12-S90x63	20	58.8	61.9	88.3	100.5
COUPLING REDUCER F12-S90x75	24	69.7	73.6	88.3	100
COUPLING REDUCER F12-S110x50	18	46	49	107.9	105
COUPLING REDUCER F12-S110x63	20	58.8	61.9	107.9	105.5
COUPLING REDUCER F12-S110x75	20	69.7	73.6	107.9	109
COUPLING REDUCER F12-S110x90	12	84.3	88.3	107.9	114

END CAP



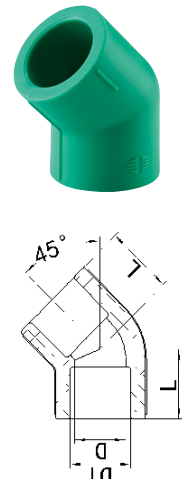
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END CAP F12-D20	2160	20	16	22
END CAP F12-D25	1800	25	18	25
END CAP F12-D32	840	32	20	28.5
END CAP F12-D40	325	40	22	32
END CAP F12-D50	176	50	25.5	37
END CAP F12-D63	90	63	29.5	44
END CAP F12-D75	72	75	32	46.2
END CAP F12-D90	34	90	36	52.8
END CAP F12-D110	24	110	42	63

EQUAL ELBOW 90°



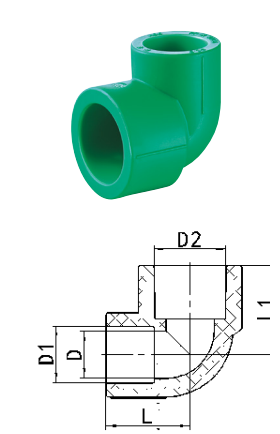
Description	pcs/ctn.	D	D1	L
EQUAL ELBOW 90° F12-L20x20	960	16	19.2	26.5
EQUAL ELBOW 90° F12-L25x25	600	20	24.1	31
EQUAL ELBOW 90° F12-L32x32	288	26.4	31.1	36.5
EQUAL ELBOW 90° F12-L40x40	120	33	39	42.5
EQUAL ELBOW 90° F12-L50x50	57	43	49	51
EQUAL ELBOW 90° F12-L63x63	24	55	61.9	61.5
EQUAL ELBOW 90° F12-L75x75	18	69.7	73.6	70.7
EQUAL ELBOW 90° F12-L90x90	12	84.3	88.3	82
EQUAL ELBOW 90° F12-L110x110	6	103.3	107.9	97.7

EQUAL ELBOW 45°



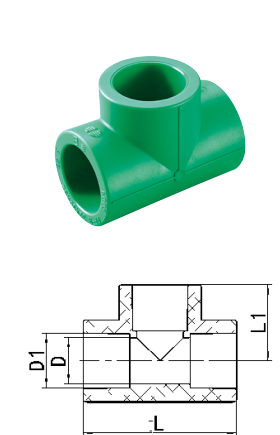
Description	pcs/ctn.	D	D1	L
EQUAL ELBOW 45° F12-L20x20	1080	16	19.2	21.5
EQUAL ELBOW 45° F12-L25x25	720	20	24.1	25
EQUAL ELBOW 45° F12-L32x32	360	26	31.1	29
EQUAL ELBOW 45° F12-L40x40	120	33	39	32.5
EQUAL ELBOW 45° F12-L50x50	60	43	49	38.5
EQUAL ELBOW 45° F12-L63x63	36	55	61.9	45
EQUAL ELBOW 45° F12-L75x75	24	69.7	73.6	51.2
EQUAL ELBOW 45° F12-L90x90	12	84.3	88.3	58.3
EQUAL ELBOW 45° F12-L110x110	8	103.3	107.9	68.3

REDUCING ELBOW



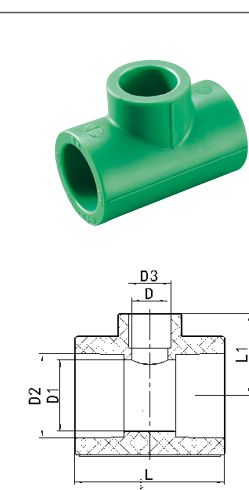
Description	pcs/ctn.	D	D1	D2	L	L1
REDUCING ELBOW F12-L25x20	600	16	19.2	24.1	28	30
REDUCING ELBOW F12-L32x20	384	16	19.2	31.1	32	32.5
REDUCING ELBOW F12-L32x25	288	20	24.1	31.1	34	35
REDUCING ELBOW F12-L40x32	120	26.4	31.1	39	40	41.5
REDUCING ELBOW F12-L50x32	100	26.4	31.1	49	44	48

EQUAL TEE



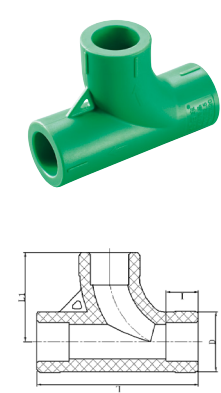
Description	pcs/ctn.	D	D1	L	L1
EQUAL TEE F12-T20x20x20	720	16	19.2	53	26.5
EQUAL TEE F12-T25x25x25	384	20	24.1	62	31
EQUAL TEE F12-T32x32x32	240	26.5	31.1	73	36.5
EQUAL TEE F12-T40x40x40	92	33	39	85	42.5
EQUAL TEE F12-T50x50x50	54	43	49	102	51
EQUAL TEE F12-T63x63x63	27	55	61.9	123	61.5
EQUAL TEE F12-T75x75x75	14	69.7	73.6	141.3	70.7
EQUAL TEE F12-T90x90x90	10	84.3	88.3	163.9	82.0
EQUAL TEE F12-T110x110x110	4	103.3	107.9	195.3	97.7

REDUCING TEE



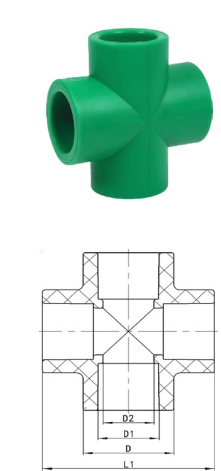
Description	pcs/ctn.	D	D1	D2	D3	L
REDUCING TEE F12-T25x20x20	600	16	16	24.1	19.2	55
REDUCING TEE F12-T25x20x25	480	16	20	24.1	19.2	57.5
REDUCING TEE F12-T32x20x32	240	16	26.5	31.1	19.2	63
REDUCING TEE F12-T32x25x32	240	20	26.5	31.1	24.1	67
REDUCING TEE F12-T40x20x40	120	16	33	39	19.2	67
REDUCING TEE F12-T40x25x40	120	20	33	39	24.1	71
REDUCING TEE F12-T40x32x40	112	26	33	39	31.1	77
REDUCING TEE F12-T50x20x50	88	16	43	49	19.2	75
REDUCING TEE F12-T50x25x50	80	20	43	49	24.1	79
REDUCING TEE F12-T50x32x50	60	26	43	49	31.1	85
REDUCING TEE F12-T50x40x50	60	33	43	49	39	92
REDUCING TEE F12-T63x20x63	45	16	55	61.9	19.2	84
REDUCING TEE F12-T63x25x63	45	20	55	61.9	24.1	88
REDUCING TEE F12-T63x32x63	36	26	55	61.9	31.1	94
REDUCING TEE F12-T63x40x63	36	33	55	61.9	39	101
REDUCING TEE F12-T63x50x63	27	43	55	61.9	49	111
REDUCING TEE F12-T75x25x75	33	22	69.7	73.6	24.1	93.1
REDUCING TEE F12-T75x32x75	30	29	69.7	73.6	31.1	100
REDUCING TEE F12-T75x40x75	24	36	69.7	73.6	39	107.9
REDUCING TEE F12-T75x50x75	20	46	69.7	73.6	49	117.8
REDUCING TEE F12-T75x63x75	18	59	69.7	73.6	61.9	130.7
REDUCING TEE F12-T90x32x90	14	26.5	84.3	88.3	31.1	108
REDUCING TEE F12-T90x40x90	12	36	84.3	88.3	39	115.9
REDUCING TEE F12-T90x50x90	12	46	84.3	88.3	49	125.8
REDUCING TEE F12-T90x63x90	12	59	84.3	88.3	61.9	138.7
REDUCING TEE F12-T90x75x90	12	69.7	84.3	88.3	73.6	149.3
REDUCING TEE F12-T110x25x110	12	20	103.3	107.9	24.1	115
REDUCING TEE F12-T110x40x110	12	33	103.3	107.9	39	128
REDUCING TEE F12-T110x50x110	10	46	103.3	107.9	49	137.8
REDUCING TEE F12-T110x63x110	8	59	103.3	107.9	61.9	150.7
REDUCING TEE F12-T110x75x110	6	69.7	103.3	107.9	73.6	161.3
REDUCING TEE F12-T110x90x110	4	84.3	103.3	107.9	88.3	175.9

SWEEP JUNCTION



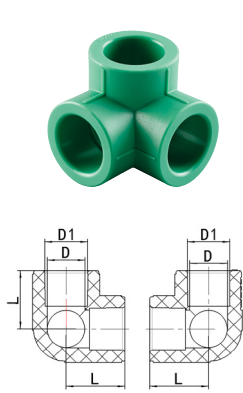
Description	pcs/ctn.	D	I	L	L1
SWEEP JUNCTION F12-T20x20x20	240	29.4	16	80	44
SWEEP JUNCTION F12-T25x25x25	180	36	18	95	52

CROSS



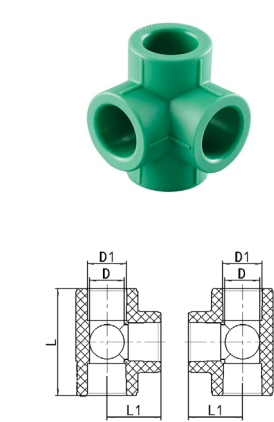
Description	pcs/ctn.	D	D1	D2	L1
CROSS F12-X20x20x20x20	360	28.4	20	16	54
CROSS F12-X25x25x25x25	180	34.5	25	20	64
CROSS F12-X32x32x32x32	120	26.5	32	43.7	75

CORNER TEE



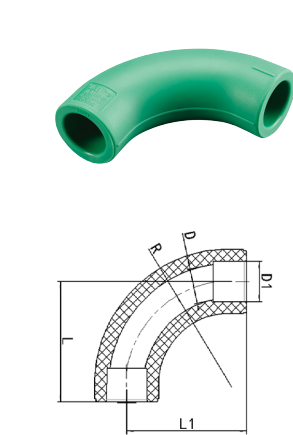
Description	pcs/ctn.	D	D1	L
CORNER TEE F12-K20x20x20	360	17	19.2	26.5
CORNER TEE F12-K25x25x25	360	21	24.1	31
CORNER TEE F12-K32x32x32	240	28	31.1	36.5

SIDE OUTLET TEE



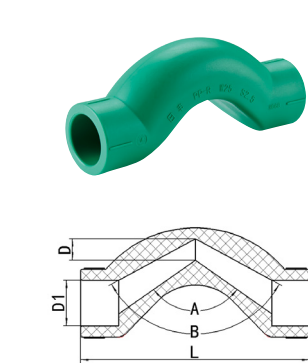
Description	pcs/ctn.	D	D1	L	L1
SIDE OUT LET F12-X20x20x20x20	360	17	19.2	53	26.5
SIDE OUT LET F12-X25x25x25x25	288	21	24.1	62	31
SIDE OUT LET F12-X32x32x32x32	144	28	31.1	73	36.5

LARGE ARC ELBOW



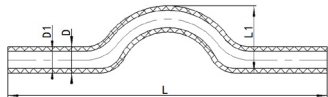
Description	pcs/ctn.	D	D1	R	L	L1
LARGE ARC ELBOW F12-L20x20	240	16.5	19.2	50.2	57	57
LARGE ARC ELBOW F12-L25x25	180	21	24.1	59.7	67	67
LARGE ARC ELBOW F12-L32x32	120	28	31.1	70.8	79	79

BRIDGE FITTING



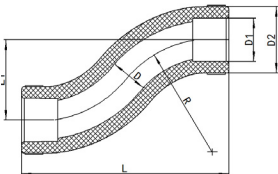
Description	pcs/ctn.	D	I	H	L
BRIDGE FITTING F12-W20x20	360	29.4	16	126	44
BRIDGE FITTING F12-W25x25	288	36	18	150	55
BRIDGE FITTING F12-W32x32	120	45	20	180	70

PIPE BRIDGE



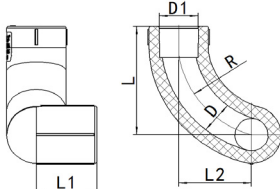
Description	pcs/ctn.	D	D1	L	L1
PIPE BRIDGE F12-W20x20 (L) (S2.5)	165	20	13.2	360	50
PIPE BRIDGE F12-W25x25 (L) (S2.5)	96	25	16.6	360	60
PIPE BRIDGE F12-W32x32 (L) (S2.5)	70	32	21.2	360	60

S-TYPE UNION



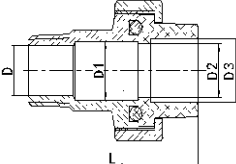
Description	pcs/ctn.	D	D1	D2	R	L	L1
S-TYPE UNION F12-S20x20	480	16.5	19.2	29.4	50.2	92	35.5
S-TYPE UNION F12-S25x25	300	21	24.1	36	59.7	104.6	38

L-TYPE ELBOW



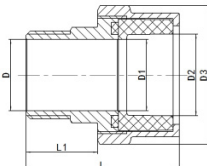
Description	pcs/ctn.	D	D1	R	L	L1	L2
L-TYPE ELBOW F12-L20x20-RIGHT	180	16.5	19.2	50.2	55.6	30	36
L-TYPE ELBOW F12-L20x20-LEFT	180	16.5	19.2	50.2	55.6	30	36

ADAPTOR UNION-MALE THREAD



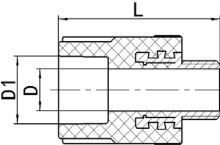
Description	pcs/ctn.	D	D1	D2	D3	L
ADAPTOR UNION-MALE THREAD F12-S20x1/2M H	150	15	21.4	16	19.2	52
ADAPTOR UNION-MALE THREAD F12-S25x1/2M H	120	15	27.4	20	24.1	55
ADAPTOR UNION-MALE THREAD F12-S25x3/4M H	150	20	21	20	24.1	55
ADAPTOR UNION-MALE THREAD F12-S25x1M H	120	26	23	20	24.1	57
ADAPTOR UNION-MALE THREAD F12-S32x3/4M H	90	20	22	26	31.1	59.5
ADAPTOR UNION-MALE THREAD F12-S32x1M H	72	26	28	26	31.1	59.5

FLEXIBLE MALE THREADED UNION



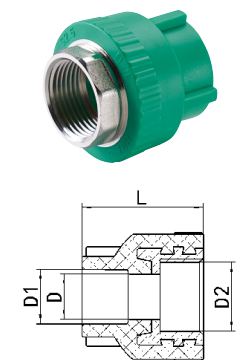
Description	pcs/ctn.	D	D1	D2	D3	L1	L
FLEXIBLE MALE THREADED UNION F12-S40x1 1/4M(H)	60	34	34	39	66	34	73
FLEXIBLE MALE THREADED UNION F12-S50x1 1/2M(H)	45	39	45	49	81	34	76.5
FLEXIBLE MALE THREADED UNION F12-S63x2M(H)	18	50.5	57	61.9	99	41	90.5

MALE THREADED UNION



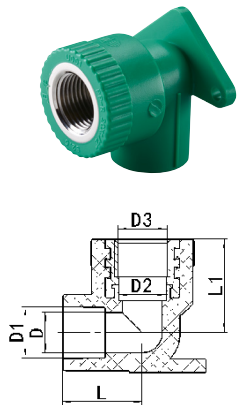
Description	pcs/ctn.	D	D1	L
MALE THREADED UNION F12-S20x1/2M	240	15	19.2	56
MALE THREADED UNION F12-S20x3/4M	180	16	19.2	57
MALE THREADED UNION F12-S25x1/2M	210	15	24.1	59
MALE THREADED UNION F12-S25x1M	90	20	24.1	73
MALE THREADED UNION F12-S25x3/4M	180	20	24.1	60
MALE THREADED UNION F12-S32x1/2M	180	14.8	31.1	62
MALE THREADED UNION F12-S32x1M	72	26	31.1	73
MALE THREADED UNION F12-S32x3/4M	144	20	31.1	62
MALE THREADED UNION F12-S40x1 1/4M	60	33.5	39	84
MALE THREADED UNION F12-S50x1 1/2M	45	38.5	49	89
MALE THREADED UNION F12-S63x2M	24	50	61.9	103

FEMALE THREADED UNION



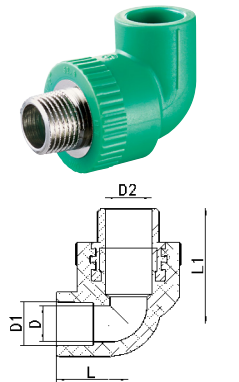
Description	pcs/ctn.	D	D1	D2	L
FEMALE THREADED UNION F12-S20x1/2F	360	16.4	19.2	19.05	42
FEMALE THREADED UNION F12-S20x3/4F	240	17	19.2	24.5	42
FEMALE THREADED UNION F12-S25x1/2F	300	16.4	24.1	19.05	45
FEMALE THREADED UNION F12-S25x1F	96	20	24.1	30.55	45
FEMALE THREADED UNION F12-S25x3/4F	180	22	24.1	24.5	45
FEMALE THREADED UNION F12-S32x1/2F	240	16.4	31.1	19.05	47
FEMALE THREADED UNION F12-S32x1F	96	26	31.1	30.55	56
FEMALE THREADED UNION F12-S32x3/4F	180	22	31.1	24.5	47
FEMALE THREADED UNION F12-S40x1 1/4F	80	33.5	39	38.95	65
FEMALE THREADED UNION F12-S50x1 1/2F	60	38.5	49	44.85	70
FEMALE THREADED UNION F12-S63x2F	36	50	61.9	56.66	81

Z-TYPE FEMALE ELBOW



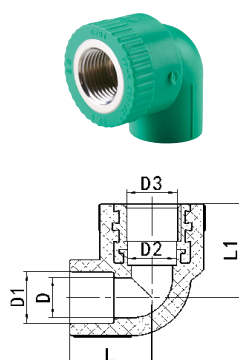
Description	pcs/ctn.	D	D1	L	L1
Z-TYPE FEMALE ELBOW F12-L20x1/2F (Z)	210	15	19.2	30	49
Z-TYPE FEMALE ELBOW F12-L25x1/2F (Z)	180	15	24.1	31.5	52

MALE THREADED ELBOW



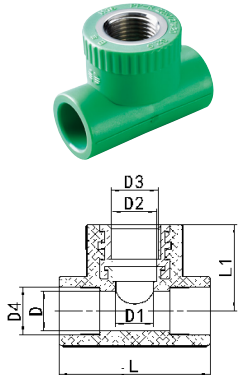
Description	pcs/ctn.	D	D1	D2	L	L1
MALE THREADED ELBOW F12-L20x1/2M	240	14.8	19.2	15.1	30	49
MALE THREADED ELBOW F12-L20x3/4M	150	16	19.2	19.5	31	51
MALE THREADED ELBOW F12-L25x1/2M	180	14.8	24.1	15.1	31.5	52
MALE THREADED ELBOW F12-L25x1M	72	20	24.1	26.3	40.5	70
MALE THREADED ELBOW F12-L25x3/4M	150	19.5	24.1	20	33	54
MALE THREADED ELBOW F12-L32x1/2M	114	14.8	31.1	15.1	36.5	56
MALE THREADED ELBOW F12-L32x1M	60	26.07	31.1	26.3	40.5	73
MALE THREADED ELBOW F12-L32x3/4M	120	19.5	31.1	20	37.5	58
MALE THREADED ELBOW F12-L40x1 1/4M	36	33.5	39	34	50	83.5
MALE THREADED ELBOW F12-L50x1 1/2M	30	38.5	49	39	57	94
MALE THREADED ELBOW F12-L63x2M	16	50	61.9	50.5	65	112

FEMALE THREADED ELBOW



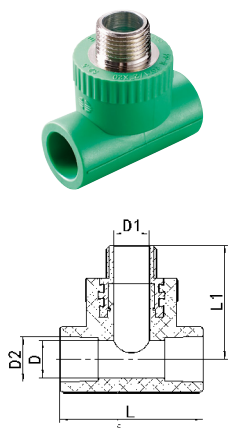
Description	pcs/ctn.	D	D1	D2	D3	L	L1
FEMALE THREADED ELBOW F12-L20x1/2F	240	16.4	19.2	16.4	19.05	30	35
FEMALE THREADED ELBOW F12-L20x3/4F	180	16	19.2	22	24.5	31	36
FEMALE THREADED ELBOW F12-L25x1/2F	210	16.4	24.1	16.4	19.05	31.5	38
FEMALE THREADED ELBOW F12-L25x1F	90	20	24.1	26	30.55	40.5	53
FEMALE THREADED ELBOW F12-L25x3/4F	180	22	24.1	22	24.5	33	39
FEMALE THREADED ELBOW F12-L32x1/2F	144	26.4	31.1	16.4	19.05	36.5	42
FEMALE THREADED ELBOW F12-L32x1F	72	26	31.1	26	30.55	40.5	56
FEMALE THREADED ELBOW F12-L32x3/4F	96	22	31.1	22	24.5	37.5	43
FEMALE THREADED ELBOW F12-L40x1 1/4F	48	33.5	39	33.5	38.95	50	64.5
FEMALE THREADED ELBOW F12-L50x1 1/2F	30	38.5	49	38.5	44.85	57	75
FEMALE THREADED ELBOW F12-L63x2F	18	50	61.9	50	56.66	65	90

FEMALE THREADED TEE



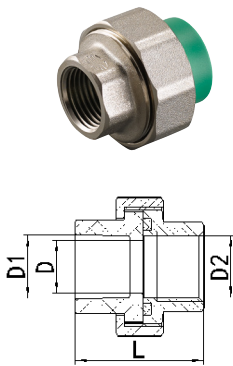
Description	pcs/ctn.	D	D1	D2	D3	D4	L	L1
FEMALE THREADED TEE F12-T20x1/2Fx20	216	16.4	16.4	19.05	19.05	19.2	60	35
FEMALE THREADED TEE F12-T25x1/2Fx25	180	20	16.4	16.4	19.05	24.1	63	38
FEMALE THREADED TEE F12-T25x1Fx25	72	20	20	26	30.55	24.1	81	53
FEMALE THREADED TEE F12-T25x3/4Fx25	150	20	22	22	24.5	24.1	66	39
FEMALE THREADED TEE F12-T32x1/2Fx32	108	26	16.4	16.4	19.05	31.1	68	43
FEMALE THREADED TEE F12-T32x1Fx32	60	26.5	26	26	30.55	31.1	81	56
FEMALE THREADED TEE F12-T32x3/4Fx32	72	26	22	22	24.5	31.1	75	43
FEMALE THREADED TEE F12-T40x1 1/4Fx40	36	33.5	33.5	33.5	38.95	39	100	64.5
FEMALE THREADED TEE F12-T50x1 1/2Fx50	20	43	38.5	38.5	44.85	49	114	75
FEMALE THREADED TEE F12-T63x2Fx63	18	55	50	50	56.66	61.9	130	90

MALE THREADED TEE



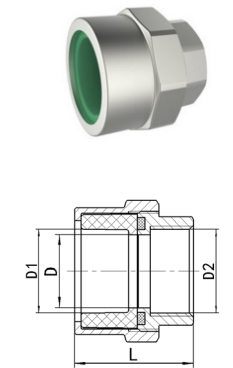
Description	pcs/ctn.	D	D1	D2	L	L1
MALE THREADED TEE F12-T20x1/2Mx20	180	16	15	19.2	60	49
MALE THREADED TEE F12-T25x1/2Mx25	144	20	15	24.1	63	52
MALE THREADED TEE F12-T25x3/4Mx25	120	20	20	24.1	66	54
MALE THREADED TEE F12-T32x1/2Mx32	90	26	15	31.1	68	57
MALE THREADED TEE F12-T32x3/4Mx32	90	26	20	31.1	75	58
MALE THREADED TEE F12-T32x1Mx32	60	26.5	26	31.1	81	73

ADAPTOR UNION-FEMALE THREADED I



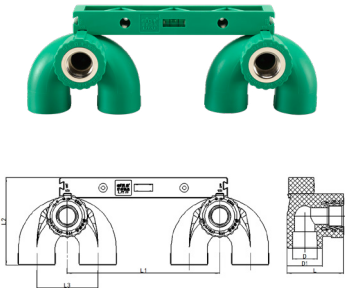
Description	pcs/ctn.	D	D1	D2	L
F12-S20x1/2F H	180	16	19.2	19.05	39
F12-S25x1/2F H	120	20	24.1	19.05	41
F12-S25x3/4F H	120	20	24.1	24.5	42
F12-S32x1F H	90	26	31.1	30.55	46

ADAPTOR UNION-FEMALE THREADED II



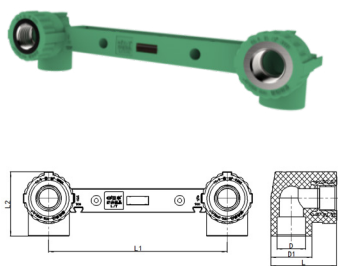
Description	pcs/ctn.	D	D1	D2	L
F12-S40x1 1/4F(H)	60	34	39	38.95	55
F12-S50x1 1/2F(H)	45	45	49	44.85	58

U-PROFILE TAP ELBOW



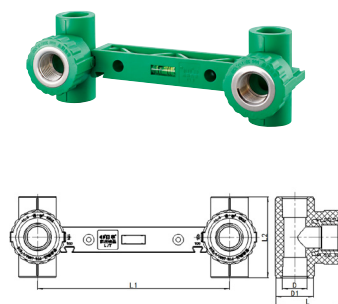
Description	pcs/ctn.	D	D1	L	L1	L2	L3
F12-L20x1/2F(150)	36	20	29.4	52	150	78	60
F12-L25x1/2F(150)	36	25	36	55	150	86	60

DOUBLE LINKED FEMALE THREADED ELBOW



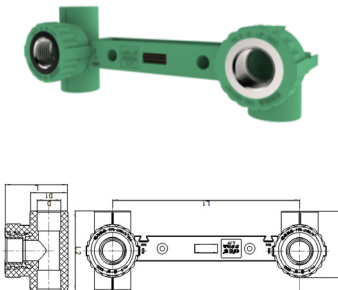
Description	pcs/ctn.	D	D1	L	L1	L2
F12-L20x1/2F(100)	72	20	29.4	50	100	66
F12-L25x1/2F(100)	72	25	36	55	100	69
F12-L20x1/2F(150)	60	20	29.4	50	150	52
F12-L25x1/2F(150)	48	25	36	55	150	69
F12-L20x1/2F(200)	48	20	29.4	50	200	52
F12-L25x1/2F(200)	48	25	36	55	200	69

DOUBLE LINKED FEMALE THREADED TEE



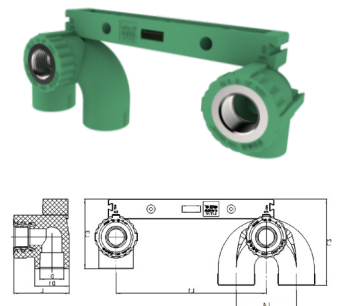
Description	pcs/ctn.	D	D1	L	L1	L2
F12-T20x1/2Fx20(150)	48	20	29.4	50	150	63
F12-T25x1/2Fx25(150)	48	25	36	56	150	63
F12-T20x1/2Fx20(150)	36	20	29.4	50	200	63
F12-T25x1/2Fx25(150)	36	25	36	56	200	63

FEMALE TEE + FEMALE ELBOW



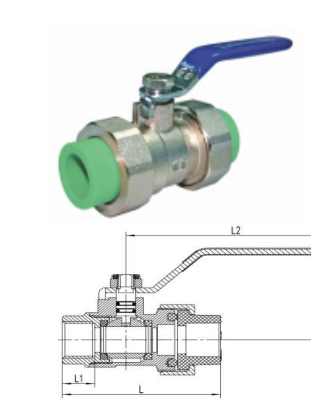
Description	pcs/ctn.	D	D1	L	L1	L2	L3
F12-20x1/2F(150)	36	20	29.4	50	150	63	52
F12-25x1/2F(150)	36	25	36	56	150	63	53
F12-20x1/2F(150)	36	20	29.4	50	200	63	52
F12-25x1/2F(150)	36	25	36	56	200	63	53

FEMALE U TEE + FEMALE ELBOW



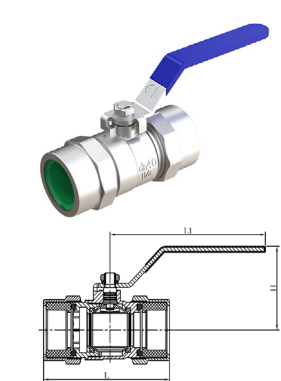
Description	pcs/ctn.	D	D1	L	L1	L2	L3	L4
F12-20x1/2F(150)	36	20	29.4	50	150	78	66	60
F12-25x1/2F(150)	36	25	36	55	150	86	69	60

BRASS BALL VALVE



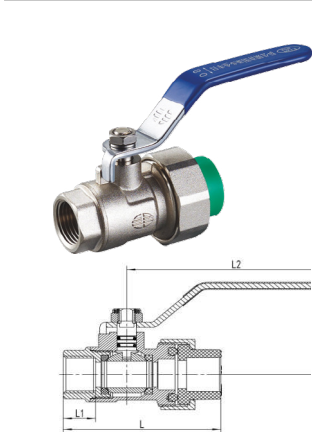
Description	pcs/ctn.	L1	L	H
F12-Q20x20	60	102	87.5	52
F12-Q25x25	48	102	92.5	56
F12-Q32x32	24	115	108	59
F12-Q75x75	4	200	181.5	88
F12-Q90x90	3	230	199	98
F12-Q110x110	2	260	203.5	112.5

BRASS BALL VALVE



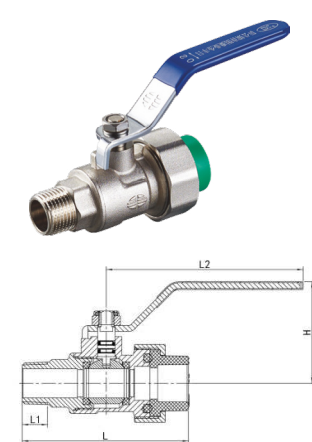
Description	pcs/ctn.	L1	L	H
F12-Q40x40	12	164	129.5	81.5
F12-Q50x50	10	193	146	95
F12-Q63x63	6	253	171.5	102

DEMOUNTABLE FEMALE BRASS BALL VALVE



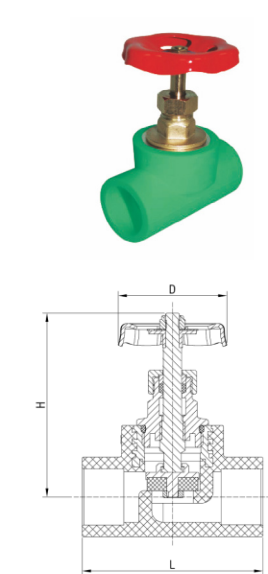
Description	pcs/ctn.	L1	L2	L	H
201-F12-Q20x1/2F	60	14	102	86.5	52
201-F12-Q25x3/4F	48	15	102	89	56
201-F12-Q32x1F	24	16	115	98.5	59

DEMOUNTABLE MALE BRASS BALL VALVE



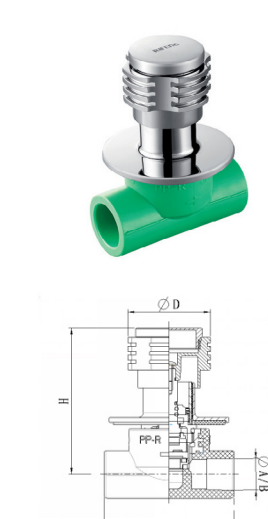
Description	pcs/ctn.	L1	L2	L	H
201-F12-Q20x1/2M	60	15	102	72.5	52
201-F12-Q25x3/4M	48	16	102	79	56
201-F12-Q32x1M	24	16	115	90.5	59

STOP VALVE



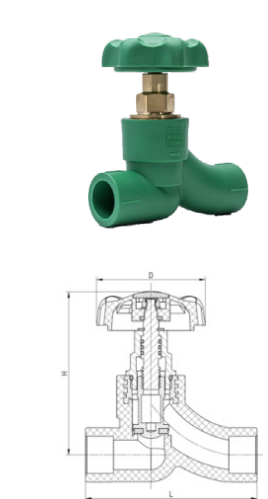
Description	pcs/ctn.	L	H	D
STOP VALVE 303-F12-J20x20	72	70	75	50.5
STOP VALVE 303-F12-J25x25	72	78	80	60
STOP VALVE 303-F12-J32x32	36	90	91	69
STOP VALVE 303-F12-J40x40	32	97	100.5	69
STOP VALVE 303-F12-J50x50	12	116	111.5	78
STOP VALVE 303-F12-J63x63	8	134	129.5	89

CONCEALED PORCELANE VALVE



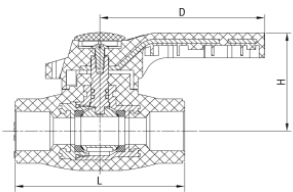
Description	pcs/ctn.	L	H	D
F12-L20x1/2F(100)	72	20	29.4	50
F12-L25x1/2F(100)	72	25	36	55
F12-L20x1/2F(100)	60	20	29.4	50
F12-L25x1/2F(100)	48	25	36	55
F12-L20x1/2F(100)	48	20	29.4	50
F12-L25x1/2F(100)	48	25	36	55

LARGE FLOW STOP VALVE



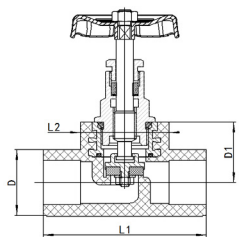
Description	pcs/ctn.	L	H	D
307-F12-J20x20	36	95	92	60
307-F12-J25x25	36	110	105	71.5
307-F12-J32x32	24	138	123	71.5

BALL VALVE



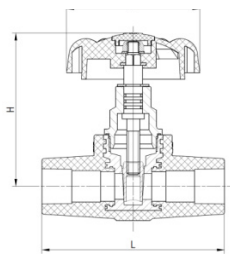
Description	pcs/ctn.	L	H	D
BALL VALVE 203-F12-J20x20	90	78	48.5	77
BALL VALVE 203-F12-J25x25	60	88	51	77
BALL VALVE 203-F12-J32x32	48	96	55	103
BALL VALVE 203-F12-J40x40	24	104	60	103
BALL VALVE 203-F12-J50x50	24	128	77	128
BALL VALVE 203-F12-J63x63	12	148	85	128

STOP VALVE III



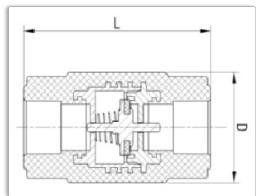
Description	pcs/ctn.	L	H	D
STOP VALVE 303-F12-J20x20 III	72	70	75	50.5
STOP VALVE 303-F12-J25x25 III	72	78	80	60
STOP VALVE 303-F12-J32x32 III	36	90	91	69
STOP VALVE 303-F12-J40x40 III	32	97	100.5	69
STOP VALVE 303-F12-J50x50 III	12	116	111.5	78
STOP VALVE 303-F12-J63x63 III	8	134	129.5	89
STOP VALVE 303-F12-J75x75 III	12	130	136.5	96.5
STOP VALVE 303-F12-J90x90 III	4	180	164	117
STOP VALVE 303-F12-J110x110 III	4	200	197	140.5

SURFACE GATE VALVE



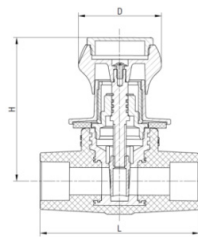
Description	pcs/ctn.	L	H	D
SURFACE GATE VALVE 102-F12-J20x20	24	98	82.5	71.5
SURFACE GATE VALVE 102-F12-J25x25	18	98	90.5	71.5
SURFACE GATE VALVE 102-F12-J32x32	18	108	90.5	71.5

CHECK VALVE



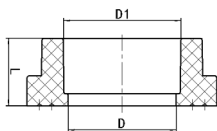
Description	pcs/ctn.	D	L
CHECK VALVE 422-F12-J20x20	120	78	44
CHECK VALVE 422-F12-J25x25	96	90	50
CHECK VALVE 422-F12-J32x32	48	100	60

CONCEALED GATE VALVE



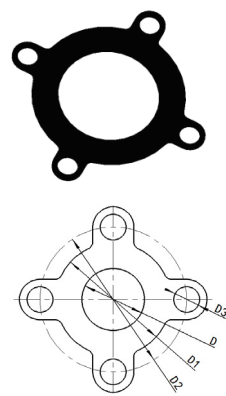
Description	pcs/ctn.	L	H	D
CONCEALED GATE VALVE 103-F12-J20x20	24	98	85	51
CONCEALED GATE VALVE 103-F12-J25x25	18	98	90	51
CONCEALED GATE VALVE 103-F12-J32x32	18	108	90	51

FLANGE ADAPTOR



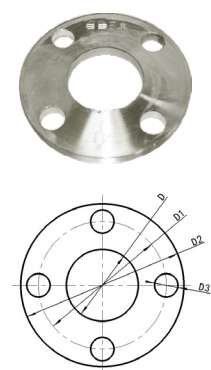
Description	pcs/ctn.	D	D1	L
FLANGE ADAPTOR F12-FC40	150	35	39	29
FLANGE ADAPTOR F12-FC50	108	45	49	32
FLANGE ADAPTOR F12-FC63	90	57	61.9	36
FLANGE ADAPTOR F12-FC75	58	69.5	73.6	38
FLANGE ADAPTOR F12-FC90	36	84	88.3	46
FLANGE ADAPTOR F12-FC110	30	103	107.9	53

FLANGE GASKET



Description	pcs/ctn.	D	D1	D2	D3
FLANGE GASKET F12-FD40	100	43	78	100	18
FLANGE GASKET F12-FD50	100	49	86	110	18
FLANGE GASKET F12-FD63	100	61	100	125	18
FLANGE GASKET F12-FD75	100	77	121	145	18
FLANGE GASKET F12-FD90	100	89	136	160	18
FLANGE GASKET F12-FD110	100	115	162	180	18

FLANGE RING



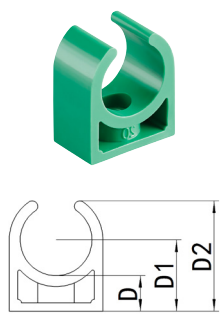
Description	pcs/ctn.	D	D1	D2	D3
FLANGE RING F12-D40	40	56	100	128	18
FLANGE RING F12-D50	40	65	110	138	18
FLANGE RING F12-D63	40	86	125	153	18
FLANGE RING F12-D75	15	96	145	173	18
FLANGE RING F12-D90	15	121	160	188	18
FLANGE RING F12-D110	15	146.5	180	208	18

SLIDING SOCKET



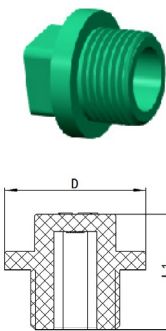
Description	pcs/ctn.
SLIDING SOCKET KH-20	100
SLIDING SOCKET KH-25	100
SLIDING SOCKET KH-32	100
SLIDING SOCKET KH-40	50
SLIDING SOCKET KH-50	50
SLIDING SOCKET KH-63	50
SLIDING SOCKET KH-75	50

PIPE CLAMP



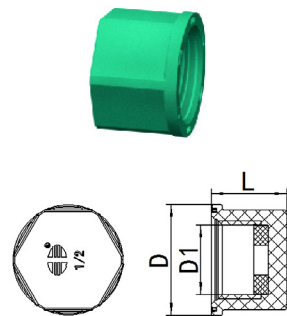
Description	pcs/ctn.	D	D1	D2
PIPE CLAMP KS1-20	2160	10	19.5	30
PIPE CLAMP KS1-25	1800	12	24	35
PIPE CLAMP KS1-32	1200	15	30	44
PIPE CLAMP KS2-20	1440	35	45	52
PIPE CLAMP KS2-25	1200	33	45	55
PIPE CLAMP KS2-32	960	30	45	54

MALE PLUG



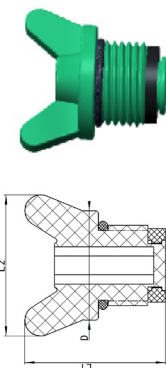
Description	pcs/ctn.	D	L1
MALE PLUG F12-D1/2M	2400	28	26.5

FEMALE PLUG



Description	pcs/ctn.	D	D1	L
FEMALE PLUG F12-D1/2F	2400	30	19	20.5

MALE PLUG WITH EARS



Description	pcs/ctn.	D	L1	L2
MALE PLUG WITH EARS F12-D1/2M-EARS	2400	28	31	36

CUTTER



Description	pcs/ctn.
CUTTER GJ-20-32	50

CUTTING TOOL



Description	pcs/ctn.
CUTTING TOOL QGQ-40-75	28

DEPTH MARKER



Description	pcs/ctn.
DEPTH MARKER	1280

WELD MACHINE



Description	pcs/ctn.
WELD MACHINE RRQ-20-32	6
WELD MACHINE RRQ-20-63	6
WELD MACHINE RRQ-75-110	4

HOT FUSION NOULD HEAD



Description	pcs/ctn.
HOT FUSION NOULD HEAD F12-20	312
HOT FUSION NOULD HEAD F12-25	220
HOT FUSION NOULD HEAD F12-32	144
HOT FUSION NOULD HEAD F12-40	114
HOT FUSION NOULD HEAD F12-50	60
HOT FUSION NOULD HEAD F12-63	40
HOT FUSION NOULD HEAD F12-75	5
HOT FUSION NOULD HEAD F12-90	5

TECHNICAL INFORMATION

PP-R Raw Material

For more than a decade, RIFENG manufactures and supplies high quality PP-R piping system to global customers from different regions. Raw materials are of critical importance to make satisfying products. For now, RIFENG adopts imported raw PP-R materials from Borouge.

RA140E - Borouge

RA140E has been recognized as a leading PP-R grade by high-end market due to its outstanding performance and quality. It origins from the famous Euro brand of chemical industry, Borealis. And Borouge is a successful joint venture of the Abu Dhabi National Oil Company and Borealis. It focus on differentiated high end applications in the Middle East and Asia Pacific customers, supplying the Borealis range of specialty products (including the RA140E) and other excellent polyolefin products from UAE.

R200P

R200P is especially designed polypropylene random copolymer (PP-R, natural colored) that features excellent long-term hydrostatic pressure resistance and heat stability. It is suitable for hot and cold water supply pipes and fittings as well as radiator connecting pipes.

PP-R Properties

Property	Test Standard	Unit	Typical Value
Density	ISO 1183	kg/m ³	905
Melt Flow Rate 230°C/2.16kg	ISO 1133	g/10 min	0.3
Flexural Modulus (2mm/min)	ISO 178	MPa	850
Tensile Modulus (1mm/min)	ISO 527	MPa	800
Tensile Strain at Yield (50mm/min)	ISO 527-2	%	13.5
Tensile Stress at Yield (50mm/min)	ISO 527-2	MPa	25
Thermal Conductivity	DIN 52612	W/mK	0.24
Coefficient of Linear Thermal Expansion (0°C/70°C)	DIN 53752	K ⁻¹	1.5×10 ⁻⁴
Charpy Impact Strength, notched (23°C)	ISO 179/1eA	Kj/m ²	50
Charpy Impact Strength, notched (0°C)	ISO 179/1eA	Kj/m ²	5.0
Charpy Impact Strength, unnotched (23°C)	ISO 179/1eU	NO break	
Charpy Impact Strength, unnotched (0°C)	ISO 179/1eU	NO break	

* Data should not be used for specification work
Kindly check product data sheet in attached annex. [RA140E]

Class of Applications

The performance requirements for piping systems conforming to EN ISO 15874 are specified for four different application classes.

Application	Design temperature T_d /°C	Time at T_d years	T_{max} (°C)	Time at T_{max} years	T_{mal} (°C)	Time at T_{mal} (h)	Application
1	60	49	80	1	95	100	Hot water supply (60°C)
2	70	49	80	1	95	100	Hot water supply (70°C)
4	20	2.5	70	2.5	100	100	Underfloor heating and low temperature radiators (70°C)
	40	20					
	60	25					
5	20	14	90	1	100	100	High temperature radiators (80°C)
	60	25					
	80	10					

T_d = design temperature
 T_{max} = maximum design temperature
 T_{mal} = malfunction temperature

A country may select either class 1 or 2 to conform to its national regulations.

Where more than one design temperature appears for any class, the times should be aggregated (e. G. The design temperature profile for 50 years for class 5 is: 20°C for 14 years followed by 60°C for 25 years, 80°C for 10 years, 90°C for 1 year and 100°C for 100h)

Note For values of T_d , T_{max} and T_{mal} in excess of those in this table, this standard does not apply.

Design pressure

With design life time of 50 years, the maximum operating pressures are classified:

- For cold water application: 10 bar
- For hot water application: 4, 6, 8 or 10 bar

The maximum operating pressure for PP-R pipes

Design pressure [bar] according to ISO 15874			
Application class	PP-R SDR11	PP-R SDR 7.4	PP-R SDR 6
1	6	8	10
2	4	6	8
4	6	10	10
5	-	6	6

Safety factor

Temperature°C	Safety factor of PP-R pipe
T_d	1.5
T_{max}	1.3
T_{mal}	1.0
T_{cold}	1.4

Design stress

Application class	Design stress of PP-R pipe (Mpa*)
1	3.02
2	2.12
4	3.29
5	1.89
50 years, at 20°C	6.93

Fire Protection

According to DIN 4102, PP-R pipe material can be classified as B2
Rating Degree of flammability:

- A1 100% non-combustible
- A2 ~98% non-combustible
- B1 Difficult to ignite
- B2 Normal combustibility
- B3 Easily ignited

* F/B3 rated materials may not be used in buildings unless combined with another material which reduces the flammability of those materials.

Chemical Resistance

In actual usage if PP-R pipe and fittings are to be used for chemical medium transportation, following factors that might affect their quality should be considered: Type of the chemicals; Concentration of the chemicals; Temperatures of the chemicals. And if the chemicals are a mixture of various chemicals, then each individual chemical should to be evaluated.

Kindly contact our company before using certain chemicals with RIFENG PP-R pipe and fittings. If no existed information can be provided then, a sampling set of RIFENG PP-R pipe and fittings will be sent for testing under actual working conditions of that chemicals, as the bases for the company to determine whether approves to use the PP-R pipe and fittings with that chemicals.

In chemicals transportation, thread fittings are not recommended to use because the metal inserts are made of brass with nickerled plating, which has a different chemical resistance as PP-R products have. Flange connection method are recommended since it can prevent the chemicals contact with any other parts except PP-R materials, to prevent leakage or other problem caused by unexpected chemical corrosion.

Permissible Working Pressure and Temperature

Accordina to long-term behavior table from DIN 8078, the lifetime of PP-R pipe can be up to 50 years depending on working pressure and working temperature. Longer ifetime is permissible when the working pressure and temperature islower.

The following equation is for calculating the hydrostatic stress of the pipe under certain working conditions. We can combine the calculated result with the long-term behavior table to know if the pipe can be used for reguired ifetime

Equation:

$$\sigma = \frac{(P \times C (De - e))}{2e}$$

σ = Hoop stress (Hydrostatic stress) (MPa)
P = Max working pressure (MPa)
C = Safety factor(C=1.5)
De = Outside diameter of the pipe (mm)
e = Wall thickness (mm)

For Example:

S2.5 PP-R pipe, size 20mm, wall thickness 3.4mm, is to be used with 70°C hot water under a continuous pressure of 0.8 MPa (approximately 8 Bars). Can the pipe be used for 50 years if the safety factor is 1.5?

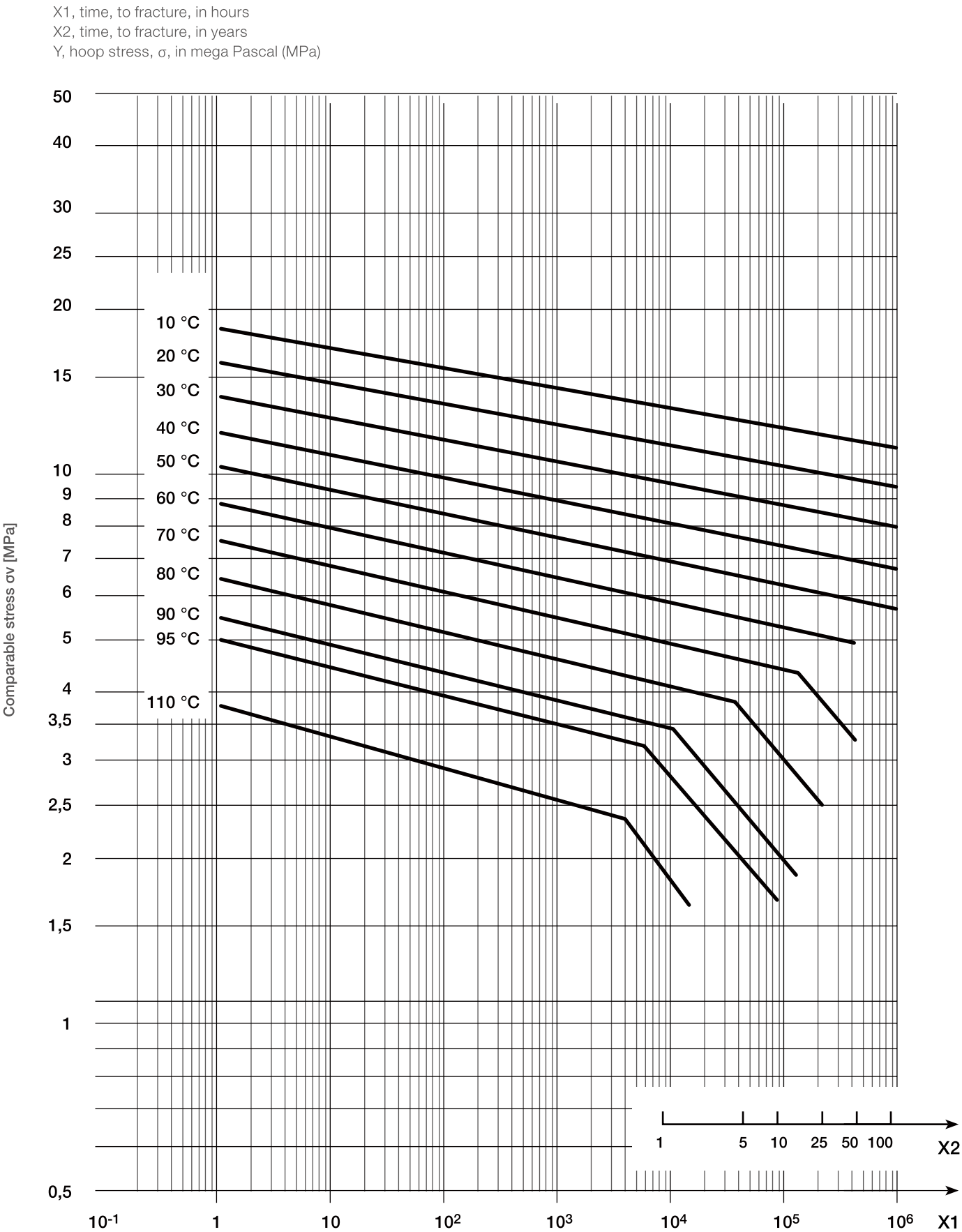
Calculation:

$$\sigma = \frac{(P \times C (De - e))}{2e}$$

$$= [0.8 \times 1.5 \times (20 - 3.4)] \div 2 \div 3.4 = 2.93\text{MPa}$$

When refer to the long-term behavior diagram, if we draw a vertical line based on 50 years lifetime from X-axis, to cross the 70°C line, the y-intercept on the hydrostatic stress will read 3.2 MPa. Then we can know that the S2.5 PP-R pipe used with 70°C hot water under a continuous pressure of 0.8 MPa and 1.5 safety factor, can be used for 50 years, as the calculated hydrostatic stress 2.93 MPa is lower than 3.2 MPa.

Long-Term Behavior Diagram of PP-R



Permissble Working Pressure Table

The table lists the permissible working pressure for pipes with different pressure class under specific temperature and working life.
The data is calculated from above formula and table 1.
Under normal working pressure and condition, the life of RIFENG PP-R pipe can reach 50 years at least.

Examples:

A PN 12.5 cold water pipe, transporting water at a temperature of 30°C can last for more than 50 years under normal conditions with an operating pressure of 13.1bars or 190psi

A PN 25 hot water pipe, transporting water at a temperature of 70 °C can last for more than 50 years under normal conditions with an operating pressure of 10.2bars or 148psi.

Temperature	Service life (Year)	Pipe S5		Pipe S3.2		Pipe S2.5	
		Pipe SDR 11		Pipe SDR 7.4		Pipe SDR 6	
		Pipe PN 12.5		Pipe PN 20		Pipe PN 25	
		Permissible working pressure (bar)					
		SF 1.25	SF 1.5	SF 1.25	SF 1.5	SF 1.25	SF 1.5
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	23.4	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	17.3	26.8	22.3
	50	13.1	10.9	20.7	17.1	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	12.6	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
Stabi composite pipe: high working stress at lower wall thickness and higher flow rate							
SDR=Standard Dimension Ratio (diameter/wall thickness ratio)		SDR=d/s(s=Pipe series index form ISO 4065)		SF=Safety factor(Safety coefficient)			

Pressure Loss

The pressure loss of the pipeline consists of the pressure loss along the path and the local.
The total pressure loss of the pipeline is equal to the sum of the pressure loss along the path and the local.

i = ∑ i_f + ∑ i_j

i—Total pressure loss in the pipeline (Pa)
i_f—Pressure loss along the path (Pa)
i_j—Local pressure loss (Pa)

Pressure loss along the path can be calculated by below formulas

i_f = λ · (L / d) · (γv^2 / 2g)

i_f - Pressure loss along the path (Pa)
L - Pipe length (m)
d - Pipeline diameter (m)
λ - Coefficient of friction resistance
γ - Medium severity (N/m³)
v - Pipe flow velocity (m/s)
g - Gravitational acceleration(m/s²)

Local pressure loss can be calculated by below formulas

i_j = ζ · (γv^2 / 2g)

i_j - Local pressure loss (Pa)
ζ - Local resistance coefficient of fittings
γ - Medium severity (N/m³)
v - Pipe flow velocity (m/s)
g - Gravitational acceleration(m/s²)

PPR S 2.5 (PN20) water temperature = 10°C density = 999.7 kg/m^3 dynamic viscosity = 1.306E-3 Pa·s																		
	20×3.4mm		25×4.2mm		32×5.4mm		40×6.7mm		50×8.3mm		63×10.5mm		75×12.5mm		90×15.0mm		110×18.3mm	
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s
0.02	0.075	0.15	0.028	0.09	0.010	0.06												
0.04	0.183	0.29	0.068	0.18	0.024	0.11	0.009	0.07	0.003	0.05								
0.06	0.332	0.44	0.118	0.28	0.040	0.17	0.015	0.11	0.006	0.07								
0.08	0.543	0.58	0.184	0.37	0.060	0.23	0.022	0.14	0.008	0.09	0.003	0.06						
0.10	0.795	0.73	0.271	0.46	0.086	0.28	0.030	0.18	0.011	0.11	0.004	0.07	0.002	0.05				
0.12	1.084	0.88	0.370	0.55	0.117	0.34	0.040	0.22	0.014	0.14	0.005	0.09	0.002	0.06				
0.14	1.417	1.02	0.481	0.65	0.153	0.40	0.052	0.25	0.018	0.16	0.007	0.10	0.003	0.07	0.001	0.05		
0.16	1.780	1.17	0.605	0.74	0.192	0.45	0.066	0.29	0.023	0.18	0.008	0.12	0.004	0.08	0.002	0.06		
0.18	2.163	1.32	0.742	0.83	0.234	0.51	0.081	0.32	0.028	0.21	0.009	0.13	0.004	0.09	0.002	0.06		
0.20	2.556	1.46	0.888	0.92	0.281	0.57	0.097	0.36	0.033	0.23	0.011	0.14	0.005	0.10	0.002	0.07	0.001	0.05
0.30	5.181	2.19	1.813	1.39	0.557	0.85	0.194	0.54	0.067	0.34	0.023	0.22	0.010	0.15	0.004	0.11	0.002	0.07
0.40	8.218	2.92	2.866	1.85	0.936	1.13	0.312	0.72	0.109	0.46	0.037	0.29	0.017	0.20	0.007	0.14	0.003	0.09
0.50	11.819	3.65	4.096	2.31	1.332	1.42	0.472	0.90	0.157	0.57	0.055	0.36	0.024	0.25	0.010	0.18	0.004	0.12
0.60	16.010	4.38	5.511	2.77	1.783	1.70	0.630	1.08	0.222	0.68	0.074	0.43	0.033	0.31	0.014	0.21	0.006	0.14
0.70	20.759	5.12	7.108	3.23	2.289	1.98	0.805	1.26	0.285	0.80	0.095	0.51	0.043	0.36	0.018	0.25	0.007	0.17
0.80	26.011	5.85	8.882	3.70	2.846	2.27	0.998	1.44	0.352	0.91	0.124	0.58	0.053	0.41	0.023	0.28	0.009	0.19
0.90	31.839	6.58	10.839	4.16	3.458	2.55	1.208	1.62	0.424	1.03	0.149	0.65	0.067	0.46	0.028	0.32	0.011	0.21
1.00	38.160	7.31	12.963	4.62	4.118	2.83	1.435	1.80	0.502	1.14	0.176	0.72	0.080	0.51	0.033	0.35	0.013	0.24
1.20	52.372	8.77	17.715	5.54	5.602	3.40	1.940	2.16	0.676	1.37	0.235	0.87	0.106	0.61	0.046	0.42	0.018	0.28
1.40			23.157	6.47	7.291	3.97	2.512	2.52	0.870	1.60	0.302	1.01	0.136	0.71	0.059	0.50	0.024	0.33
1.60			29.207	7.39	9.165	4.53	3.148	2.88	1.086	1.83	0.375	1.15	0.168	0.81	0.073	0.57	0.029	0.38
1.80			35.248	8.32	11.247	5.10	3.850	3.24	1.324	2.05	0.455	1.30	0.204	0.92	0.088	0.64	0.035	0.43
2.00			40.990	9.24	13.510	5.67	4.613	3.60	1.582	2.28	0.542	1.44	0.242	1.02	0.105	0.71	0.042	0.47
2.20					15.816	6.23	5.445	3.96	1.861	2.51	0.636	1.59	0.283	1.12	0.122	0.78	0.049	0.52
2.40					17.917	6.80	6.335	4.32	2.161	2.74	0.736	1.73	0.327	1.22	0.141	0.85	0.056	0.57
2.60					20.314	7.37	7.274	4.68	2.482	2.97	0.844	1.88	0.374	1.32	0.160	0.92	0.063	0.61
2.80					23.188	7.93	8.179	5.04	2.822	3.20	0.957	2.02	0.423	1.43	0.181	0.99	0.072	0.66
3.00					26.134	8.50	9.054	5.40	3.184	3.42	1.078	2.17	0.475	1.53	0.203	1.06	0.080	0.71
3.20					29.350	9.07	9.986	5.76	3.561	3.65	1.205	2.31	0.531	1.63	0.226	1.13	0.089	0.76
3.40					32.680	9.63	11.029	6.12	3.938	3.88	1.338	2.45	0.589	1.73	0.251	1.20	0.098	0.80
3.60							12.243	6.48	4.311	4.11	1.478	2.60	0.649	1.83	0.276	1.27	0.108	0.85
3.80							13.444	6.84	4.636	4.34	1.625	2.74	0.713	1.94	0.303	1.34	0.118	0.90
4.00							14.783	7.20	5.026	4.57	1.776	2.89	0.779	2.04	0.330	1.41	0.129	0.95
4.20							16.110	7.56	5.449	4.79	1.928	3.03	0.848	2.14	0.359	1.49	0.140	0.99
4.40							17.520	7.92	5.902	5.02	2.075	3.18	0.920	2.24	0.389	1.56	0.151	1.04
4.60							19.028	8.28	6.388	5.25	2.216	3.32	0.994	2.34	0.420	1.63	0.163	1.09
4.80							20.540	8.64	6.898	5.48	2.356	3.46	1.070	2.44	0.452	1.70	0.175	1.13
5.00							22.150	9.00	7.417	5.71	2.507	3.61	1.146	2.55	0.486	1.77	0.188	1.18
5.50							26.320	9.90	8.819	6.28	2.948	3.97	1.325	2.80	0.574	1.95	0.222	1.30
6.00									10.332	6.85	3.444	4.33	1.511	3.06	0.665	2.12	0.258	1.42
6.50									11.953	7.42	3.977	4.69	1.733	3.31	0.752	2.30	0.296	1.54
7.00									13.675	7.99	4.547	5.05	1.977	3.57	0.840	2.48	0.337	1.65
7.50									15.518	8.56	5.154	5.41	2.238	3.82	0.941	2.65	0.378	1.77
8.00									17.497	9.13	5.796	5.77	2.514	4.07	1.054	2.83	0.416	1.89
8.50									19.552	9.70	6.476	6.14	2.806	4.33	1.174	3.01	0.456	2.01
9.00											7.190	6.50	3.113	4.58	1.301	3.18	0.500	2.13
9.50											7.941	6.86	3.435	4.84	1.434	3.36	0.550	2.25
10.00											8.723	7.22	3.772	5.09	1.574	3.54	0.602	2.36
11.00											10.399	7.94	4.491	5.60	1.871	3.89	0.714	2.60
12.00											12.208	8.66	5.270	6.11	2.193	4.24	0.835	2.84
13.00											14.152	9.38	6.106	6.62	2.538	4.60	0.966	3.07
14.00													6.999	7.13	2.908	4.95	1.105	3.31
15.00													7.950	7.64	3.302	5.31	1.254	3.54
16.00													8.955	8.15	3.718	5.66	1.411	3.78
17.00													10.016	8.66	4.157	6.01	1.577	4.02
18.00													11.131	9.17	4.619	6.37	1.752	4.25
19.00													12.302	9.68	5.104	6.72	1.935	4.49
20.00															5.611	7.07	2.126	4.73

PPR S 2.5 (PN20) water temperature = 20°C density = 998.2 kg/m^3 dynamic viscosity = 1.004E-3 Pa·s																			
	20×3.4mm		25×4.2mm		32×5.4mm		40×6.7mm		50×8.3mm		63×10.5mm		75×12.5mm		90×15.0mm		110×18.3mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.061	0.15	0.023	0.09	0.008	0.06													
0.04	0.158	0.29	0.057	0.18	0.020	0.11	0.007	0.07	0.003	0.05									
0.06	0.308	0.44	0.105	0.28	0.035	0.17	0.013	0.11	0.005	0.07									
0.08	0.503	0.58	0.172	0.37	0.054	0.23	0.019	0.14	0.007	0.09	0.003	0.06							
0.10	0.738	0.73	0.251	0.46	0.080	0.28	0.027	0.18	0.010	0.11	0.003	0.07	0.002	0.05					
0.12	1.010	0.88	0.343	0.55	0.109	0.34	0.037	0.22	0.013	0.14	0.005	0.09	0.002	0.06					
0.14	1.305	1.02	0.448	0.65	0.142	0.40	0.049	0.25	0.017	0.16	0.006	0.10	0.003	0.07	0.001	0.05			
0.16	1.610	1.17	0.562	0.74	0.178	0.45	0.061	0.29	0.021	0.18	0.007	0.12	0.003	0.08	0.001	0.06			
0.18	2.056	1.32	0.682	0.83	0.218	0.51	0.075	0.32	0.026	0.21	0.009	0.13	0.004	0.09	0.002	0.06			
0.20	2.449	1.46	0.804	0.92	0.261	0.57	0.090	0.36	0.031	0.23	0.011	0.14	0.005	0.10	0.002	0.07	0.001	0.05	
0.30	4.674	2.19	1.631	1.39	0.532	0.85	0.177	0.54	0.062	0.34	0.021	0.22	0.009	0.15	0.004	0.11	0.002	0.07	
0.40	7.478	2.92	2.588	1.85	0.840	1.13	0.298	0.72	0.099	0.46	0.035	0.29	0.015	0.20	0.007	0.14	0.003	0.09	
0.50	10.843	3.65	3.728	2.31	1.202	1.42	0.424	0.90	0.150	0.57	0.050	0.36	0.022	0.25	0.010	0.18	0.004	0.12	
0.60	14.772	4.38	5.050	2.77	1.619	1.70	0.567	1.08	0.200	0.68	0.070	0.43	0.030	0.31	0.013	0.21	0.005	0.14	
0.70	19.225	5.12	6.543	3.23	2.089	1.98	0.728	1.26	0.256	0.80	0.090	0.51	0.041	0.36	0.017	0.25	0.007	0.17	
0.80	24.194	5.85	8.207	3.70	2.608	2.27	0.907	1.44	0.317	0.91	0.111	0.58	0.050	0.41	0.021	0.28	0.008	0.19	
0.90	29.705	6.58	10.046	4.16	3.180	2.55	1.102	1.62	0.384	1.03	0.134	0.65	0.060	0.46	0.026	0.32	0.010	0.21	
1.00	35.656	7.31	12.052	4.62	3.805	2.83	1.313	1.80	0.456	1.14	0.159	0.72	0.071	0.51	0.031	0.35	0.012	0.24	
1.20	46.915	8.77	16.553	5.54	5.199	3.40	1.786	2.16	0.617	1.37	0.213	0.87	0.096	0.61	0.042	0.42	0.017	0.28	
1.40			21.094	6.47	6.793	3.97	2.324	2.52	0.799	1.60	0.275	1.01	0.123	0.71	0.053	0.50	0.021	0.33	
1.60			25.924	7.39	8.556	4.53	2.926	2.88	1.002	1.83	0.343	1.15	0.153	0.81	0.066	0.57	0.026	0.38	
1.80			31.822	8.32	10.275	5.10	3.592	3.24	1.226	2.05	0.418	1.30	0.186	0.92	0.080	0.64	0.032	0.43	
2.00			38.680	9.24	12.030	5.67	4.310	3.60	1.471	2.28	0.500	1.44	0.221	1.02	0.095	0.71	0.038	0.47	
2.20					14.188	6.23	5.028	3.96	1.736	2.51	0.588	1.59	0.260	1.12	0.111	0.78	0.044	0.52	
2.40					16.584	6.80	5.690	4.32	2.020	2.74	0.683	1.73	0.301	1.22	0.129	0.85	0.051	0.57	
2.60					19.132	7.37	6.478	4.68	2.312	2.97	0.785	1.88	0.345	1.32	0.147	0.92	0.058	0.61	
2.80					21.960	7.93	7.387	5.04	2.596	3.20	0.893	2.02	0.392	1.43	0.167	0.99	0.065	0.66	
3.00					24.889	8.50	8.362	5.40	2.860	3.42	1.007	2.17	0.442	1.53	0.187	1.06	0.073	0.71	
3.20					28.001	9.07	9.400	5.76	3.175	3.65	1.124	2.31	0.494	1.63	0.209	1.13	0.082	0.76	
3.40					31.393	9.63	10.463	6.12	3.526	3.88	1.238	2.45	0.549	1.73	0.232	1.20	0.090	0.80	
3.60							11.610	6.48	3.900	4.11	1.346	2.60	0.607	1.83	0.257	1.27	0.100	0.85	
3.80							12.818	6.84	4.303	4.34	1.458	2.74	0.665	1.94	0.282	1.34	0.109	0.90	
4.00							14.094	7.20	4.721	4.57	1.585	2.89	0.723	2.04	0.308	1.41	0.119	0.95	
4.20							15.414	7.56	5.157	4.79	1.724	3.03	0.777	2.14	0.336	1.49	0.130	0.99	
4.40							16.741	7.92	5.607	5.02	1.873	3.18	0.831	2.24	0.364	1.56	0.140	1.04	
4.60							18.175	8.28	6.080	5.25	2.028	3.32	0.891	2.34	0.392	1.63	0.152	1.09	
4.80							19.651	8.64	6.573	5.48	2.189	3.46	0.956	2.44	0.419	1.70	0.163	1.13	
5.00							21.241	9.00	7.084	5.71	2.356	3.61	1.027	2.55	0.446	1.77	0.176	1.18	
5.50							25.229	9.90	8.433	6.28	2.800	3.97	1.217	2.80	0.515	1.95	0.207	1.30	
6.00									9.890	6.85	3.280	4.33	1.423	3.06	0.597	2.12	0.238	1.42	
6.50									11.459	7.42	3.796	4.69	1.645	3.31	0.688	2.30	0.267	1.54	
7.00									13.141	7.99	4.348	5.05	1.882	3.57	0.786	2.48	0.302	1.65	
7.50									14.935	8.56	4.935	5.41	2.134	3.82	0.891	2.65	0.341	1.77	
8.00									16.812	9.13	5.557	5.77	2.401	4.07	1.001	2.83	0.383	1.89	
8.50									18.801	9.70	6.213	6.14	2.684	4.33	1.118	3.01	0.427	2.01	
9.00											6.905	6.50	2.980	4.58	1.240	3.18	0.473	2.13	
9.50											7.629	6.86	3.292	4.84	1.369	3.36	0.521	2.25	
10.00											8.386	7.22	3.618	5.09	1.504	3.54	0.572	2.36	
11.00											10.001	7.94	4.313	5.60	1.792	3.89	0.681	2.60	
12.00											11.744	8.66	5.064	6.11	2.103	4.24	0.798	2.84	
13.00											13.617	9.38	5.871	6.62	2.437	4.60	0.924	3.07	
14.00														6.733	7.13	2.794	4.95	1.059	3.31
15.00														7.648	7.64	3.173	5.31	1.202	3.54
16.00														8.617	8.15	3.575	5.66	1.354	3.78
17.00														9.639	8.66	3.998	6.01	1.515	4.02
18.00														10.714	9.17	4.444	6.37	1.683	4.25
19.00														11.839	9.68	4.910	6.72	1.860	4.49
20.00																5.398	7.07	2.044	4.73

PPR S 2.5 (PN20) water temperature = 50°C density = 988.1 kg/m^3 dynamic viscosity = 5.494E-4 Pa·s																		
	20×3.4mm		25×4.2mm		32×5.4mm		40×6.7mm		50×8.3mm		63×10.5mm		75×12.5mm		90×15.0mm		110×18.3mm	
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s
0.02	0.042	0.15	0.015	0.09	0.005	0.06												
0.04	0.131	0.29	0.044	0.18	0.014	0.11	0.005	0.07	0.002	0.05								
0.06	0.262	0.44	0.089	0.28	0.028	0.17	0.010	0.11	0.003	0.07								
0.08	0.423	0.58	0.146	0.37	0.046	0.23	0.016	0.14	0.005	0.09	0.002	0.06						
0.10	0.640	0.73	0.211	0.46	0.068	0.28	0.023	0.18	0.008	0.11	0.003	0.07	0.001	0.05				
0.12	0.857	0.88	0.287	0.55	0.092	0.34	0.032	0.22	0.011	0.14	0.004	0.09	0.002	0.06				
0.14	1.094	1.02	0.383	0.65	0.117	0.40	0.041	0.25	0.014	0.16	0.005	0.10	0.002	0.07	0.001	0.05		
0.16	1.356	1.17	0.474	0.74	0.154	0.45	0.052	0.29	0.018	0.18	0.006	0.12	0.003	0.08	0.001	0.06		
0.18	1.641	1.32	0.571	0.83	0.186	0.51	0.062	0.32	0.022	0.21	0.007	0.13	0.003	0.09	0.001	0.06		
0.20	1.949	1.46	0.676	0.92	0.220	0.57	0.078	0.36	0.026	0.23	0.009	0.14	0.004	0.10	0.002	0.07	0.001	0.05
0.30	3.831	2.19	1.314	1.39	0.422	0.85	0.148	0.54	0.052	0.34	0.018	0.22	0.008	0.15	0.003	0.11	0.001	0.07
0.40	6.263	2.92	2.129	1.85	0.678	1.13	0.236	0.72	0.083	0.46	0.029	0.29	0.013	0.20	0.005	0.14	0.002	0.09
0.50	9.229	3.65	3.120	2.31	0.987	1.42	0.342	0.90	0.119	0.57	0.041	0.36	0.019	0.25	0.008	0.18	0.003	0.12
0.60	12.392	4.38	4.280	2.77	1.346	1.70	0.464	1.08	0.161	0.68	0.056	0.43	0.025	0.31	0.011	0.21	0.004	0.14
0.70	15.702	5.12	5.577	3.23	1.757	1.98	0.602	1.26	0.208	0.80	0.072	0.51	0.032	0.36	0.014	0.25	0.006	0.17
0.80	19.882	5.85	6.810	3.70	2.216	2.27	0.757	1.44	0.260	0.91	0.089	0.58	0.040	0.41	0.017	0.28	0.007	0.19
0.90	24.596	6.58	8.226	4.16	2.706	2.55	0.929	1.62	0.318	1.03	0.109	0.65	0.048	0.46	0.021	0.32	0.008	0.21
1.00	29.786	7.31	9.893	4.62	3.170	2.83	1.116	1.80	0.381	1.14	0.130	0.72	0.058	0.51	0.025	0.35	0.010	0.24
1.20	41.747	8.77	13.772	5.54	4.279	3.40	1.506	2.16	0.522	1.37	0.177	0.87	0.078	0.61	0.033	0.42	0.013	0.28
1.40			18.222	6.47	5.640	3.97	1.904	2.52	0.681	1.60	0.231	1.01	0.102	0.71	0.043	0.50	0.017	0.33
1.60			23.404	7.39	7.170	4.53	2.411	2.88	0.831	1.83	0.291	1.15	0.128	0.81	0.054	0.57	0.021	0.38
1.80			28.903	8.32	8.893	5.10	2.982	3.24	1.007	2.05	0.356	1.30	0.157	0.92	0.066	0.64	0.026	0.43
2.00			34.998	9.24	10.812	5.67	3.623	3.60	1.213	2.28	0.416	1.44	0.188	1.02	0.080	0.71	0.031	0.47
2.20					12.914	6.23	4.299	3.96	1.440	2.51	0.484	1.59	0.220	1.12	0.094	0.78	0.036	0.52
2.40					15.134	6.80	5.040	4.32	1.688	2.74	0.563	1.73	0.250	1.22	0.109	0.85	0.042	0.57
2.60					17.375	7.37	5.842	4.68	1.951	2.97	0.650	1.88	0.284	1.32	0.125	0.92	0.049	0.61
2.80					19.999	7.93	6.682	5.04	2.234	3.20	0.743	2.02	0.324	1.43	0.139	0.99	0.055	0.66
3.00					22.726	8.50	7.589	5.40	2.532	3.42	0.842	2.17	0.366	1.53	0.155	1.06	0.062	0.71
3.20					25.629	9.07	8.545	5.76	2.850	3.65	0.947	2.31	0.411	1.63	0.173	1.13	0.069	0.76
3.40					28.749	9.63	9.589	6.12	3.188	3.88	1.057	2.45	0.459	1.73	0.192	1.20	0.076	0.80
3.60							10.658	6.48	3.546	4.11	1.174	2.60	0.509	1.83	0.213	1.27	0.082	0.85
3.80							11.728	6.84	3.913	4.34	1.296	2.74	0.561	1.94	0.234	1.34	0.090	0.90
4.00							12.903	7.20	4.309	4.57	1.424	2.89	0.616	2.04	0.257	1.41	0.099	0.95
4.20							14.200	7.56	4.718	4.79	1.558	3.03	0.673	2.14	0.281	1.49	0.107	0.99
4.40							15.407	7.92	5.136	5.02	1.696	3.18	0.733	2.24	0.306	1.56	0.117	1.04
4.60							16.786	8.28	5.573	5.25	1.842	3.32	0.795	2.34	0.331	1.63	0.126	1.09
4.80							18.196	8.64	6.030	5.48	1.992	3.46	0.860	2.44	0.358	1.70	0.137	1.13
5.00							19.530	9.00	6.496	5.71	2.147	3.61	0.927	2.55	0.386	1.77	0.147	1.18
5.50							23.257	9.90	7.770	6.28	2.561	3.97	1.105	2.80	0.459	1.95	0.175	1.30
6.00									9.118	6.85	3.007	4.33	1.297	3.06	0.539	2.12	0.205	1.42
6.50									10.558	7.42	3.487	4.69	1.503	3.31	0.624	2.30	0.237	1.54
7.00									12.109	7.99	3.998	5.05	1.724	3.57	0.716	2.48	0.271	1.65
7.50									13.779	8.56	4.543	5.41	1.958	3.82	0.813	2.65	0.308	1.77
8.00									15.505	9.13	5.119	5.77	2.206	4.07	0.915	2.83	0.347	1.89
8.50									17.336	9.70	5.726	6.14	2.468	4.33	1.024	3.01	0.388	2.01
9.00											6.364	6.50	2.743	4.58	1.138	3.18	0.431	2.13
9.50											7.034	6.86	3.031	4.84	1.257	3.36	0.476	2.25
10.00											7.734	7.22	3.333	5.09	1.382	3.54	0.523	2.36
11.00											9.227	7.94	3.975	5.60	1.648	3.89	0.624	2.60
12.00											10.838	8.66	4.668	6.11	1.936	4.24	0.733	2.84
13.00											12.569	9.38	5.414	6.62	2.245	4.60	0.850	3.07
14.00													6.209	7.13	2.574	4.95	0.975	3.31
15.00													7.054	7.64	2.925	5.31	1.107	3.54
16.00													7.949	8.15	3.296	5.66	1.247	3.78
17.00													8.893	8.66	3.686	6.01	1.395	4.02
18.00													9.886	9.17	4.097	6.37	1.551	4.25
19.00													10.925	9.68	4.528	6.72	1.714	4.49
20.00															4.979	7.07	1.884	4.73

PPR S 2.5 (PN20) water temperature = 70°C density = 977.8 kg/m^3 dynamic viscosity = 4.061E-4 Pa·s																		
	20×3.4mm		25×4.2mm		32×5.4mm		40×6.7mm		50×8.3mm		63×10.5mm		75×12.5mm		90×15.0mm		110×18.3mm	
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s
0.02	0.037	0.15	0.013	0.09	0.004	0.06												
0.04	0.121	0.29	0.041	0.18	0.013	0.11	0.004	0.07	0.002	0.05								
0.06	0.239	0.44	0.083	0.28	0.026	0.17	0.009	0.11	0.003	0.07								
0.08	0.402	0.58	0.132	0.37	0.043	0.23	0.015	0.14	0.005	0.09	0.002	0.06						
0.10	0.572	0.73	0.201	0.46	0.061	0.28	0.022	0.18	0.007	0.11	0.003	0.07	0.001	0.05				
0.12	0.766	0.88	0.268	0.55	0.087	0.34	0.029	0.22	0.010	0.14	0.003	0.09	0.002	0.06				
0.14	0.984	1.02	0.342	0.65	0.112	0.40	0.037	0.25	0.013	0.16	0.005	0.10	0.002	0.07	0.001	0.05		
0.16	1.226	1.17	0.424	0.74	0.138	0.45	0.049	0.29	0.016	0.18	0.006	0.12	0.003	0.08	0.001	0.06		
0.18	1.490	1.32	0.514	0.83	0.166	0.51	0.059	0.32	0.020	0.21	0.007	0.13	0.003	0.09	0.001	0.06		
0.20	1.777	1.46	0.611	0.92	0.197	0.57	0.070	0.36	0.025	0.23	0.008	0.14	0.004	0.10	0.002	0.07	0.001	0.05
0.30	3.546	2.19	1.205	1.39	0.384	0.85	0.134	0.54	0.047	0.34	0.016	0.22	0.007	0.15	0.003	0.11	0.001	0.07
0.40	5.839	2.92	1.974	1.85	0.623	1.13	0.215	0.72	0.075	0.46	0.026	0.29	0.012	0.20	0.005	0.14	0.002	0.09
0.50	8.191	3.65	2.909	2.31	0.914	1.42	0.314	0.90	0.108	0.57	0.037	0.36	0.017	0.25	0.007	0.18	0.003	0.12
0.60	11.276	4.38	3.830	2.77	1.255	1.70	0.429	1.08	0.147	0.68	0.051	0.43	0.023	0.31	0.010	0.21	0.004	0.14
0.70	14.898	5.12	4.965	3.23	1.614	1.98	0.560	1.26	0.191	0.80	0.065	0.51	0.029	0.36	0.013	0.25	0.005	0.17
0.80	19.040	5.85	6.303	3.70	1.961	2.27	0.706	1.44	0.241	0.91	0.082	0.58	0.036	0.41	0.016	0.28	0.006	0.19
0.90	23.637	6.58	7.815	4.16	2.417	2.55	0.849	1.62	0.296	1.03	0.100	0.65	0.044	0.46	0.019	0.32	0.007	0.21
1.00	28.714	7.31	9.461	4.62	2.918	2.83	0.996	1.80	0.355	1.14	0.120	0.72	0.053	0.51	0.023	0.35	0.009	0.24
1.20	40.011	8.77	13.188	5.54	4.063	3.40	1.365	2.16	0.469	1.37	0.165	0.87	0.072	0.61	0.031	0.42	0.012	0.28
1.40			17.603	6.47	5.382	3.97	1.802	2.52	0.607	1.60	0.212	1.01	0.095	0.71	0.040	0.50	0.016	0.33
1.60			22.516	7.39	6.905	4.53	2.307	2.88	0.772	1.83	0.260	1.15	0.119	0.81	0.050	0.57	0.020	0.38
1.80			27.760	8.32	8.575	5.10	2.858	3.24	0.956	2.05	0.319	1.30	0.141	0.92	0.062	0.64	0.024	0.43
2.00			33.955	9.24	10.393	5.67	3.464	3.60	1.158	2.28	0.386	1.44	0.168	1.02	0.073	0.71	0.029	0.47
2.20					12.388	6.23	4.132	3.96	1.378	2.51	0.458	1.59	0.199	1.12	0.084	0.78	0.034	0.52
2.40					14.592	6.80	4.841	4.32	1.618	2.74	0.537	1.73	0.233	1.22	0.098	0.85	0.039	0.57
2.60					16.867	7.37	5.639	4.68	1.874	2.97	0.621	1.88	0.269	1.32	0.113	0.92	0.044	0.61
2.80					19.305	7.93	6.464	5.04	2.148	3.20	0.711	2.02	0.308	1.43	0.129	0.99	0.049	0.66
3.00					21.896	8.50	7.365	5.40	2.442	3.42	0.807	2.17	0.349	1.53	0.146	1.06	0.056	0.71
3.20					24.882	9.07	8.250	5.76	2.750	3.65	0.909	2.31	0.393	1.63	0.164	1.13	0.063	0.76
3.40					27.800	9.63	9.246	6.12	3.076	3.88	1.017	2.45	0.439	1.73	0.183	1.20	0.070	0.80
3.60							10.228	6.48	3.417	4.11	1.130	2.60	0.488	1.83	0.203	1.27	0.077	0.85
3.80							11.387	6.84	3.778	4.34	1.248	2.74	0.539	1.94	0.224	1.34	0.085	0.90
4.00							12.474	7.20	4.154	4.57	1.372	2.89	0.592	2.04	0.246	1.41	0.094	0.95
4.20							13.681	7.56	4.551	4.79	1.501	3.03	0.648	2.14	0.269	1.49	0.102	0.99
4.40							14.851	7.92	4.954	5.02	1.636	3.18	0.706	2.24	0.293	1.56	0.111	1.04
4.60							16.196	8.28	5.383	5.25	1.776	3.32	0.766	2.34	0.318	1.63	0.121	1.09
4.80							17.366	8.64	5.830	5.48	1.922	3.46	0.829	2.44	0.344	1.70	0.131	1.13
5.00							18.920	9.00	6.285	5.71	2.072	3.61	0.893	2.55	0.371	1.77	0.141	1.18
5.50							22.451	9.90	7.502	6.28	2.472	3.97	1.065	2.80	0.442	1.95	0.168	1.30
6.00									8.796	6.85	2.903	4.33	1.251	3.06	0.519	2.12	0.197	1.42
6.50									10.208	7.42	3.367	4.69	1.451	3.31	0.602	2.30	0.228	1.54
7.00									11.693	7.99	3.861	5.05	1.664	3.57	0.690	2.48	0.261	1.65
7.50									13.283	8.56	4.387	5.41	1.890	3.82	0.784	2.65	0.297	1.77
8.00									15.001	9.13	4.944	5.77	2.130	4.07	0.883	2.83	0.334	1.89
8.50									16.791	9.70	5.530	6.14	2.382	4.33	0.988	3.01	0.374	2.01
9.00											6.147	6.50	2.648	4.58	1.098	3.18	0.416	2.13
9.50											6.794	6.86	2.927	4.84	1.214	3.36	0.459	2.25
10.00											7.471	7.22	3.217	5.09	1.334	3.54	0.505	2.36
11.00											8.913	7.94	3.838	5.60	1.591	3.89	0.602	2.60
12.00											10.470	8.66	4.508	6.11	1.869	4.24	0.707	2.84
13.00											12.143	9.38	5.228	6.62	2.167	4.60	0.820	3.07
14.00													5.997	7.13	2.486	4.95	0.941	3.31
15.00													6.814	7.64	2.824	5.31	1.069	3.54
16.00													7.679	8.15	3.182	5.66	1.204	3.78
17.00													8.592	8.66	3.560	6.01	1.347	4.02
18.00													9.550	9.17	3.957	6.37	1.497	4.25
19.00													10.556	9.68	4.373	6.72	1.655	4.49
20.00															4.809	7.07	1.819	4.73

PPR S 3.2 (PN16) water temperature = 10°C density = 999.7 kg/m^3 dynamic viscosity = 1.306E-3 Pa·s																			
	20×2.8mm		25×3.5mm		32×4.4mm		40×5.5mm		50×6.9mm		63×8.6mm		75×10.3mm		90×12.3mm		110×15.1mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.052	0.12	0.020	0.08	0.007	0.05													
0.04	0.126	0.25	0.048	0.16	0.016	0.09	0.006	0.06											
0.06	0.224	0.37	0.083	0.24	0.027	0.14	0.010	0.09	0.004	0.06									
0.08	0.360	0.49	0.127	0.31	0.040	0.19	0.015	0.12	0.006	0.08	0.002	0.05							
0.10	0.529	0.61	0.185	0.39	0.056	0.24	0.021	0.15	0.008	0.10	0.003	0.06							
0.12	0.720	0.74	0.253	0.47	0.076	0.28	0.027	0.18	0.010	0.12	0.004	0.07	0.002	0.05					
0.14	0.939	0.86	0.329	0.55	0.100	0.33	0.035	0.21	0.013	0.14	0.004	0.08	0.002	0.06					
0.16	1.183	0.98	0.413	0.63	0.126	0.38	0.044	0.24	0.016	0.16	0.005	0.10	0.003	0.07	0.001	0.05			
0.18	1.445	1.11	0.507	0.71	0.154	0.43	0.054	0.27	0.019	0.17	0.006	0.11	0.003	0.08	0.001	0.05			
0.20	1.718	1.23	0.608	0.79	0.184	0.47	0.065	0.30	0.023	0.19	0.008	0.12	0.003	0.09	0.002	0.06			
0.30	3.481	1.84	1.181	1.18	0.368	0.71	0.129	0.45	0.046	0.29	0.015	0.18	0.007	0.13	0.003	0.09	0.001	0.06	
0.40	5.503	2.46	1.978	1.57	0.597	0.95	0.210	0.61	0.075	0.39	0.025	0.24	0.011	0.17	0.005	0.12	0.002	0.08	
0.50	7.898	3.07	2.823	1.96	0.883	1.18	0.307	0.76	0.109	0.49	0.036	0.30	0.016	0.22	0.007	0.15	0.003	0.10	
0.60	10.667	3.68	3.791	2.36	1.179	1.42	0.425	0.91	0.146	0.58	0.050	0.36	0.022	0.26	0.009	0.18	0.004	0.12	
0.70	13.802	4.30	4.883	2.75	1.511	1.66	0.542	1.06	0.197	0.68	0.064	0.42	0.029	0.30	0.012	0.21	0.005	0.14	
0.80	17.282	4.91	6.100	3.14	1.878	1.89	0.671	1.21	0.244	0.78	0.080	0.49	0.036	0.34	0.015	0.24	0.006	0.16	
0.90	21.126	5.53	7.409	3.54	2.276	2.13	0.812	1.36	0.294	0.87	0.101	0.55	0.044	0.39	0.019	0.27	0.007	0.18	
1.00	25.309	6.14	8.863	3.93	2.710	2.37	0.963	1.51	0.347	0.97	0.119	0.61	0.054	0.43	0.022	0.30	0.009	0.20	
1.20	34.707	7.37	12.086	4.72	3.673	2.84	1.299	1.82	0.466	1.17	0.159	0.73	0.072	0.52	0.031	0.36	0.012	0.24	
1.40	45.246	8.60	15.788	5.50	4.771	3.31	1.678	2.12	0.600	1.36	0.203	0.85	0.092	0.60	0.040	0.42	0.016	0.28	
1.60	55.709	9.82	19.907	6.29	5.994	3.78	2.101	2.42	0.747	1.55	0.253	0.97	0.114	0.69	0.049	0.48	0.020	0.32	
1.80			24.343	7.07	7.341	4.26	2.566	2.73	0.909	1.75	0.306	1.09	0.138	0.77	0.060	0.54	0.024	0.36	
2.00			28.520	7.86	8.816	4.73	3.073	3.03	1.085	1.94	0.364	1.21	0.164	0.86	0.070	0.60	0.028	0.40	
2.20			33.001	8.65	10.413	5.20	3.621	3.33	1.276	2.14	0.426	1.34	0.192	0.95	0.082	0.65	0.033	0.44	
2.40			38.317	9.43	12.028	5.68	4.211	3.63	1.480	2.33	0.493	1.46	0.221	1.03	0.095	0.71	0.038	0.48	
2.60					13.540	6.15	4.843	3.94	1.698	2.53	0.564	1.58	0.253	1.12	0.108	0.77	0.043	0.52	
2.80					15.126	6.62	5.505	4.24	1.929	2.72	0.639	1.70	0.286	1.20	0.122	0.83	0.049	0.56	
3.00					16.959	7.10	6.173	4.54	2.175	2.91	0.719	1.82	0.321	1.29	0.136	0.89	0.055	0.60	
3.20					19.002	7.57	6.777	4.84	2.434	3.11	0.803	1.94	0.358	1.38	0.152	0.95	0.061	0.64	
3.40					21.248	8.04	7.418	5.15	2.704	3.30	0.891	2.06	0.397	1.46	0.168	1.01	0.067	0.68	
3.60					23.510	8.52	8.115	5.45	2.981	3.50	0.984	2.19	0.437	1.55	0.185	1.07	0.074	0.72	
3.80					25.894	8.99	8.922	5.75	3.249	3.69	1.080	2.31	0.480	1.63	0.202	1.13	0.080	0.76	
4.00					28.408	9.46	9.763	6.06	3.524	3.89	1.182	2.43	0.524	1.72	0.221	1.19	0.087	0.80	
4.20					31.000	9.94	10.653	6.36	3.760	4.08	1.287	2.55	0.570	1.81	0.240	1.25	0.095	0.84	
4.40							11.565	6.66	4.045	4.28	1.395	2.67	0.618	1.89	0.260	1.31	0.102	0.88	
4.60							12.531	6.96	4.363	4.47	1.505	2.79	0.668	1.98	0.280	1.37	0.110	0.92	
4.80							13.571	7.27	4.699	4.66	1.614	2.91	0.719	2.07	0.301	1.43	0.119	0.96	
5.00							14.601	7.57	5.055	4.86	1.718	3.03	0.772	2.15	0.323	1.49	0.127	1.00	
5.50							17.399	8.33	5.999	5.34	1.978	3.34	0.907	2.37	0.382	1.64	0.150	1.10	
6.00							20.357	9.08	7.019	5.83	2.287	3.64	1.034	2.58	0.444	1.79	0.174	1.20	
6.50							23.633	9.84	8.114	6.32	2.635	3.95	1.168	2.80	0.509	1.93	0.200	1.30	
7.00									9.288	6.80	3.011	4.25	1.325	3.01	0.571	2.08	0.227	1.40	
7.50									10.540	7.29	3.410	4.55	1.497	3.23	0.633	2.23	0.256	1.50	
8.00									11.865	7.77	3.832	4.86	1.681	3.44	0.702	2.38	0.285	1.60	
8.50									13.259	8.26	4.279	5.16	1.874	3.66	0.780	2.53	0.314	1.70	
9.00									14.723	8.74	4.748	5.46	2.079	3.87	0.863	2.68	0.341	1.80	
9.50									16.279	9.23	5.242	5.77	2.293	4.09	0.951	2.83	0.372	1.90	
10.00									17.885	9.72	5.758	6.07	2.517	4.30	1.042	2.98	0.405	2.00	
11.00											6.859	6.68	2.995	4.73	1.238	3.27	0.480	2.20	
12.00											8.049	7.28	3.512	5.16	1.450	3.57	0.561	2.40	
13.00											9.330	7.89	4.069	5.59	1.678	3.87	0.648	2.60	
14.00											10.696	8.50	4.663	6.02	1.922	4.17	0.741	2.80	
15.00											12.150	9.10	5.294	6.45	2.181	4.47	0.841	3.00	
16.00											13.689	9.71	5.963	6.88	2.455	4.76	0.946	3.20	
17.00													6.669	7.31	2.745	5.06	1.057	3.40	
18.00													7.411	7.74	3.050	5.36	1.173	3.60	
19.00													8.190	8.17	3.370	5.66	1.296	3.80	
20.00													9.004	8.60	3.704	5.95	1.424	4.00	

PPR S 3.2 (PN16) water temperature = 20°C density = 998.2 kg/m^3 dynamic viscosity = 1.004E-3 Pa·s																			
	20×2.8mm		25×3.5mm		32×4.4mm		40×5.5mm		50×6.9mm		63×8.6mm		75×10.3mm		90×12.3mm		110×15.1mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.042	0.12	0.016	0.08	0.006	0.05													
0.04	0.107	0.25	0.040	0.16	0.013	0.09	0.005	0.06											
0.06	0.204	0.37	0.072	0.24	0.023	0.14	0.009	0.09	0.003	0.06									
0.08	0.335	0.49	0.117	0.31	0.036	0.19	0.013	0.12	0.005	0.08	0.002	0.05							
0.10	0.489	0.61	0.172	0.39	0.052	0.24	0.018	0.15	0.007	0.10	0.002	0.06							
0.12	0.671	0.74	0.234	0.47	0.071	0.28	0.025	0.18	0.009	0.12	0.003	0.07	0.001	0.05					
0.14	0.872	0.86	0.306	0.55	0.093	0.33	0.033	0.21	0.011	0.14	0.004	0.08	0.002	0.06					
0.16	1.083	0.98	0.385	0.63	0.116	0.38	0.041	0.24	0.014	0.16	0.005	0.10	0.002	0.07	0.001	0.05			
0.18	1.303	1.11	0.469	0.71	0.143	0.43	0.050	0.27	0.018	0.17	0.006	0.11	0.003	0.08	0.001	0.05			
0.20	1.641	1.23	0.556	0.79	0.171	0.47	0.060	0.30	0.021	0.19	0.007	0.12	0.003	0.09	0.001	0.06			
0.30	3.130	1.84	1.126	1.18	0.334	0.71	0.120	0.45	0.043	0.29	0.014	0.18	0.006	0.13	0.003	0.09	0.001	0.06	
0.40	4.994	2.46	1.782	1.57	0.557	0.95	0.200	0.61	0.069	0.39	0.023	0.24	0.010	0.17	0.004	0.12	0.002	0.08	
0.50	7.223	3.07	2.559	1.96	0.794	1.18	0.286	0.76	0.104	0.49	0.034	0.30	0.015	0.22	0.006	0.15	0.003	0.10	
0.60	9.811	3.68	3.461	2.36	1.067	1.42	0.382	0.91	0.139	0.58	0.045	0.36	0.020	0.26	0.009	0.18	0.003	0.12	
0.70	12.756	4.30	4.476	2.75	1.373	1.66	0.490	1.06	0.177	0.68	0.061	0.42	0.026	0.30	0.011	0.21	0.005	0.14	
0.80	16.050	4.91	5.610	3.14	1.713	1.89	0.608	1.21	0.219	0.78	0.075	0.49	0.034	0.34	0.014	0.24	0.006	0.16	
0.90	19.674	5.53	6.861	3.54	2.086	2.13	0.738	1.36	0.265	0.87	0.090	0.55	0.041	0.39	0.018	0.27	0.007	0.18	
1.00	23.620	6.14	8.219	3.93	2.491	2.37	0.879	1.51	0.315	0.97	0.107	0.61	0.049	0.43	0.021	0.30	0.008	0.20	
1.20	31.751	7.37	11.276	4.72	3.400	2.84	1.193	1.82	0.425	1.17	0.144	0.73	0.065	0.52	0.028	0.36	0.011	0.24	
1.40	40.364	8.60	14.686	5.50	4.435	3.31	1.550	2.12	0.549	1.36	0.185	0.85	0.083	0.60	0.036	0.42	0.015	0.28	
1.60	51.166	9.82	17.863	6.29	5.596	3.78	1.948	2.42	0.687	1.55	0.230	0.97	0.104	0.69	0.044	0.48	0.018	0.32	
1.80			21.690	7.07	6.841	4.26	2.388	2.73	0.840	1.75	0.280	1.09	0.126	0.77	0.054	0.54	0.022	0.36	
2.00			26.174	7.86	8.002	4.73	2.869	3.03	1.006	1.94	0.334	1.21	0.150	0.86	0.064	0.60	0.026	0.40	
2.20			31.098	8.65	9.253	5.20	3.381	3.33	1.186	2.14	0.393	1.34	0.175	0.95	0.075	0.65	0.030	0.44	
2.40			36.404	9.43	10.789	5.68	3.876	3.63	1.380	2.33	0.456	1.46	0.203	1.03	0.086	0.71	0.034	0.48	
2.60					12.425	6.15	4.353	3.94	1.587	2.53	0.523	1.58	0.233	1.12	0.098	0.77	0.039	0.52	
2.80					14.192	6.62	4.909	4.24	1.799	2.72	0.594	1.70	0.264	1.20	0.111	0.83	0.044	0.56	
3.00					16.102	7.10	5.528	4.54	1.982	2.91	0.670	1.82	0.297	1.29	0.125	0.89	0.050	0.60	
3.20					18.077	7.57	6.195	4.84	2.196	3.11	0.750	1.94	0.332	1.38	0.140	0.95	0.055	0.64	
3.40					20.249	8.04	6.920	5.15	2.413	3.30	0.833	2.06	0.369	1.46	0.155	1.01	0.061	0.68	
3.60					22.432	8.52	7.660	5.45	2.663	3.50	0.918	2.19	0.408	1.55	0.171	1.07	0.067	0.72	
3.80					24.734	8.99	8.445	5.75	2.932	3.69	1.000	2.31	0.448	1.63	0.188	1.13	0.074	0.76	
4.00					27.193	9.46	9.287	6.06	3.214	3.89	1.078	2.43	0.490	1.72	0.205	1.19	0.081	0.80	
4.20					29.840	9.94	10.194	6.36	3.509	4.08	1.159	2.55	0.531	1.81	0.223	1.25	0.088	0.84	
4.40							11.038	6.66	3.815	4.28	1.249	2.67	0.571	1.89	0.242	1.31	0.095	0.88	
4.60							11.991	6.96	4.132	4.47	1.347	2.79	0.610	1.98	0.262	1.37	0.102	0.92	
4.80							12.987	7.27	4.466	4.66	1.452	2.91	0.649	2.07	0.282	1.43	0.110	0.96	
5.00							14.004	7.57	4.810	4.86	1.562	3.03	0.692	2.15	0.302	1.49	0.118	1.00	
5.50							16.685	8.33	5.723	5.34	1.853	3.34	0.815	2.37	0.349	1.64	0.140	1.10	
6.00							19.558	9.08	6.710	5.83	2.169	3.64	0.952	2.58	0.399	1.79	0.162	1.20	
6.50							22.671	9.84	7.771	6.32	2.508	3.95	1.099	2.80	0.457	1.93	0.184	1.30	
7.00									8.909	6.80	2.871	4.25	1.257	3.01	0.521	2.08	0.206	1.40	
7.50									10.111	7.29	3.257	4.55	1.424	3.23	0.590	2.23	0.230	1.50	
8.00									11.397	7.77	3.666	4.86	1.602	3.44	0.663	2.38	0.257	1.60	
8.50									12.741	8.26	4.099	5.16	1.789	3.66	0.740	2.53	0.287	1.70	
9.00									14.154	8.74	4.553	5.46	1.987	3.87	0.821	2.68	0.318	1.80	
9.50									15.653	9.23	5.029	5.77	2.194	4.09	0.905	2.83	0.350	1.90	
10.00									17.202	9.72	5.528	6.07	2.411	4.30	0.994	2.98	0.384	2.00	
11.00											6.591	6.68	2.873	4.73	1.184	3.27	0.457	2.20	
12.00											7.741	7.28	3.373	5.16	1.389	3.57	0.535	2.40	
13.00											8.974	7.89	3.909	5.59	1.609	3.87	0.619	2.60	
14.00											10.292	8.50	4.482	6.02	1.844	4.17	0.709	2.80	
15.00											11.691	9.10	5.091	6.45	2.095	4.47	0.805	3.00	
16.00											13.175	9.71	5.736	6.88	2.360	4.76	0.907	3.20	
17.00													6.416	7.31	2.639	5.06	1.014	3.40	
18.00													7.131	7.74	2.933	5.36	1.127	3.60	
19.00													7.880	8.17	3.241	5.66	1.245	3.80	
20.00													8.664	8.60	3.563	5.95	1.368	4.00	

PPR S 3.2 (PN16) water temperature = 50°C density = 988.1 kg/m^3 dynamic viscosity = 5.494E-4 Pa·s																		
	20×2.8mm		25×3.5mm		32×4.4mm		40×5.5mm		50×6.9mm		63×8.6mm		75×10.3mm		90×12.3mm		110×15.1mm	
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s
0.02	0.029	0.12	0.011	0.08	0.004	0.05												
0.04	0.087	0.25	0.030	0.16	0.009	0.09	0.003	0.06										
0.06	0.174	0.37	0.061	0.24	0.018	0.14	0.006	0.09	0.002	0.06								
0.08	0.283	0.49	0.100	0.31	0.030	0.19	0.011	0.12	0.004	0.08	0.001	0.05						
0.10	0.404	0.61	0.146	0.39	0.044	0.24	0.016	0.15	0.006	0.10	0.002	0.06						
0.12	0.575	0.74	0.194	0.47	0.061	0.28	0.021	0.18	0.008	0.12	0.002	0.07	0.001	0.05				
0.14	0.734	0.86	0.265	0.55	0.078	0.33	0.028	0.21	0.010	0.14	0.003	0.08	0.001	0.06				
0.16	0.909	0.98	0.327	0.63	0.096	0.38	0.035	0.24	0.012	0.16	0.004	0.10	0.002	0.07	0.001	0.05		
0.18	1.098	1.11	0.394	0.71	0.123	0.43	0.042	0.27	0.015	0.17	0.005	0.11	0.002	0.08	0.001	0.05		
0.20	1.303	1.23	0.466	0.79	0.146	0.47	0.050	0.30	0.018	0.19	0.006	0.12	0.003	0.09	0.001	0.06		
0.30	2.548	1.84	0.901	1.18	0.279	0.71	0.100	0.45	0.036	0.29	0.012	0.18	0.005	0.13	0.002	0.09	0.001	0.06
0.40	4.153	2.46	1.458	1.57	0.446	0.95	0.159	0.61	0.057	0.39	0.020	0.24	0.009	0.17	0.004	0.12	0.001	0.08
0.50	6.110	3.07	2.129	1.96	0.647	1.18	0.229	0.76	0.082	0.49	0.028	0.30	0.013	0.22	0.006	0.15	0.002	0.10
0.60	8.376	3.68	2.915	2.36	0.881	1.42	0.310	0.91	0.111	0.58	0.038	0.36	0.017	0.26	0.007	0.18	0.003	0.12
0.70	10.553	4.30	3.813	2.75	1.148	1.66	0.402	1.06	0.143	0.68	0.048	0.42	0.022	0.30	0.009	0.21	0.004	0.14
0.80	13.124	4.91	4.749	3.14	1.447	1.89	0.505	1.21	0.178	0.78	0.060	0.49	0.027	0.34	0.012	0.24	0.005	0.16
0.90	16.305	5.53	5.641	3.54	1.776	2.13	0.618	1.36	0.218	0.87	0.073	0.55	0.033	0.39	0.014	0.27	0.006	0.18
1.00	19.693	6.14	6.726	3.93	2.119	2.37	0.742	1.51	0.261	0.97	0.087	0.61	0.039	0.43	0.017	0.30	0.007	0.20
1.20	27.277	7.37	9.315	4.72	2.785	2.84	1.017	1.82	0.357	1.17	0.118	0.73	0.053	0.52	0.022	0.36	0.009	0.24
1.40	36.138	8.60	12.341	5.50	3.659	3.31	1.283	2.12	0.467	1.36	0.154	0.85	0.068	0.60	0.029	0.42	0.012	0.28
1.60	46.676	9.82	15.820	6.29	4.644	3.78	1.598	2.42	0.581	1.55	0.194	0.97	0.086	0.69	0.036	0.48	0.014	0.32
1.80			19.621	7.07	5.745	4.26	1.978	2.73	0.692	1.75	0.238	1.09	0.105	0.77	0.044	0.54	0.018	0.36
2.00			23.831	7.86	7.003	4.73	2.386	3.03	0.827	1.94	0.284	1.21	0.127	0.86	0.053	0.60	0.021	0.40
2.20			28.336	8.65	8.308	5.20	2.835	3.33	0.981	2.14	0.328	1.34	0.149	0.95	0.063	0.65	0.025	0.44
2.40			33.374	9.43	9.785	5.68	3.330	3.63	1.147	2.33	0.376	1.46	0.172	1.03	0.073	0.71	0.029	0.48
2.60					11.282	6.15	3.843	3.94	1.326	2.53	0.431	1.58	0.193	1.12	0.084	0.77	0.033	0.52
2.80					13.007	6.62	4.404	4.24	1.517	2.72	0.492	1.70	0.217	1.20	0.095	0.83	0.037	0.56
3.00					14.690	7.10	4.989	4.54	1.721	2.91	0.557	1.82	0.245	1.29	0.105	0.89	0.042	0.60
3.20					16.639	7.57	5.640	4.84	1.937	3.11	0.626	1.94	0.275	1.38	0.116	0.95	0.047	0.64
3.40					18.592	8.04	6.309	5.15	2.164	3.30	0.699	2.06	0.306	1.46	0.128	1.01	0.052	0.68
3.60					20.681	8.52	7.023	5.45	2.404	3.50	0.776	2.19	0.340	1.55	0.141	1.07	0.057	0.72
3.80					22.889	8.99	7.745	5.75	2.655	3.69	0.856	2.31	0.375	1.63	0.155	1.13	0.061	0.76
4.00					25.141	9.46	8.512	6.06	2.918	3.89	0.940	2.43	0.411	1.72	0.170	1.19	0.067	0.80
4.20					27.419	9.94	9.343	6.36	3.193	4.08	1.028	2.55	0.449	1.81	0.186	1.25	0.072	0.84
4.40							10.157	6.66	3.479	4.28	1.120	2.67	0.489	1.89	0.202	1.31	0.079	0.88
4.60							11.070	6.96	3.776	4.47	1.215	2.79	0.530	1.98	0.219	1.37	0.085	0.92
4.80							11.997	7.27	4.086	4.66	1.313	2.91	0.573	2.07	0.237	1.43	0.092	0.96
5.00							12.888	7.57	4.405	4.86	1.416	3.03	0.618	2.15	0.255	1.49	0.099	1.00
5.50							15.324	8.33	5.254	5.34	1.688	3.34	0.736	2.37	0.304	1.64	0.117	1.10
6.00							17.959	9.08	6.172	5.83	1.982	3.64	0.864	2.58	0.356	1.79	0.137	1.20
6.50							20.845	9.84	7.154	6.32	2.298	3.95	1.001	2.80	0.412	1.93	0.159	1.30
7.00									8.208	6.80	2.635	4.25	1.148	3.01	0.473	2.08	0.182	1.40
7.50									9.326	7.29	2.993	4.55	1.304	3.23	0.537	2.23	0.206	1.50
8.00									10.510	7.77	3.373	4.86	1.469	3.44	0.604	2.38	0.232	1.60
8.50									11.757	8.26	3.773	5.16	1.643	3.66	0.676	2.53	0.260	1.70
9.00									13.068	8.74	4.194	5.46	1.826	3.87	0.751	2.68	0.289	1.80
9.50									14.438	9.23	4.635	5.77	2.017	4.09	0.830	2.83	0.319	1.90
10.00									15.874	9.72	5.096	6.07	2.218	4.30	0.912	2.98	0.350	2.00
11.00											6.079	6.68	2.646	4.73	1.088	3.27	0.418	2.20
12.00											7.140	7.28	3.108	5.16	1.278	3.57	0.491	2.40
13.00											8.278	7.89	3.603	5.59	1.481	3.87	0.569	2.60
14.00											9.497	8.50	4.132	6.02	1.699	4.17	0.652	2.80
15.00											10.790	9.10	4.694	6.45	1.930	4.47	0.741	3.00
16.00											12.157	9.71	5.290	6.88	2.175	4.76	0.834	3.20
17.00													5.917	7.31	2.433	5.06	0.933	3.40
18.00													6.578	7.74	2.704	5.36	1.037	3.60
19.00													7.269	8.17	2.988	5.66	1.146	3.80
20.00													7.993	8.60	3.285	5.95	1.260	4.00

PPR S 3.2 (PN16) water temperature = 70°C density = 977.8 kg/m^3 dynamic viscosity = 4.061E-4 Pa·s																		
	20×2.8mm		25×3.5mm		32×4.4mm		40×5.5mm		50×6.9mm		63×8.6mm		75×10.3mm		90×12.3mm		110×15.1mm	
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s
0.02	0.025	0.12	0.009	0.08	0.003	0.05												
0.04	0.080	0.25	0.028	0.16	0.009	0.09	0.003	0.06										
0.06	0.160	0.37	0.056	0.24	0.017	0.14	0.006	0.09	0.002	0.06								
0.08	0.269	0.49	0.091	0.31	0.028	0.19	0.010	0.12	0.003	0.08	0.001	0.05						
0.10	0.384	0.61	0.138	0.39	0.041	0.24	0.014	0.15	0.005	0.10	0.002	0.06						
0.12	0.514	0.74	0.185	0.47	0.055	0.28	0.020	0.18	0.007	0.12	0.002	0.07	0.001	0.05				
0.14	0.658	0.86	0.236	0.55	0.074	0.33	0.025	0.21	0.009	0.14	0.003	0.08	0.001	0.06				
0.16	0.819	0.98	0.292	0.63	0.091	0.38	0.033	0.24	0.011	0.16	0.004	0.10	0.002	0.07	0.001	0.05		
0.18	0.994	1.11	0.354	0.71	0.110	0.43	0.040	0.27	0.014	0.17	0.005	0.11	0.002	0.08	0.001	0.05		
0.20	1.184	1.23	0.420	0.79	0.130	0.47	0.047	0.30	0.017	0.19	0.006	0.12	0.002	0.09	0.001	0.06		
0.30	2.352	1.84	0.824	1.18	0.252	0.71	0.090	0.45	0.032	0.29	0.011	0.18	0.005	0.13	0.002	0.09	0.001	0.06
0.40	3.869	2.46	1.347	1.57	0.408	0.95	0.144	0.61	0.052	0.39	0.018	0.24	0.008	0.17	0.003	0.12	0.001	0.08
0.50	5.508	3.07	1.983	1.96	0.597	1.18	0.209	0.76	0.074	0.49	0.025	0.30	0.011	0.22	0.005	0.15	0.002	0.10
0.60	7.431	3.68	2.679	2.36	0.820	1.42	0.286	0.91	0.101	0.58	0.034	0.36	0.015	0.26	0.007	0.18	0.003	0.12
0.70	9.841	4.30	3.383	2.75	1.070	1.66	0.372	1.06	0.131	0.68	0.044	0.42	0.020	0.30	0.008	0.21	0.003	0.14
0.80	12.496	4.91	4.290	3.14	1.314	1.89	0.470	1.21	0.165	0.78	0.055	0.49	0.025	0.34	0.010	0.24	0.004	0.16
0.90	15.501	5.53	5.291	3.54	1.575	2.13	0.576	1.36	0.202	0.87	0.067	0.55	0.030	0.39	0.013	0.27	0.005	0.18
1.00	18.859	6.14	6.424	3.93	1.896	2.37	0.677	1.51	0.243	0.97	0.080	0.61	0.036	0.43	0.015	0.30	0.006	0.20
1.20	26.396	7.37	8.953	4.72	2.635	2.84	0.906	1.82	0.329	1.17	0.110	0.73	0.049	0.52	0.021	0.36	0.008	0.24
1.40	34.968	8.60	11.892	5.50	3.494	3.31	1.198	2.12	0.415	1.36	0.143	0.85	0.064	0.60	0.027	0.42	0.011	0.28
1.60	44.770	9.82	15.166	6.29	4.454	3.78	1.521	2.42	0.526	1.55	0.177	0.97	0.080	0.69	0.034	0.48	0.013	0.32
1.80			18.911	7.07	5.543	4.26	1.885	2.73	0.650	1.75	0.213	1.09	0.097	0.77	0.041	0.54	0.016	0.36
2.00			22.962	7.86	6.729	4.73	2.285	3.03	0.787	1.94	0.256	1.21	0.114	0.86	0.049	0.60	0.019	0.40
2.20			27.567	8.65	8.017	5.20	2.722	3.33	0.936	2.14	0.303	1.34	0.133	0.95	0.057	0.65	0.023	0.44
2.40			32.175	9.43	9.405	5.68	3.197	3.63	1.098	2.33	0.355	1.46	0.156	1.03	0.065	0.71	0.027	0.48
2.60					10.913	6.15	3.702	3.94	1.272	2.53	0.410	1.58	0.180	1.12	0.075	0.77	0.030	0.52
2.80					12.511	6.62	4.244	4.24	1.458	2.72	0.470	1.70	0.206	1.20	0.085	0.83	0.034	0.56
3.00					14.229	7.10	4.821	4.54	1.655	2.91	0.533	1.82	0.233	1.29	0.097	0.89	0.038	0.60
3.20					16.087	7.57	5.436	4.84	1.864	3.11	0.600	1.94	0.262	1.38	0.109	0.95	0.042	0.64
3.40					17.980	8.04	6.109	5.15	2.085	3.30	0.671	2.06	0.293	1.46	0.121	1.01	0.047	0.68
3.60					20.059	8.52	6.751	5.45	2.317	3.50	0.745	2.19	0.325	1.55	0.134	1.07	0.052	0.72
3.80					22.122	8.99	7.461	5.75	2.562	3.69	0.823	2.31	0.359	1.63	0.148	1.13	0.057	0.76
4.00					24.181	9.46	8.243	6.06	2.815	3.89	0.904	2.43	0.394	1.72	0.163	1.19	0.063	0.80
4.20					26.409	9.94	9.030	6.36	3.080	4.08	0.990	2.55	0.431	1.81	0.178	1.25	0.069	0.84
4.40							9.840	6.66	3.358	4.28	1.079	2.67	0.470	1.89	0.194	1.31	0.075	0.88
4.60							10.645	6.96	3.648	4.47	1.171	2.79	0.510	1.98	0.210	1.37	0.081	0.92
4.80							11.551	7.27	3.945	4.66	1.266	2.91	0.552	2.07	0.227	1.43	0.088	0.96
5.00							12.472	7.57	4.254	4.86	1.365	3.03	0.595	2.15	0.245	1.49	0.094	1.00
5.50							14.797	8.33	5.075	5.34	1.629	3.34	0.709	2.37	0.292	1.64	0.112	1.10
6.00							17.303	9.08	5.960	5.83	1.913	3.64	0.833	2.58	0.343	1.79	0.132	1.20
6.50							20.157	9.84	6.910	6.32	2.218	3.95	0.966	2.80	0.397	1.93	0.153	1.30
7.00									7.927	6.80	2.544	4.25	1.108	3.01	0.456	2.08	0.175	1.40
7.50									9.012	7.29	2.890	4.55	1.258	3.23	0.517	2.23	0.199	1.50
8.00									10.153	7.77	3.256	4.86	1.418	3.44	0.583	2.38	0.224	1.60
8.50									11.356	8.26	3.644	5.16	1.586	3.66	0.652	2.53	0.250	1.70
9.00									12.625	8.74	4.049	5.46	1.762	3.87	0.725	2.68	0.278	1.80
9.50									13.959	9.23	4.476	5.77	1.948	4.09	0.801	2.83	0.307	1.90
10.00									15.334	9.72	4.921	6.07	2.142	4.30	0.880	2.98	0.338	2.00
11.00											5.871	6.68	2.554	4.73	1.050	3.27	0.403	2.20
12.00											6.897	7.28	3.000	5.16	1.233	3.57	0.473	2.40
13.00											7.998	7.89	3.479	5.59	1.430	3.87	0.549	2.60
14.00											9.174	8.50	3.990	6.02	1.640	4.17	0.629	2.80
15.00											10.423	9.10	4.534	6.45	1.863	4.47	0.715	3.00
16.00											11.749	9.71	5.110	6.88	2.100	4.76	0.805	3.20
17.00													5.715	7.31	2.349	5.06	0.901	3.40
18.00													6.353	7.74	2.611	5.36	1.001	3.60
19.00													7.023	8.17	2.886	5.66	1.106	3.80
20.00													7.722	8.60	3.173	5.95	1.216	4.00

PPR S 4 (PN12.5) water temperature = 10°C density = 999.7 kg/m^3 dynamic viscosity = 1.306E-3 Pa·s																			
	20×2.3mm		25×2.8mm		32×3.6mm		40×4.5mm		50×5.6mm		63×7.1mm		75×8.4mm		90×10.1mm		110×12.3mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.039	0.11	0.015	0.07															
0.04	0.094	0.21	0.035	0.14	0.012	0.08	0.005	0.05											
0.06	0.165	0.32	0.059	0.20	0.020	0.12	0.008	0.08	0.003	0.05									
0.08	0.262	0.43	0.090	0.27	0.030	0.17	0.011	0.11	0.004	0.07									
0.10	0.386	0.54	0.129	0.34	0.042	0.21	0.015	0.13	0.006	0.08	0.002	0.05							
0.12	0.526	0.64	0.178	0.41	0.056	0.25	0.020	0.16	0.007	0.10	0.003	0.06	0.001	0.05					
0.14	0.684	0.75	0.232	0.47	0.073	0.29	0.026	0.19	0.009	0.12	0.003	0.07	0.002	0.05					
0.16	0.862	0.86	0.291	0.54	0.092	0.33	0.032	0.21	0.011	0.14	0.004	0.09	0.002	0.06					
0.18	1.055	0.97	0.356	0.61	0.112	0.37	0.039	0.24	0.014	0.15	0.005	0.10	0.002	0.07	0.001	0.05			
0.20	1.260	1.07	0.427	0.68	0.134	0.41	0.047	0.26	0.016	0.17	0.006	0.11	0.003	0.08	0.001	0.05			
0.30	2.559	1.61	0.835	1.01	0.270	0.62	0.095	0.40	0.033	0.25	0.011	0.16	0.005	0.11	0.002	0.08	0.001	0.05	
0.40	4.040	2.15	1.404	1.35	0.429	0.83	0.155	0.53	0.054	0.34	0.019	0.21	0.008	0.15	0.003	0.10	0.001	0.07	
0.50	5.788	2.68	2.000	1.69	0.651	1.04	0.221	0.66	0.079	0.42	0.027	0.27	0.012	0.19	0.005	0.13	0.002	0.09	
0.60	7.806	3.22	2.683	2.03	0.869	1.24	0.314	0.79	0.106	0.51	0.037	0.32	0.016	0.23	0.007	0.16	0.003	0.10	
0.70	10.083	3.76	3.448	2.37	1.111	1.45	0.400	0.93	0.144	0.59	0.048	0.37	0.021	0.26	0.009	0.18	0.004	0.12	
0.80	12.612	4.29	4.297	2.71	1.379	1.66	0.495	1.06	0.178	0.68	0.059	0.43	0.026	0.30	0.011	0.21	0.004	0.14	
0.90	15.398	4.83	5.227	3.04	1.671	1.86	0.598	1.19	0.214	0.76	0.075	0.48	0.032	0.34	0.014	0.24	0.005	0.16	
1.00	18.441	5.37	6.233	3.38	1.986	2.07	0.709	1.32	0.253	0.85	0.089	0.53	0.039	0.38	0.017	0.26	0.007	0.17	
1.20	25.235	6.44	8.497	4.06	2.691	2.48	0.955	1.59	0.339	1.01	0.119	0.64	0.053	0.45	0.023	0.31	0.009	0.21	
1.40	32.997	7.52	11.067	4.74	3.488	2.90	1.232	1.85	0.435	1.18	0.152	0.75	0.068	0.53	0.030	0.37	0.011	0.24	
1.60	41.127	8.59	13.954	5.41	4.380	3.31	1.540	2.12	0.542	1.35	0.188	0.86	0.084	0.60	0.037	0.42	0.015	0.28	
1.80	48.987	9.66	17.120	6.09	5.357	3.73	1.878	2.38	0.659	1.52	0.228	0.96	0.101	0.68	0.044	0.47	0.018	0.31	
2.00			20.431	6.77	6.428	4.14	2.247	2.65	0.785	1.69	0.271	1.07	0.120	0.75	0.052	0.52	0.021	0.35	
2.20			23.523	7.44	7.593	4.55	2.646	2.91	0.922	1.86	0.317	1.18	0.141	0.83	0.061	0.57	0.024	0.38	
2.40			26.899	8.12	8.824	4.97	3.075	3.18	1.069	2.03	0.366	1.28	0.162	0.90	0.070	0.63	0.028	0.42	
2.60			30.901	8.80	10.057	5.38	3.534	3.44	1.225	2.20	0.419	1.39	0.185	0.98	0.080	0.68	0.032	0.45	
2.80			35.241	9.47	11.189	5.80	4.022	3.71	1.391	2.37	0.474	1.50	0.209	1.05	0.090	0.73	0.036	0.49	
3.00					12.406	6.21	4.532	3.97	1.568	2.54	0.533	1.60	0.234	1.13	0.101	0.78	0.040	0.52	
3.20					13.867	6.62	5.035	4.24	1.753	2.71	0.595	1.71	0.261	1.20	0.112	0.84	0.044	0.56	
3.40					15.406	7.04	5.491	4.50	1.949	2.88	0.660	1.82	0.289	1.28	0.124	0.89	0.049	0.59	
3.60					17.081	7.45	5.982	4.77	2.153	3.04	0.728	1.92	0.319	1.35	0.137	0.94	0.054	0.63	
3.80					18.855	7.87	6.514	5.03	2.362	3.21	0.800	2.03	0.349	1.43	0.150	0.99	0.059	0.66	
4.00					20.681	8.28	7.125	5.30	2.568	3.38	0.874	2.14	0.381	1.50	0.163	1.05	0.064	0.70	
4.20					22.593	8.69	7.764	5.56	2.769	3.55	0.952	2.25	0.415	1.58	0.177	1.10	0.069	0.73	
4.40					24.615	9.11	8.421	5.83	2.954	3.72	1.033	2.35	0.449	1.65	0.192	1.15	0.075	0.77	
4.60					26.602	9.52	9.167	6.09	3.159	3.89	1.115	2.46	0.485	1.73	0.207	1.20	0.081	0.80	
4.80					28.616	9.94	9.872	6.36	3.386	4.06	1.199	2.57	0.523	1.80	0.222	1.25	0.086	0.84	
5.00							10.633	6.62	3.633	4.23	1.282	2.67	0.561	1.88	0.238	1.31	0.093	0.87	
5.50							12.675	7.29	4.304	4.65	1.476	2.94	0.662	2.07	0.281	1.44	0.109	0.96	
6.00							14.793	7.95	5.034	5.07	1.693	3.21	0.765	2.26	0.327	1.57	0.126	1.05	
6.50							17.118	8.61	5.818	5.50	1.946	3.48	0.861	2.44	0.376	1.70	0.145	1.13	
7.00							19.578	9.27	6.654	5.92	2.221	3.74	0.966	2.63	0.426	1.83	0.165	1.22	
7.50							22.204	9.94	7.547	6.34	2.515	4.01	1.087	2.82	0.474	1.96	0.186	1.31	
8.00									8.495	6.77	2.825	4.28	1.218	3.01	0.521	2.09	0.208	1.40	
8.50									9.490	7.19	3.154	4.54	1.358	3.20	0.575	2.22	0.230	1.48	
9.00									10.541	7.61	3.499	4.81	1.506	3.38	0.635	2.35	0.252	1.57	
9.50									11.644	8.03	3.862	5.08	1.660	3.57	0.698	2.48	0.273	1.66	
10.00									12.799	8.46	4.241	5.35	1.821	3.76	0.765	2.61	0.295	1.75	
11.00									15.254	9.30	5.051	5.88	2.166	4.13	0.909	2.87	0.348	1.92	
12.00											5.927	6.42	2.539	4.51	1.064	3.14	0.406	2.09	
13.00											6.868	6.95	2.940	4.89	1.230	3.40	0.469	2.27	
14.00											7.873	7.49	3.369	5.26	1.408	3.66	0.536	2.44	
15.00											8.942	8.02	3.824	5.64	1.598	3.92	0.607	2.62	
16.00											10.075	8.55	4.307	6.01	1.798	4.18	0.683	2.79	
17.00											11.269	9.09	4.817	6.39	2.010	4.44	0.763	2.97	
18.00											12.523	9.62	5.352	6.77	2.233	4.70	0.847	3.14	
19.00													5.914	7.14	2.467	4.97	0.935	3.32	
20.00													6.501	7.52	2.711	5.23	1.027	3.49	

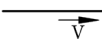
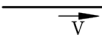
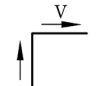
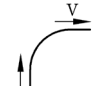
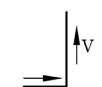
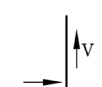
PPR S 4 (PN12.5) water temperature = 20°C density = 998.2 kg/m^3 dynamic viscosity = 1.004E-3 Pa·s																			
	20×2.3mm		25×2.8mm		32×3.6mm		40×4.5mm		50×5.6mm		63×7.1mm		75×8.4mm		90×10.1mm		110×12.3mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.032	0.11	0.012	0.07															
0.04	0.080	0.21	0.029	0.14	0.010	0.08	0.004	0.05											
0.06	0.149	0.32	0.051	0.20	0.017	0.12	0.007	0.08	0.003	0.05									
0.08	0.245	0.43	0.082	0.27	0.026	0.17	0.010	0.11	0.004	0.07									
0.10	0.357	0.54	0.121	0.34	0.038	0.21	0.013	0.13	0.005	0.08	0.002	0.05							
0.12	0.489	0.64	0.165	0.41	0.052	0.25	0.018	0.16	0.006	0.10	0.002	0.06	0.001	0.05					
0.14	0.637	0.75	0.215	0.47	0.068	0.29	0.024	0.19	0.008	0.12	0.003	0.07	0.001	0.05					
0.16	0.796	0.86	0.271	0.54	0.085	0.33	0.030	0.21	0.010	0.14	0.004	0.09	0.002	0.06					
0.18	0.958	0.97	0.331	0.61	0.104	0.37	0.037	0.24	0.013	0.15	0.004	0.10	0.002	0.07	0.001	0.05			
0.20	1.140	1.07	0.394	0.68	0.125	0.41	0.044	0.26	0.015	0.17	0.005	0.11	0.002	0.08	0.001	0.05			
0.30	2.298	1.61	0.799	1.01	0.244	0.62	0.088	0.40	0.031	0.25	0.011	0.16	0.005	0.11	0.002	0.08	0.001	0.05	
0.40	3.655	2.15	1.262	1.35	0.410	0.83	0.140	0.53	0.050	0.34	0.017	0.21	0.008	0.15	0.003	0.10	0.001	0.07	
0.50	5.279	2.68	1.809	1.69	0.585	1.04	0.211	0.66	0.072	0.42	0.025	0.27	0.011	0.19	0.005	0.13	0.002	0.09	
0.60	7.164	3.22	2.441	2.03	0.784	1.24	0.282	0.79	0.101	0.51	0.034	0.32	0.015	0.23	0.006	0.16	0.003	0.10	
0.70	9.296	3.76	3.155	2.37	1.008	1.45	0.361	0.93	0.129	0.59	0.045	0.37	0.019	0.26	0.008	0.18	0.003	0.12	
0.80	11.687	4.29	3.948	2.71	1.256	1.66	0.448	1.06	0.160	0.68	0.056	0.43	0.025	0.30	0.010	0.21	0.004	0.14	
0.90	14.308	4.83	4.823	3.04	1.528	1.86	0.543	1.19	0.193	0.76	0.068	0.48	0.030	0.34	0.013	0.24	0.005	0.16	
1.00	17.187	5.37	5.775	3.38	1.824	2.07	0.646	1.32	0.229	0.85	0.080	0.53	0.036	0.38	0.016	0.26	0.006	0.17	
1.20	23.531	6.44	7.912	4.06	2.483	2.48	0.874	1.59	0.308	1.01	0.107	0.64	0.048	0.45	0.021	0.31	0.008	0.21	
1.40	29.436	7.52	10.342	4.74	3.236	2.90	1.134	1.85	0.397	1.18	0.137	0.75	0.061	0.53	0.027	0.37	0.011	0.24	
1.60	37.136	8.59	12.809	5.41	4.076	3.31	1.424	2.12	0.497	1.35	0.171	0.86	0.076	0.60	0.033	0.42	0.013	0.28	
1.80	45.712	9.66	15.251	6.09	5.006	3.73	1.744	2.38	0.606	1.52	0.208	0.96	0.092	0.68	0.040	0.47	0.016	0.31	
2.00			18.269	6.77	5.945	4.14	2.094	2.65	0.726	1.69	0.248	1.07	0.109	0.75	0.047	0.52	0.019	0.35	
2.20			21.673	7.44	6.836	4.55	2.472	2.91	0.855	1.86	0.291	1.18	0.128	0.83	0.055	0.57	0.022	0.38	
2.40			25.407	8.12	7.857	4.97	2.866	3.18	0.994	2.03	0.338	1.28	0.148	0.90	0.064	0.63	0.025	0.42	
2.60			29.325	8.80	9.047	5.38	3.223	3.44	1.143	2.20	0.387	1.39	0.170	0.98	0.073	0.68	0.029	0.45	
2.80			33.700	9.47	10.307	5.80	3.606	3.71	1.300	2.37	0.440	1.50	0.192	1.05	0.082	0.73	0.032	0.49	
3.00					11.692	6.21	4.036	3.97	1.461	2.54	0.496	1.60	0.216	1.13	0.093	0.78	0.036	0.52	
3.20					13.166	6.62	4.526	4.24	1.617	2.71	0.555	1.71	0.242	1.20	0.103	0.84	0.040	0.56	
3.40					14.700	7.04	5.039	4.50	1.756	2.88	0.617	1.82	0.268	1.28	0.114	0.89	0.045	0.59	
3.60					16.268	7.45	5.587	4.77	1.924	3.04	0.681	1.92	0.296	1.35	0.126	0.94	0.049	0.63	
3.80					17.966	7.87	6.157	5.03	2.108	3.21	0.745	2.03	0.325	1.43	0.138	0.99	0.054	0.66	
4.00					19.765	8.28	6.774	5.30	2.308	3.38	0.806	2.14	0.356	1.50	0.151	1.05	0.059	0.70	
4.20					21.615	8.69	7.385	5.56	2.517	3.55	0.865	2.25	0.388	1.58	0.164	1.10	0.064	0.73	
4.40					23.509	9.11	8.049	5.83	2.737	3.72	0.928	2.35	0.419	1.65	0.178	1.15	0.069	0.77	
4.60					25.426	9.52	8.729	6.09	2.965	3.89	0.997	2.46	0.451	1.73	0.193	1.20	0.074	0.80	
4.80					27.621	9.94	9.443	6.36	3.202	4.06	1.073	2.57	0.481	1.80	0.208	1.25	0.080	0.84	
5.00							10.162	6.62	3.447	4.23	1.153	2.67	0.510	1.88	0.223	1.31	0.086	0.87	
5.50							12.090	7.29	4.100	4.65	1.367	2.94	0.593	2.07	0.261	1.44	0.101	0.96	
6.00							14.161	7.95	4.804	5.07	1.599	3.21	0.690	2.26	0.297	1.57	0.118	1.05	
6.50							16.414	8.61	5.563	5.50	1.849	3.48	0.796	2.44	0.337	1.70	0.135	1.13	
7.00							18.867	9.27	6.374	5.92	2.116	3.74	0.910	2.63	0.383	1.83	0.152	1.22	
7.50							21.390	9.94	7.237	6.34	2.399	4.01	1.031	2.82	0.433	1.96	0.168	1.31	
8.00									8.149	6.77	2.700	4.28	1.159	3.01	0.487	2.09	0.187	1.40	
8.50									9.115	7.19	3.018	4.54	1.294	3.20	0.543	2.22	0.208	1.48	
9.00									10.131	7.61	3.352	4.81	1.436	3.38	0.602	2.35	0.230	1.57	
9.50									11.198	8.03	3.702	5.08	1.586	3.57	0.664	2.48	0.253	1.66	
10.00									12.307	8.46	4.069	5.35	1.742	3.76	0.729	2.61	0.278	1.75	
11.00									14.680	9.30	4.851	5.88	2.075	4.13	0.867	2.87	0.330	1.92	
12.00											5.696	6.42	2.436	4.51	1.017	3.14	0.386	2.09	
13.00											6.603	6.95	2.823	4.89	1.178	3.40	0.447	2.27	
14.00											7.573	7.49	3.237	5.26	1.350	3.66	0.512	2.44	
15.00											8.604	8.02	3.676	5.64	1.533	3.92	0.581	2.62	
16.00											9.693	8.55	4.142	6.01	1.727	4.18	0.654	2.79	
17.00											10.843	9.09	4.633	6.39	1.931	4.44	0.731	2.97	
18.00											12.053	9.62	5.148	6.77	2.146	4.70	0.812	3.14	
19.00													5.689	7.14	2.372	4.97	0.897	3.32	
20.00													6.255	7.52	2.607	5.23	0.986	3.49	

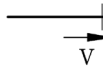
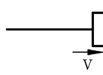
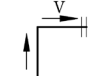
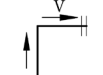
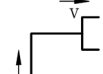
PPR S 4 (PN12.5) water temperature = 50°C density = 988.1 kg/m^3 dynamic viscosity = 5.494E-4 Pa·s																			
	20×2.3mm		25×2.8mm		32×3.6mm		40×4.5mm		50×5.6mm		63×7.1mm		75×8.4mm		90×10.1mm		110×12.3mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.021	0.11	0.008	0.07															
0.04	0.063	0.21	0.021	0.14	0.007	0.08	0.003	0.05											
0.06	0.126	0.32	0.043	0.20	0.013	0.12	0.005	0.08	0.002	0.05									
0.08	0.207	0.43	0.070	0.27	0.022	0.17	0.008	0.11	0.003	0.07									
0.10	0.297	0.54	0.103	0.34	0.032	0.21	0.011	0.13	0.004	0.08	0.001	0.05							
0.12	0.423	0.64	0.138	0.41	0.044	0.25	0.016	0.16	0.005	0.10	0.002	0.06	0.001	0.05					
0.14	0.540	0.75	0.179	0.47	0.057	0.29	0.020	0.19	0.007	0.12	0.002	0.07	0.001	0.05					
0.16	0.667	0.86	0.232	0.54	0.071	0.33	0.025	0.21	0.009	0.14	0.003	0.09	0.001	0.06					
0.18	0.806	0.97	0.280	0.61	0.088	0.37	0.031	0.24	0.011	0.15	0.004	0.10	0.002	0.07	0.001	0.05			
0.20	0.955	1.07	0.330	0.68	0.108	0.41	0.037	0.26	0.013	0.17	0.004	0.11	0.002	0.08	0.001	0.05			
0.30	1.864	1.61	0.636	1.01	0.205	0.62	0.074	0.40	0.027	0.25	0.009	0.16	0.004	0.11	0.002	0.08	0.001	0.05	
0.40	3.030	2.15	1.026	1.35	0.327	0.83	0.117	0.53	0.042	0.34	0.015	0.21	0.006	0.15	0.003	0.10	0.001	0.07	
0.50	4.444	2.68	1.497	1.69	0.474	1.04	0.168	0.66	0.060	0.42	0.021	0.27	0.009	0.19	0.004	0.13	0.002	0.09	
0.60	6.107	3.22	2.046	2.03	0.644	1.24	0.227	0.79	0.080	0.51	0.028	0.32	0.013	0.23	0.005	0.16	0.002	0.10	
0.70	7.855	3.76	2.674	2.37	0.838	1.45	0.294	0.93	0.104	0.59	0.036	0.37	0.016	0.26	0.007	0.18	0.003	0.12	
0.80	9.571	4.29	3.366	2.71	1.055	1.66	0.369	1.06	0.129	0.68	0.045	0.43	0.020	0.30	0.009	0.21	0.003	0.14	
0.90	11.785	4.83	4.063	3.04	1.295	1.86	0.452	1.19	0.157	0.76	0.054	0.48	0.024	0.34	0.010	0.24	0.004	0.16	
1.00	14.254	5.37	4.740	3.38	1.556	2.07	0.541	1.32	0.188	0.85	0.065	0.53	0.029	0.38	0.012	0.26	0.005	0.17	
1.20	19.834	6.44	6.509	4.06	2.058	2.48	0.744	1.59	0.257	1.01	0.088	0.64	0.039	0.45	0.017	0.31	0.007	0.21	
1.40	26.258	7.52	8.611	4.74	2.660	2.90	0.953	1.85	0.336	1.18	0.114	0.75	0.050	0.53	0.021	0.37	0.008	0.24	
1.60	33.644	8.59	11.008	5.41	3.377	3.31	1.169	2.12	0.423	1.35	0.143	0.86	0.063	0.60	0.027	0.42	0.011	0.28	
1.80	41.617	9.66	13.609	6.09	4.179	3.73	1.438	2.38	0.509	1.52	0.176	0.96	0.077	0.68	0.033	0.47	0.013	0.31	
2.00			16.606	6.77	5.049	4.14	1.736	2.65	0.597	1.69	0.211	1.07	0.092	0.75	0.039	0.52	0.015	0.35	
2.20			19.739	7.44	6.011	4.55	2.069	2.91	0.704	1.86	0.246	1.18	0.109	0.83	0.046	0.57	0.018	0.38	
2.40			23.203	8.12	7.049	4.97	2.417	3.18	0.823	2.03	0.279	1.28	0.126	0.90	0.054	0.63	0.021	0.42	
2.60			26.947	8.80	8.233	5.38	2.797	3.44	0.951	2.20	0.319	1.39	0.143	0.98	0.062	0.68	0.024	0.45	
2.80			30.847	9.47	9.393	5.80	3.198	3.71	1.087	2.37	0.363	1.50	0.160	1.05	0.070	0.73	0.027	0.49	
3.00					10.675	6.21	3.633	3.97	1.233	2.54	0.411	1.60	0.178	1.13	0.079	0.78	0.030	0.52	
3.20					12.040	6.62	4.089	4.24	1.387	2.71	0.462	1.71	0.199	1.20	0.087	0.84	0.034	0.56	
3.40					13.398	7.04	4.576	4.50	1.549	2.88	0.515	1.82	0.222	1.28	0.095	0.89	0.038	0.59	
3.60					15.008	7.45	5.081	4.77	1.720	3.04	0.572	1.92	0.246	1.35	0.104	0.94	0.042	0.63	
3.80					16.503	7.87	5.621	5.03	1.900	3.21	0.631	2.03	0.271	1.43	0.114	0.99	0.045	0.66	
4.00					18.141	8.28	6.180	5.30	2.088	3.38	0.693	2.14	0.298	1.50	0.125	1.05	0.049	0.70	
4.20					19.824	8.69	6.766	5.56	2.285	3.55	0.757	2.25	0.325	1.58	0.137	1.10	0.053	0.73	
4.40					21.594	9.11	7.370	5.83	2.489	3.72	0.825	2.35	0.354	1.65	0.149	1.15	0.057	0.77	
4.60					23.466	9.52	7.985	6.09	2.701	3.89	0.894	2.46	0.384	1.73	0.161	1.20	0.062	0.80	
4.80					25.461	9.94	8.670	6.36	2.922	4.06	0.967	2.57	0.415	1.80	0.174	1.25	0.066	0.84	
5.00							9.331	6.62	3.151	4.23	1.042	2.67	0.447	1.88	0.187	1.31	0.071	0.87	
5.50							11.132	7.29	3.759	4.65	1.243	2.94	0.532	2.07	0.223	1.44	0.085	0.96	
6.00							13.060	7.95	4.414	5.07	1.459	3.21	0.624	2.26	0.261	1.57	0.099	1.05	
6.50							15.179	8.61	5.118	5.50	1.691	3.48	0.723	2.44	0.302	1.70	0.115	1.13	
7.00							17.355	9.27	5.870	5.92	1.939	3.74	0.829	2.63	0.346	1.83	0.131	1.22	
7.50							19.776	9.94	6.669	6.34	2.203	4.01	0.941	2.82	0.393	1.96	0.149	1.31	
8.00									7.516	6.77	2.482	4.28	1.061	3.01	0.442	2.09	0.168	1.40	
8.50									8.408	7.19	2.776	4.54	1.186	3.20	0.495	2.22	0.187	1.48	
9.00									9.346	7.61	3.085	4.81	1.318	3.38	0.550	2.35	0.208	1.57	
9.50									10.329	8.03	3.410	5.08	1.457	3.57	0.607	2.48	0.230	1.66	
10.00									11.357	8.46	3.749	5.35	1.601	3.76	0.668	2.61	0.253	1.75	
11.00									13.545	9.30	4.471	5.88	1.910	4.13	0.796	2.87	0.301	1.92	
12.00											5.252	6.42	2.243	4.51	0.935	3.14	0.354	2.09	
13.00											6.090	6.95	2.601	4.89	1.084	3.40	0.410	2.27	
14.00											6.986	7.49	2.983	5.26	1.243	3.66	0.470	2.44	
15.00											7.937	8.02	3.389	5.64	1.412	3.92	0.534	2.62	
16.00											8.943	8.55	3.819	6.01	1.591	4.18	0.601	2.79	
17.00											10.004	9.09	4.271	6.39	1.780	4.44	0.672	2.97	
18.00											11.119	9.62	4.747	6.77	1.978	4.70	0.747	3.14	
19.00													5.247	7.14	2.186	4.97	0.826	3.32	
20.00											5.789	7.52	2.403	5.23	2.403	5.23	0.908	3.49	

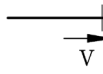
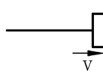
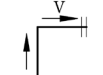
PPR S 5 (PN10) water temperature = 10°C density = 999.7 kg/m^3 dynamic viscosity = 1.306E-3 Pa·s																			
	20×2.0mm		25×2.3mm		32×2.9mm		40×3.7mm		50×4.6mm		63×5.8mm		75×6.8mm		90×8.2mm		110×10.0mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.033	0.10	0.012	0.06															
0.04	0.079	0.20	0.028	0.12	0.010	0.07	0.004	0.05											
0.06	0.139	0.30	0.048	0.18	0.016	0.11	0.006	0.07	0.002	0.05									
0.08	0.219	0.40	0.072	0.24	0.024	0.15	0.009	0.10	0.004	0.06									
0.10	0.322	0.50	0.102	0.31	0.033	0.19	0.012	0.12	0.005	0.08	0.002	0.05							
0.12	0.440	0.60	0.140	0.37	0.043	0.22	0.016	0.14	0.006	0.09	0.002	0.06							
0.14	0.571	0.70	0.183	0.43	0.056	0.26	0.020	0.17	0.007	0.11	0.003	0.07	0.001	0.05					
0.16	0.720	0.80	0.230	0.49	0.071	0.30	0.025	0.19	0.009	0.12	0.003	0.08	0.002	0.05					
0.18	0.882	0.90	0.281	0.55	0.087	0.33	0.031	0.22	0.011	0.14	0.004	0.09	0.002	0.06					
0.20	1.054	0.99	0.337	0.61	0.104	0.37	0.037	0.24	0.013	0.15	0.004	0.10	0.002	0.07	0.001	0.05			
0.30	2.149	1.49	0.665	0.92	0.209	0.56	0.075	0.36	0.026	0.23	0.009	0.14	0.004	0.10	0.002	0.07	0.001	0.05	
0.40	3.393	1.99	1.117	1.22	0.334	0.74	0.122	0.48	0.043	0.31	0.015	0.19	0.006	0.14	0.003	0.09	0.001	0.06	
0.50	4.858	2.49	1.590	1.53	0.507	0.93	0.176	0.60	0.063	0.38	0.021	0.24	0.009	0.17	0.004	0.12	0.002	0.08	
0.60	6.541	2.98	2.129	1.84	0.676	1.11	0.249	0.72	0.084	0.46	0.029	0.29	0.013	0.20	0.005	0.14	0.002	0.09	
0.70	8.436	3.48	2.736	2.14	0.864	1.30	0.318	0.84	0.110	0.54	0.038	0.34	0.017	0.24	0.007	0.16	0.003	0.11	
0.80	10.558	3.98	3.404	2.45	1.071	1.48	0.393	0.96	0.141	0.61	0.047	0.39	0.021	0.27	0.009	0.19	0.004	0.13	
0.90	12.874	4.48	4.139	2.75	1.296	1.67	0.475	1.08	0.170	0.69	0.059	0.43	0.025	0.30	0.011	0.21	0.004	0.14	
1.00	15.397	4.97	4.934	3.06	1.541	1.85	0.562	1.20	0.201	0.76	0.070	0.48	0.030	0.34	0.013	0.24	0.005	0.16	
1.20	21.070	5.97	6.714	3.67	2.083	2.23	0.756	1.44	0.269	0.92	0.094	0.58	0.042	0.41	0.017	0.28	0.007	0.19	
1.40	27.542	6.96	8.737	4.28	2.698	2.60	0.975	1.68	0.345	1.07	0.120	0.67	0.053	0.47	0.023	0.33	0.009	0.22	
1.60	34.647	7.96	11.001	4.90	3.381	2.97	1.217	1.92	0.429	1.22	0.148	0.77	0.066	0.54	0.029	0.38	0.012	0.25	
1.80	41.322	8.95	13.494	5.51	4.138	3.34	1.484	2.16	0.521	1.38	0.180	0.87	0.079	0.61	0.035	0.42	0.014	0.28	
2.00	48.570	9.95	16.205	6.12	4.962	3.71	1.774	2.40	0.621	1.53	0.213	0.96	0.094	0.68	0.041	0.47	0.017	0.31	
2.20			18.776	6.73	5.854	4.08	2.088	2.64	0.729	1.68	0.249	1.06	0.110	0.74	0.048	0.52	0.019	0.35	
2.40			21.346	7.34	6.813	4.45	2.425	2.88	0.844	1.84	0.288	1.16	0.127	0.81	0.055	0.56	0.022	0.38	
2.60			24.278	7.95	7.815	4.82	2.785	3.11	0.967	1.99	0.329	1.25	0.144	0.88	0.063	0.61	0.025	0.41	
2.80			27.766	8.57	8.782	5.19	3.168	3.35	1.098	2.14	0.372	1.35	0.163	0.95	0.071	0.66	0.028	0.44	
3.00			31.420	9.18	9.696	5.56	3.574	3.59	1.236	2.29	0.418	1.45	0.183	1.01	0.079	0.71	0.031	0.47	
3.20			35.206	9.79	10.710	5.94	3.992	3.83	1.382	2.45	0.467	1.54	0.203	1.08	0.088	0.75	0.035	0.50	
3.40					11.870	6.31	4.404	4.07	1.536	2.60	0.518	1.64	0.225	1.15	0.097	0.80	0.039	0.53	
3.60					13.140	6.68	4.784	4.31	1.696	2.75	0.571	1.73	0.248	1.22	0.107	0.85	0.042	0.57	
3.80					14.450	7.05	5.170	4.55	1.864	2.91	0.626	1.83	0.272	1.28	0.117	0.89	0.046	0.60	
4.00					15.870	7.42	5.622	4.79	2.035	3.06	0.685	1.93	0.297	1.35	0.127	0.94	0.050	0.63	
4.20					17.314	7.79	6.102	5.03	2.203	3.21	0.745	2.02	0.322	1.42	0.138	0.99	0.054	0.66	
4.40					18.849	8.16	6.629	5.27	2.366	3.37	0.808	2.12	0.349	1.49	0.149	1.03	0.059	0.69	
4.60					20.426	8.53	7.180	5.51	2.519	3.52	0.873	2.22	0.377	1.55	0.161	1.08	0.063	0.72	
4.80					22.116	8.90	7.739	5.75	2.683	3.67	0.940	2.31	0.406	1.62	0.173	1.13	0.068	0.75	
5.00					23.767	9.27	8.332	5.99	2.867	3.82	1.009	2.41	0.436	1.69	0.186	1.18	0.073	0.79	
5.50							9.906	6.59	3.384	4.21	1.173	2.65	0.514	1.86	0.219	1.29	0.085	0.86	
6.00							11.596	7.19	3.954	4.59	1.334	2.89	0.598	2.03	0.254	1.41	0.099	0.94	
6.50							13.434	7.79	4.569	4.97	1.523	3.13	0.679	2.20	0.293	1.53	0.113	1.02	
7.00							15.397	8.39	5.224	5.35	1.736	3.37	0.757	2.36	0.333	1.65	0.129	1.10	
7.50							17.458	8.99	5.923	5.74	1.964	3.61	0.845	2.53	0.373	1.76	0.145	1.18	
8.00							19.688	9.58	6.664	6.12	2.205	3.86	0.945	2.70	0.411	1.88	0.163	1.26	
8.50									7.444	6.50	2.461	4.10	1.052	2.87	0.450	2.00	0.181	1.34	
9.00									8.267	6.88	2.730	4.34	1.166	3.04	0.494	2.12	0.199	1.41	
9.50									9.130	7.27	3.012	4.58	1.285	3.21	0.543	2.23	0.216	1.49	
10.00									10.034	7.65	3.307	4.82	1.409	3.38	0.595	2.35	0.234	1.57	
11.00									11.959	8.41	3.937	5.30	1.675	3.72	0.705	2.59	0.272	1.73	
12.00									14.039	9.18	4.618	5.78	1.963	4.05	0.825	2.82	0.317	1.89	
13.00									16.277	9.94	5.351	6.27	2.272	4.39	0.954	3.06	0.366	2.04	
14.00											6.134	6.75	2.603	4.73	1.092	3.29	0.419	2.20	
15.00											6.966	7.23	2.954	5.07	1.238	3.53	0.474	2.36	
16.00											7.847	7.71	3.327	5.40	1.394	3.76	0.533	2.52	
17.00											8.776	8.19	3.720	5.74	1.558	4.00	0.595	2.67	
18.00											9.754	8.67	4.133	6.08	1.730	4.23	0.660	2.83	
19.00											10.777	9.16	4.567	6.42	1.911	4.47	0.729	2.99	
20.00											11.849	9.64	5.020	6.75	2.100	4.70	0.801	3.14	

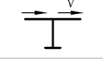
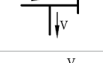
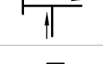
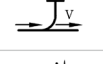
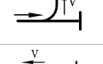
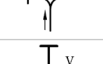
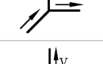
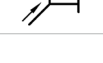
PPR S 5 (PN10) water temperature = 20°C density = 998.2 kg/m^3 dynamic viscosity = 1.004E-3 Pa·s																		
	20×2.0mm		25×2.3mm		32×2.9mm		40×3.7mm		50×4.6mm		63×5.8mm		75×6.8mm		90×8.2mm		110×10.0mm	
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s
0.02	0.027	0.10	0.010	0.06														
0.04	0.067	0.20	0.023	0.12	0.008	0.07	0.003	0.05										
0.06	0.124	0.30	0.041	0.18	0.014	0.11	0.005	0.07	0.002	0.05								
0.08	0.204	0.40	0.065	0.24	0.020	0.15	0.008	0.10	0.003	0.06								
0.10	0.298	0.50	0.096	0.31	0.029	0.19	0.011	0.12	0.004	0.08	0.001	0.05						
0.12	0.408	0.60	0.130	0.37	0.040	0.22	0.014	0.14	0.005	0.09	0.002	0.06						
0.14	0.532	0.70	0.170	0.43	0.053	0.26	0.019	0.17	0.007	0.11	0.002	0.07	0.001	0.05				
0.16	0.667	0.80	0.214	0.49	0.066	0.30	0.024	0.19	0.008	0.12	0.003	0.08	0.001	0.05				
0.18	0.806	0.90	0.262	0.55	0.081	0.33	0.029	0.22	0.010	0.14	0.003	0.09	0.002	0.06				
0.20	0.951	0.99	0.313	0.61	0.097	0.37	0.035	0.24	0.012	0.15	0.004	0.10	0.002	0.07	0.001	0.05		
0.30	1.930	1.49	0.636	0.92	0.190	0.56	0.069	0.36	0.024	0.23	0.008	0.14	0.004	0.10	0.002	0.07	0.001	0.05
0.40	3.067	1.99	1.003	1.22	0.319	0.74	0.111	0.48	0.040	0.31	0.013	0.19	0.006	0.14	0.003	0.09	0.001	0.06
0.50	4.423	2.49	1.436	1.53	0.455	0.93	0.168	0.60	0.057	0.38	0.020	0.24	0.009	0.17	0.004	0.12	0.001	0.08
0.60	5.991	2.98	1.935	1.84	0.609	1.11	0.224	0.72	0.080	0.46	0.027	0.29	0.012	0.20	0.005	0.14	0.002	0.09
0.70	7.771	3.48	2.498	2.14	0.782	1.30	0.286	0.84	0.103	0.54	0.036	0.34	0.015	0.24	0.007	0.16	0.003	0.11
0.80	9.763	3.98	3.124	2.45	0.974	1.48	0.355	0.96	0.127	0.61	0.044	0.39	0.019	0.27	0.008	0.19	0.003	0.13
0.90	11.955	4.48	3.810	2.75	1.183	1.67	0.430	1.08	0.153	0.69	0.053	0.43	0.024	0.30	0.010	0.21	0.004	0.14
1.00	14.344	4.97	4.560	3.06	1.410	1.85	0.511	1.20	0.181	0.76	0.063	0.48	0.028	0.34	0.012	0.24	0.005	0.16
1.20	19.672	5.97	6.242	3.67	1.919	2.23	0.691	1.44	0.244	0.92	0.084	0.58	0.037	0.41	0.016	0.28	0.007	0.19
1.40	24.821	6.96	8.159	4.28	2.498	2.60	0.896	1.68	0.315	1.07	0.108	0.67	0.048	0.47	0.021	0.33	0.008	0.22
1.60	30.790	7.96	10.245	4.90	3.146	2.97	1.124	1.92	0.393	1.22	0.135	0.77	0.059	0.54	0.026	0.38	0.010	0.25
1.80	38.006	8.95	12.156	5.51	3.862	3.34	1.375	2.16	0.479	1.38	0.164	0.87	0.072	0.61	0.031	0.42	0.013	0.28
2.00	46.040	9.95	14.430	6.12	4.632	3.71	1.650	2.40	0.573	1.53	0.195	0.96	0.085	0.68	0.037	0.47	0.015	0.31
2.20			17.039	6.73	5.369	4.08	1.948	2.64	0.675	1.68	0.229	1.06	0.100	0.74	0.043	0.52	0.017	0.35
2.40			19.936	7.34	6.093	4.45	2.266	2.88	0.784	1.84	0.265	1.16	0.116	0.81	0.050	0.56	0.020	0.38
2.60			23.060	7.95	6.975	4.82	2.590	3.11	0.901	1.99	0.304	1.25	0.132	0.88	0.057	0.61	0.023	0.41
2.80			26.433	8.57	7.936	5.19	2.881	3.35	1.025	2.14	0.345	1.35	0.150	0.95	0.064	0.66	0.025	0.44
3.00			29.888	9.18	8.987	5.56	3.193	3.59	1.155	2.29	0.388	1.45	0.168	1.01	0.072	0.71	0.029	0.47
3.20			33.684	9.79	10.102	5.94	3.557	3.83	1.286	2.45	0.434	1.54	0.188	1.08	0.081	0.75	0.032	0.50
3.40					11.250	6.31	3.958	4.07	1.410	2.60	0.483	1.64	0.208	1.15	0.089	0.80	0.035	0.53
3.60					12.491	6.68	4.380	4.31	1.530	2.75	0.533	1.73	0.230	1.22	0.098	0.85	0.039	0.57
3.80					13.788	7.05	4.826	4.55	1.665	2.91	0.585	1.83	0.253	1.28	0.108	0.89	0.042	0.60
4.00					15.144	7.42	5.301	4.79	1.816	3.06	0.638	1.93	0.276	1.35	0.118	0.94	0.046	0.63
4.20					16.564	7.79	5.793	5.03	1.979	3.21	0.688	2.02	0.301	1.42	0.128	0.99	0.050	0.66
4.40					18.058	8.16	6.297	5.27	2.151	3.37	0.736	2.12	0.326	1.49	0.139	1.03	0.054	0.69
4.60					19.628	8.53	6.831	5.51	2.329	3.52	0.786	2.22	0.352	1.55	0.150	1.08	0.058	0.72
4.80					21.147	8.90	7.383	5.75	2.514	3.67	0.842	2.31	0.378	1.62	0.161	1.13	0.063	0.75
5.00					22.867	9.27	7.951	5.99	2.707	3.82	0.902	2.41	0.402	1.69	0.173	1.18	0.067	0.79
5.50							9.481	6.59	3.217	4.21	1.068	2.65	0.463	1.86	0.204	1.29	0.079	0.86
6.00							11.126	7.19	3.770	4.59	1.249	2.89	0.535	2.03	0.235	1.41	0.092	0.94
6.50							12.875	7.79	4.364	4.97	1.443	3.13	0.617	2.20	0.264	1.53	0.106	1.02
7.00							14.784	8.39	4.999	5.35	1.650	3.37	0.704	2.36	0.298	1.65	0.120	1.10
7.50							16.783	8.99	5.674	5.74	1.871	3.61	0.798	2.53	0.337	1.76	0.133	1.18
8.00							18.958	9.58	6.390	6.12	2.105	3.86	0.897	2.70	0.378	1.88	0.147	1.26
8.50									7.145	6.50	2.352	4.10	1.001	2.87	0.421	2.00	0.163	1.34
9.00									7.940	6.88	2.612	4.34	1.111	3.04	0.467	2.12	0.180	1.41
9.50									8.774	7.27	2.885	4.58	1.226	3.21	0.515	2.23	0.198	1.49
10.00									9.646	7.65	3.171	4.82	1.346	3.38	0.565	2.35	0.217	1.57
11.00									11.505	8.41	3.779	5.30	1.603	3.72	0.672	2.59	0.258	1.73
12.00									13.512	9.18	4.437	5.78	1.882	4.05	0.788	2.82	0.302	1.89
13.00									15.667	9.94	5.143	6.27	2.180	4.39	0.913	3.06	0.349	2.04
14.00											5.898	6.75	2.500	4.73	1.046	3.29	0.399	2.20
15.00											6.700	7.23	2.839	5.07	1.188	3.53	0.453	2.36
16.00											7.549	7.71	3.198	5.40	1.338	3.76	0.510	2.52
17.00											8.443	8.19	3.577	5.74	1.496	4.00	0.570	2.67
18.00											9.386	8.67	3.976	6.08	1.662	4.23	0.633	2.83
19.00											10.371	9.16	4.393	6.42	1.837	4.47	0.699	2.99
20.00											11.404	9.64	4.830	6.75	2.019	4.70	0.768	3.14

PPR S 5 (PN10) water temperature = 50°C density = 988.1 kg/m^3 dynamic viscosity = 5.494E-4 Pa·s																			
	20×2.0mm		25×2.3mm		32×2.9mm		40×3.7mm		50×4.6mm		63×5.8mm		75×6.8mm		90×8.2mm		110×10.0mm		
Q (L/s)	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	R kPa/m	v m/s	
0.02	0.018	0.10	0.006	0.06															
0.04	0.053	0.20	0.017	0.12	0.005	0.07	0.002	0.05											
0.06	0.106	0.30	0.034	0.18	0.010	0.11	0.004	0.07	0.001	0.05									
0.08	0.173	0.40	0.055	0.24	0.017	0.15	0.006	0.10	0.002	0.06									
0.10	0.250	0.50	0.081	0.31	0.025	0.19	0.009	0.12	0.003	0.08	0.001	0.05							
0.12	0.354	0.60	0.110	0.37	0.034	0.22	0.012	0.14	0.004	0.09	0.001	0.06							
0.14	0.453	0.70	0.140	0.43	0.045	0.26	0.016	0.17	0.006	0.11	0.002	0.07	0.001	0.05					
0.16	0.560	0.80	0.185	0.49	0.055	0.30	0.020	0.19	0.007	0.12	0.002	0.08	0.001	0.05					
0.18	0.676	0.90	0.222	0.55	0.067	0.33	0.025	0.22	0.009	0.14	0.003	0.09	0.001	0.06					
0.20	0.801	0.99	0.263	0.61	0.084	0.37	0.029	0.24	0.010	0.15	0.003	0.10	0.002	0.07	0.001	0.05			
0.30	1.558	1.49	0.505	0.92	0.159	0.56	0.059	0.36	0.021	0.23	0.007	0.14	0.003	0.10	0.001	0.07	0.001	0.05	
0.40	2.530	1.99	0.812	1.22	0.254	0.74	0.093	0.48	0.033	0.31	0.012	0.19	0.005	0.14	0.002	0.09	0.001	0.06	
0.50	3.710	2.49	1.183	1.53	0.367	0.93	0.133	0.60	0.047	0.38	0.017	0.24	0.007	0.17	0.003	0.12	0.001	0.08	
0.60	5.094	2.98	1.615	1.84	0.498	1.11	0.180	0.72	0.064	0.46	0.022	0.29	0.010	0.20	0.004	0.14	0.002	0.09	
0.70	6.624	3.48	2.109	2.14	0.648	1.30	0.233	0.84	0.082	0.54	0.028	0.34	0.013	0.24	0.006	0.16	0.002	0.11	
0.80	8.039	3.98	2.662	2.45	0.814	1.48	0.291	0.96	0.102	0.61	0.035	0.39	0.016	0.27	0.007	0.19	0.003	0.13	
0.90	9.782	4.48	3.232	2.75	0.998	1.67	0.356	1.08	0.124	0.69	0.043	0.43	0.019	0.30	0.008	0.21	0.003	0.14	
1.00	11.817	4.97	3.753	3.06	1.199	1.85	0.427	1.20	0.149	0.76	0.051	0.48	0.022	0.34	0.010	0.24	0.004	0.16	
1.20	16.487	5.97	5.125	3.67	1.624	2.23	0.586	1.44	0.203	0.92	0.069	0.58	0.030	0.41	0.013	0.28	0.005	0.19	
1.40	21.857	6.96	6.776	4.28	2.050	2.60	0.762	1.68	0.265	1.07	0.089	0.67	0.039	0.47	0.017	0.33	0.007	0.22	
1.60	27.972	7.96	8.646	4.90	2.595	2.97	0.929	1.92	0.334	1.22	0.112	0.77	0.049	0.54	0.021	0.38	0.008	0.25	
1.80	34.594	8.95	10.683	5.51	3.210	3.34	1.129	2.16	0.406	1.38	0.138	0.87	0.060	0.61	0.026	0.42	0.010	0.28	
2.00	42.146	9.95	13.019	6.12	3.891	3.71	1.362	2.40	0.473	1.53	0.166	0.96	0.070	0.68	0.031	0.47	0.012	0.31	
2.20			15.464	6.73	4.627	4.08	1.620	2.64	0.554	1.68	0.194	1.06	0.084	0.74	0.036	0.52	0.014	0.35	
2.40			18.196	7.34	5.427	4.45	1.894	2.88	0.647	1.84	0.221	1.16	0.098	0.81	0.042	0.56	0.016	0.38	
2.60			21.113	7.95	6.291	4.82	2.194	3.11	0.747	1.99	0.250	1.25	0.112	0.88	0.048	0.61	0.019	0.41	
2.80			24.246	8.57	7.225	5.19	2.512	3.35	0.854	2.14	0.284	1.35	0.126	0.95	0.055	0.66	0.021	0.44	
3.00			27.363	9.18	8.166	5.56	2.849	3.59	0.968	2.29	0.321	1.45	0.139	1.01	0.061	0.71	0.024	0.47	
3.20			30.988	9.79	9.203	5.94	3.212	3.83	1.088	2.45	0.361	1.54	0.155	1.08	0.068	0.75	0.027	0.50	
3.40					10.287	6.31	3.585	4.07	1.215	2.60	0.402	1.64	0.172	1.15	0.075	0.80	0.030	0.53	
3.60					11.471	6.68	3.990	4.31	1.350	2.75	0.446	1.73	0.191	1.22	0.081	0.85	0.033	0.57	
3.80					12.675	7.05	4.407	4.55	1.490	2.91	0.492	1.83	0.210	1.28	0.089	0.89	0.036	0.60	
4.00					13.964	7.42	4.841	4.79	1.637	3.06	0.540	1.93	0.230	1.35	0.097	0.94	0.039	0.63	
4.20					15.263	7.79	5.305	5.03	1.791	3.21	0.590	2.02	0.252	1.42	0.106	0.99	0.042	0.66	
4.40					16.645	8.16	5.775	5.27	1.951	3.37	0.643	2.12	0.274	1.49	0.115	1.03	0.045	0.69	
4.60					18.019	8.53	6.269	5.51	2.118	3.52	0.697	2.22	0.297	1.55	0.125	1.08	0.048	0.72	
4.80					19.548	8.90	6.791	5.75	2.290	3.67	0.754	2.31	0.321	1.62	0.135	1.13	0.052	0.75	
5.00					21.102	9.27	7.314	5.99	2.470	3.82	0.812	2.41	0.345	1.69	0.145	1.18	0.056	0.79	
5.50							8.721	6.59	2.945	4.21	0.968	2.65	0.411	1.86	0.173	1.29	0.066	0.86	
6.00							10.236	7.19	3.460	4.59	1.136	2.89	0.482	2.03	0.202	1.41	0.077	0.94	
6.50							11.901	7.79	4.011	4.97	1.317	3.13	0.559	2.20	0.234	1.53	0.090	1.02	
7.00							13.620	8.39	4.600	5.35	1.510	3.37	0.640	2.36	0.268	1.65	0.102	1.10	
7.50							15.473	8.99	5.226	5.74	1.716	3.61	0.727	2.53	0.304	1.76	0.116	1.18	
8.00							17.465	9.58	5.889	6.12	1.933	3.86	0.819	2.70	0.343	1.88	0.131	1.26	
8.50									6.587	6.50	2.162	4.10	0.916	2.87	0.383	2.00	0.146	1.34	
9.00									7.322	6.88	2.403	4.34	1.018	3.04	0.426	2.12	0.162	1.41	
9.50									8.093	7.27	2.656	4.58	1.125	3.21	0.470	2.23	0.179	1.49	
10.00									8.897	7.65	2.919	4.82	1.237	3.38	0.517	2.35	0.197	1.57	
11.00									10.614	8.41	3.482	5.30	1.475	3.72	0.617	2.59	0.235	1.73	
12.00									12.470	9.18	4.090	5.78	1.732	4.05	0.724	2.82	0.275	1.89	
13.00									14.459	9.94	4.743	6.27	2.008	4.39	0.839	3.06	0.319	2.04	
14.00											5.439	6.75	2.303	4.73	0.963	3.29	0.366	2.20	
15.00											6.179	7.23	2.616	5.07	1.093	3.53	0.416	2.36	
16.00											6.963	7.71	2.948	5.40	1.232	3.76	0.468	2.52	
17.00											7.789	8.19	3.298	5.74	1.378	4.00	0.523	2.67	
18.00											8.659	8.67	3.665	6.08	1.531	4.23	0.582	2.83	
19.00											9.569	9.16	4.051	6.42	1.692	4.47	0.643	2.99	
20.00											10.522	9.64	4.454	6.75	1.861	4.70	0.706	3.14	

Condition: water temperature 300K, density 997.6kg/m ³ , flow velocity 2m/s													
Item	Sketch	Symbol	Coefficient ζ	Specif.									
			Equivalent length eL	20×20	25×25	32×32	40×40	50×50	63×63	75×75	90×90	110×110	160×160
Straight Coupling			Zeta	0.10	0.10	0.12	0.12	0.14	0.14	0.16	0.13	0.12	0.12
			m	0.05	0.05	0.08	0.11	0.14	0.18	0.21	0.21	0.25	0.39
Demountable Straight Coupling			Zeta	0.10	0.10	0.12	0.14	0.16	0.16	\	0.29	\	\
			m	0.04	0.05	0.08	0.11	0.13	0.16	\	0.46	\	\
S-straight Coupling			Zeta	0.79	0.79	\	\	\	\	\	\	\	\
			m	0.31	0.35	\	\	\	\	\	\	\	\
Bridge			Zeta	1.15	1.12	1.10	\	\	\	\	\	\	\
			m	1.52	1.44	1.39	\	\	\	\	\	\	\
Large Arc Bridge			Zeta	0.85	1.09	0.80	\	\	\	\	\	\	\
			m	0.49	0.68	1.02	\	\	\	\	\	\	\
Pipe Bridge			Zeta	0.77	0.63	0.47	\	\	\	\	\	\	\
			m	0.66	0.71	0.74	\	\	\	\	\	\	\
Elbow 45°			Zeta	0.37	0.36	0.44	0.52	0.83	0.82	1.30	1.47	1.48	1.49
			m	0.15	0.20	0.31	0.46	0.65	1.05	1.67	2.31	2.94	4.71
Elbow			Zeta	1.15	1.13	1.26	1.24	1.54	1.72	2.81	2.88	2.93	2.66
			m	0.46	0.61	0.82	1.09	1.57	2.21	3.67	4.65	5.86	8.41
Large Arc Elbow			Zeta	0.58	0.65	0.91	\	\	\	\	\	\	\
			m	0.20	0.29	0.47	\	\	\	\	\	\	\
L Bending Elbow (left)			Zeta	1.70	\	\	\	\	\	\	\	\	\
			m	0.60	\	\	\	\	\	\	\	\	\
L Bending Elbow (right)			Zeta	1.70	\	\	\	\	\	\	\	\	\
			m	0.60	\	\	\	\	\	\	\	\	\

Item	Sketch	Symbol	Coefficient ζ	Specif.												
			Equivalent length eL	20×1/2F	20×3/4F	25×1/2F	25×3/4F	25×1F	32×1/2F	32×3/4F	32×1F	40×1 1/4F	50×1 1/2F	63×2F	75×2 1/2F	
Female Straight Coupling			Zeta	0.23	0.63	0.35	0.41	0.51	0.86	0.35	0.20	0.29	0.21	0.28	0.59	
			m	0.08	0.20	0.41	0.15	0.27	3.73	0.50	0.14	0.24	0.33	0.52	0.75	
Demountable Female Coupling			Zeta	0.18	\	0.59	0.15	\	\	0.61	0.20	0.33	\	\	\	
			m	0.07	\	0.32	0.08	\	\	5.04	0.14	0.25	\	\	\	
Female Elbow			Zeta	1.40	2.57	1.41	1.63	2.63	1.26	1.43	1.38	1.57	1.79	1.80	\	
			m	0.51	1.02	1.68	0.52	1.40	5.52	1.94	0.96	1.30	1.81	2.32	\	
Wall-plated Female Elbow			Zeta	1.50	\	1.12	\	\	\	\	\	\	\	\	\	
			m	0.54	\	1.32	\	\	\	\	\	\	\	\	\	
Demountable Female Elbow			Zeta	1.68	\	1.45	1.23	\	\	\	\	\	\	\	\	
			m	6.67	\	19.04	2.74	\	\	\	\	\	\	\	\	

Item	Sketch	Symbol	Coefficient ζ	Specif.														
			Equivalent length eL	20×1/2M	20×3/4M	25×1/2M	25×3/4M	25×1M	32×1/2M	32×3/4M	32×1M	40×1 1/4M	50×1 1/2M	63×2M	75×2 1/2M	90×3M		
Male Straight Coupling			Zeta	0.31	0.47	0.25	0.20	0.64	0.64	0.15	0.13	0.35	0.13	0.15	0.31	0.44		
			m	0.12	0.19	0.44	0.12	0.34	4.22	0.32	0.25	0.29	0.21	0.28	0.60	0.93		
Demountable Male Coupling			Zeta	0.15	\	0.27	0.20	0.49	\	\	0.28	0.43	0.20	0.27	\	\		
			m	0.08	\	0.46	0.11	0.26	\	\	0.20	0.34	0.30	0.48	\	\		
Male Elbow			Zeta	1.21	2.43	1.12	1.36	2.67	2.34	1.37	1.53	1.63	1.18	1.30	\	\		
			m	0.66	0.96	1.90	0.81	1.43	5.18	2.99	1.06	1.35	1.91	2.45	\	\		

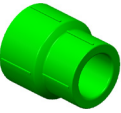
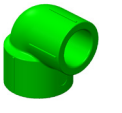
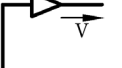
Item	Sketch	Symbol	Coefficient ζ	Specif.										
			Equivalent length eL	20×20×20	25×25×25	32×32×32	40×40×40	50×50×50	63×63×63	75×75×75	90×90×90	110×110×110	160×160×160	
Tee			Zeta	0.20	0.35	0.31	0.29	0.45	0.52	0.83	0.88	0.86	0.90	
			m	0.08	0.15	0.20	0.25	0.46	0.68	1.08	1.38	1.71	2.86	
			Zeta	1.27	1.58	1.49	1.43	1.80	2.12	2.96	3.26	3.20	2.98	
			m	0.50	0.70	0.95	1.24	1.83	2.72	3.86	4.94	6.43	9.52	
			Zeta	1.27	1.56	1.51	1.46	1.78	2.52	4.31	4.67	4.86	4.11	
			m	0.50	0.69	0.97	1.27	1.80	3.19	5.58	7.32	9.68	13.01	
Sweep Junction			Zeta	0.45	0.39	\	\	\	\	\	\	\	\	
			m	0.14	0.17	\	\	\	\	\	\	\	\	
			Zeta	1.11	1.01	\	\	\	\	\	\	\	\	
			m	0.34	0.44	\	\	\	\	\	\	\	\	
"Y" Tee			Zeta	0.77	0.86	\	\	\	\	\	\	\	\	
			m	0.27	0.38	\	\	\	\	\	\	\	\	
			Zeta	0.77	0.86	\	\	\	\	\	\	\	\	
			m	0.27	0.38	\	\	\	\	\	\	\	\	
Corner Tee			Zeta	1.46	1.78	2.35	\	\	\	\	\	\	\	
			m	0.46	0.79	1.20	\	\	\	\	\	\	\	
			Zeta	1.46	1.78	2.35	\	\	\	\	\	\	\	
			m	0.46	0.79	1.20	\	\	\	\	\	\	\	

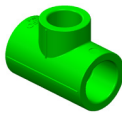
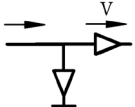
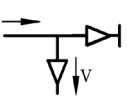
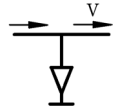
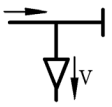
Item	Sketch	Symbol	Coefficient ζ	Specif.									
			Equivalent length eL	20x1/2Fx20	25x1/2Fx25	25x3/4Fx25	25x1Fx25	32x1/2Fx32	32x3/4Fx32	32x1Fx32	40x1 1/4Fx40	50x1 1/2Fx50	63x2Fx63
Female Tee			Zeta	0.26	0.18	0.21	0.22	0.21	0.23	0.25	0.35	0.43	0.49
			m	0.09	0.10	0.11	0.12	0.14	0.16	0.17	0.29	0.44	0.63
			Zeta	1.42	1.17	1.85	2.64	1.29	1.28	1.49	1.71	1.23	1.40
			m	0.51	1.38	0.68	1.40	5.66	1.75	1.04	1.42	1.96	2.66

Item	Sketch	Symbol	Coefficient ζ	Specif.									
			Equivalent length eL	20x1/2Mx20	25x1/2Mx25	25x3/4Mx25	25x1Mx25	32x1/2Mx32	32x3/4Mx32	32x1Mx32	40x1 1/4Mx40	50x1 1/2Mx50	63x2Mx63
Male Tee			Zeta	0.19	0.17	0.20	0.21	0.22	0.30	\	\	\	\
			m	0.08	0.09	0.11	0.14	0.15	0.19	\	\	\	\
			Zeta	1.20	1.27	1.50	1.77	1.71	1.65	\	\	\	\
			m	0.62	1.46	0.81	5.27	1.78	1.14	\	\	\	\

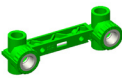
Item	Sketch	Symbol	Coefficient ζ	Specif.		
			Equivalent length eL	20×20×20×20	25×25×25×25	32×32×32×32
Cross			Zeta	0.23	0.23	0.35
			m	0.09	0.13	0.22
			Zeta	1.34	1.34	1.56
			m	0.53	0.71	1.00
Inner Bridge Cross			Zeta	0.84	1.32	\
			m	0.66	1.42	\
			Zeta	0.84	1.32	\
			m	0.66	1.42	\
Side Outlet Tee			Zeta	0.41	0.37	0.53
			m	0.13	0.16	0.28
			Zeta	1.97	1.78	2.31
			m	0.61	0.79	1.19
			Zeta	2.26	2.06	2.84
			m	0.70	0.91	1.47
			Zeta	1.94	1.75	2.32
			m	0.61	0.77	1.20

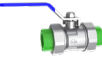
Item	Sketch	Symbol	Coefficient ζ	Specif.	
			Equivalent length eL	25x25x20x20	
Reducing Inner Bridge Cross			Zeta	20x20	25x25
			m	0.90	\
			Zeta	0.71	\
			m	\	1.26
			Zeta	\	1.35
			m	\	

		Item			
		Reducing Straight Coupling		Reducing Elbow	
Sketch					
Symbol					
Coefficient ζ	Equivalent length eL	Zeta	m	Zeta	m
Specif.	25x20	0.47	0.39	1.07	0.89
	32x20	1.90	2.18	1.40	1.62
	32x25	0.66	0.76	1.10	1.26
	40x20	5.50	8.67	1.49	3.13
	40x25	2.08	3.33	\	\
	40x32	0.68	1.06	\	\
	50x20	14.55	31.63	\	\
	50x25	5.80	12.45	\	\
	50x32	2.28	4.75	\	\
	50x40	0.81	1.68	\	\
	63x20	39.24	122.23	\	\
	63x25	15.21	44.82	\	\
	63x32	7.07	20.27	\	\
	63x40	2.77	7.77	\	\
	63x50	1.13	3.15	\	\
	75x63	1.01	3.53	\	\
	90x50	7.20	31.95	\	\
	90x63	2.70	11.86	\	\
	90x75	0.66	3.09	\	\
	110x50	13.23	77.19	\	\
	110x63	8.29	47.09	\	\
	110x75	3.44	20.58	\	\
	110x90	0.90	5.40	\	\
	160x110	3.04	29.36	\	\

		Item							
		Reducing Tee							
Sketch									
Symbol									
Coefficient ζ	Equivalent length eL	Zeta	m	Zeta	m	Zeta	m	Zeta	m
Specif.	25x20x20	0.36	0.30	2.00	1.62	\	\	\	\
	25x20x25	\	\	\	\	0.16	0.13	1.91	1.66
	32x20x32	\	\	\	\	0.21	0.25	4.11	4.81
	32x25x32	\	\	\	\	0.27	0.31	2.34	2.66
	40x20x40	\	\	\	\	0.15	0.24	8.73	13.81
	40x25x40	\	\	\	\	0.21	0.33	3.99	6.29
	40x32x40	\	\	\	\	0.25	0.39	2.16	3.34
	50x20x50	\	\	\	\	0.18	0.39	23.54	50.05
	50x25x50	\	\	\	\	0.25	0.53	9.78	20.72
	50x32x50	\	\	\	\	0.31	0.65	4.46	9.25
	50x40x50	\	\	\	\	0.38	0.79	2.58	5.35
	63x20x63	\	\	\	\	0.04	0.10	64.61	140.31
	63x25x63	\	\	\	\	0.14	0.34	25.52	63.98
	63x32x63	\	\	\	\	0.26	0.65	9.03	22.41
	63x40x63	\	\	\	\	0.33	0.85	4.75	12.17
	63x50x63	\	\	\	\	0.40	1.06	2.95	7.77
	75x25x75	\	\	\	\	0.06	0.19	49.87	150.32
	75x32x75	\	\	\	\	0.22	0.69	25.64	78.72
	75x40x75	\	\	\	\	0.38	1.21	11.75	37.23
	75x50x75	\	\	\	\	0.59	1.88	6.60	21.03
	75x63x75	\	\	\	\	0.73	2.42	4.18	14.03
	90x32x90	\	\	\	\	0.09	0.35	42.71	162.73
	90x40x90	\	\	\	\	0.26	1.03	20.20	79.41
	90x50x90	\	\	\	\	0.44	1.76	11.01	43.32
	90x63x90	\	\	\	\	0.63	2.61	6.39	26.57
	90x75x90	\	\	\	\	0.74	3.20	4.47	19.47
	110x25x110	\	\	\	\	0.05	0.33	245.17	1803.72
	110x40x110	\	\	\	\	0.10	0.49	37.99	205.01
	110x50x110	\	\	\	\	0.29	1.44	21.51	111.05
	110x63x110	\	\	\	\	0.43	2.25	10.94	56.73
	110x75x110	\	\	\	\	0.57	3.12	6.95	38.30
	110x90x110	\	\	\	\	0.66	3.71	4.80	26.96
	160x110x160	\	\	\	\	0.63	6.12	6.54	69.66

Item	Sketch	Symbol	Coefficient ζ	Specif.	
			Equivalent length eL	20×1/2F	25×1/2F
Assembly Double Female Elbow			Zeta	1.50	2.57
			m	0.54	1.37

Item	Sketch	Symbol	Coefficient ζ	Specif.	
			Equivalent length eL	20×1/2F×20	25×1/2F×25
U-profile Female Elbow			Zeta	0.81	0.86
			m	0.47	0.49
			Zeta	2.02	3.07
			m	1.12	1.70
U-profile Tap Elbow			Zeta	0.81	0.86
			m	0.47	0.49
			Zeta	2.02	3.07
			m	1.12	1.70
Assembly Double Female Tee			Zeta	0.39	0.32
			m	0.12	0.14
			Zeta	1.59	1.22
			m	0.57	1.44

Item	Sketch	Coefficient ζ	Specif.								
		Equivalent length eL	20×20	25×25	32×32	40×40	50×50	63×63	75×75	90×90	110×110
102 Surface Mounted PPR Gate Valve		Zeta	0.52	0.45	0.65	\	\	\	\	\	\
		m	0.35	0.47	2.45	\	\	\	\	\	\
103 Concealed PPR Gate Valve		Zeta	0.52	0.45	0.65	\	\	\	\	\	\
		m	0.35	0.47	2.45	\	\	\	\	\	\
201 Demountable Ball Valve		Zeta	0.35	0.26	0.27	0.31	0.29	0.25	\	\	\
		m	0.24	0.17	0.26	0.35	0.44	0.51	\	\	\
203 Ball Valve PP-R Coated		Zeta	0.20	0.21	0.32	0.39	0.30	0.27	\	\	\
		m	0.19	0.27	0.77	1.44	1.29	1.51	\	\	\
303 PPR Stop Valve I		Zeta	7.25	8.68	8.45	5.13	5.86	5.38	\	\	\
		m	9.06	11.91	12.48	28.97	27.17	45.23	\	\	\
303 PPR Stop Valve III		Zeta	6.83	8.36	8.47	5.16	6.18	5.01	3.71	4.24	4.87
		m	8.66	10.73	16.18	28.21	30.59	45.62	84.69	81.10	91.74
307 Mass Flow Stop Valve		Zeta	3.86	4.80	5.50	\	\	\	\	\	\
		m	3.54	4.91	7.45	\	\	\	\	\	\
422 PP-R Check Valve		Zeta	8.75	7.48	6.28	\	\	\	\	\	\
		m	2.66	3.21	3.77	\	\	\	\	\	\
703 Concealed Ceramic Core Valve		Zeta	38.72	53.44	\	\	\	\	\	\	\
		m	23.43	44.83	\	\	\	\	\	\	\

Item	Sketch	Coefficient ζ	Specif.					
		Equivalent length eL	20×1/2F	25×3/4F	32×1F	20×1/2M	25×3/4M	32×1M
201 Female Demountable Ball Valve		Zeta	0.25	0.20	0.26	\	\	\
		m	0.17	0.13	0.24	\	\	\
201 Male Demountable Ball Valve		Zeta	\	\	\	0.28	0.25	0.03
			\	\	\	0.19	0.17	0.27

Flow Rate Capacity of PP-R

The flow rate of the PP-R Pipe:

- 1.When the nominal outer diameter ≤ DN32, it should not be greater than 1.2m/s
- 2.When the nominal outer diameter is DN40 - DN63, it should not be greater than 1.5m/s
- 3.When the nominal outer diameter ≥ DN63, it should not be greater than 2.0m/s

Flow comparison table

Flow m³/h									
DN	0.4m/s	0.8m/s	1.0m/s	1.4m/s	1.8m/s	2.0m/s	2.4m/s	2.6m/s	3.0m/s
20	0.5	0.9	1.1	1.6	2.0	2.3	2.7	2.9	3.4
25	0.7	1.4	1.8	2.5	3.2	3.5	4.2	4.6	5.3
32	1.2	2.3	2.9	4.1	5.2	5.8	6.9	7.5	8.7
40	1.8	3.6	4.5	6.3	8.1	9.0	10.9	11.8	13.6
50	2.8	5.7	7.1	9.9	12.7	14.1	17.0	18.4	21.2
65	4.8	9.6	11.9	16.7	21.5	23.9	28.7	31.1	35.8
80	7.2	14.5	18.1	25.3	32.6	36.2	43.4	47	54.3
100	11.3	22.6	28.3	39.6	50.9	56.5	67.9	73.5	84.8
125	17.7	35.3	44.2	61.9	79.5	88.4	106.0	114.9	132.5
150	25.4	50.9	63.6	89.1	114.5	127.2	152.7	165.4	190.9
200	45.2	90.5	113.1	158.3	203.6	226.2	274.1	294.1	339.3

PRODUCTION AND QUALITY CONTROL

Internal Control

All RIFENG products are subjected to three stages of inspection: material inspection for raw materials, production inspection for production process, finished products inspection for finished product. Only those products that passed all stages of testing can be delivered or stored in RIFENG warehouse. Besides the production process, the monitoring on testing devices is also undertaken. Last but not least, according to ISO 9001, permanent records document are made.

In internal quality control, RIFENG PP-R pipes and fittings are mainly periodically subjected to the following extensive test programs according standards:

Material characterization tests

The physical and chemical properties of raw material are both the base of the product quality. Testing the incoming resin is the first step in quality control program. It is usually checked for contamination, melt flow index and density. Any resin which does not meet the raw material specification is not used for the production.

Thermal reversion properties

Thermal properties of the plastic materials are equally important as mechanical properties. All kinds of plastic material are more sensitive to changes in temperature than metal. Thus the plastic pipe are subjected to a thermal stress inside a thermostatic chamber with a continuous air circulation to observe shrinkage in accordance with DIN 8078.

Creep strength test

Pipes are subjected to creep tests that determines their service life and that provides the required information about the mechanical characteristic of the pipe long term burst strength.

Dimensional tests

Pipe diameter, wall thickness, ovality and length are measured on regular basis to insure compliance with prevailing specification. The outside diameter and wall thickness should comply with DIN 8077.

Impact strength test

Impact resistance is the ability of a material to resist breaking under the shock loading. Standard test specimens prepared from the pipes are subjected to a pendulum type impact load in accordance with DIN 8078



External Control

Besides the internal control which is planned and maintained by qualified RIFENG technical department, there are also periodic external controls carried out by independent international organization like TÜV-Germany or testing institute authorized by DVGW, etc. These controls include both product testing according to relevant standards and whole quality system controls.



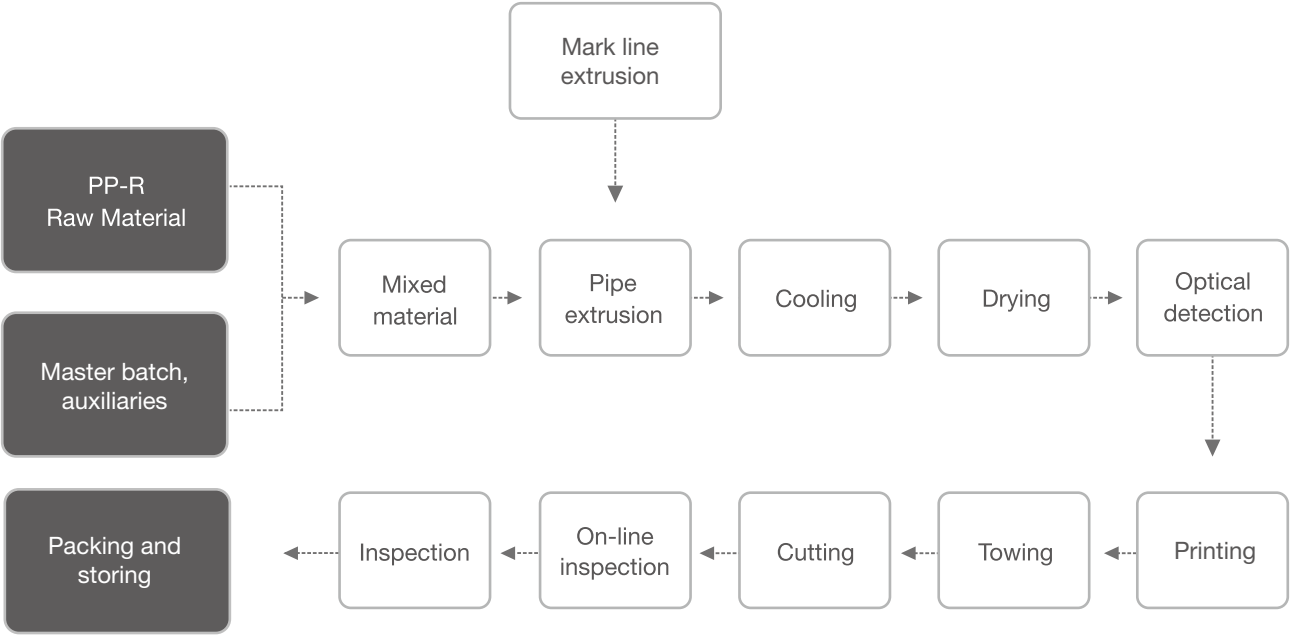
Management
System
ISO 9001:2015
www.tuv.com
ID 1100009308



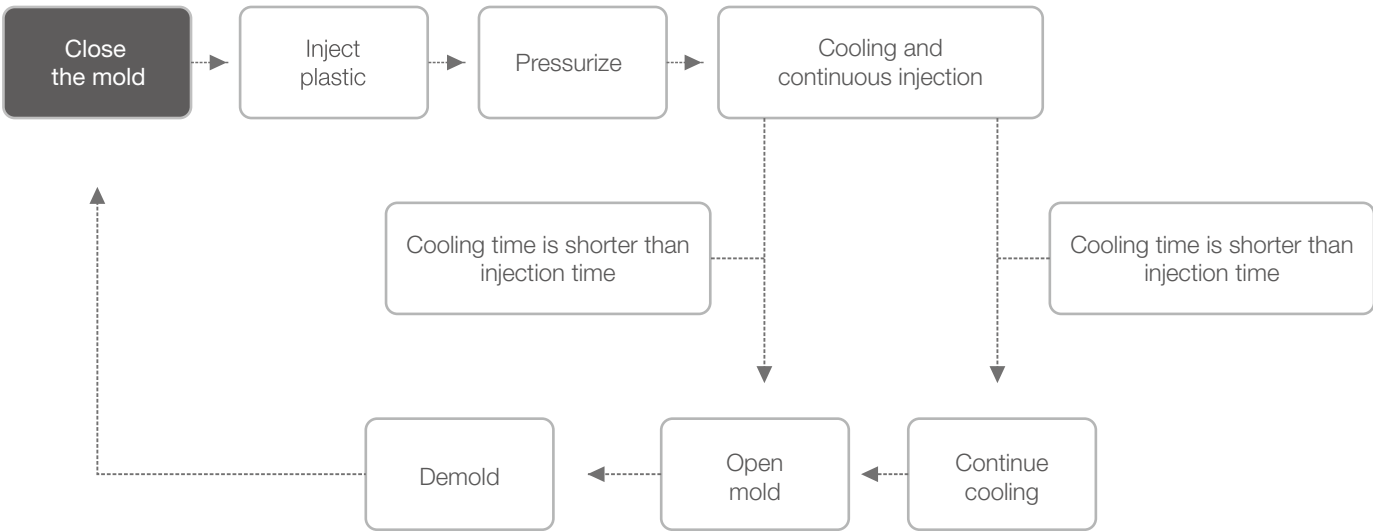
Quality Management

Production process

Production process of PP-R pipes:

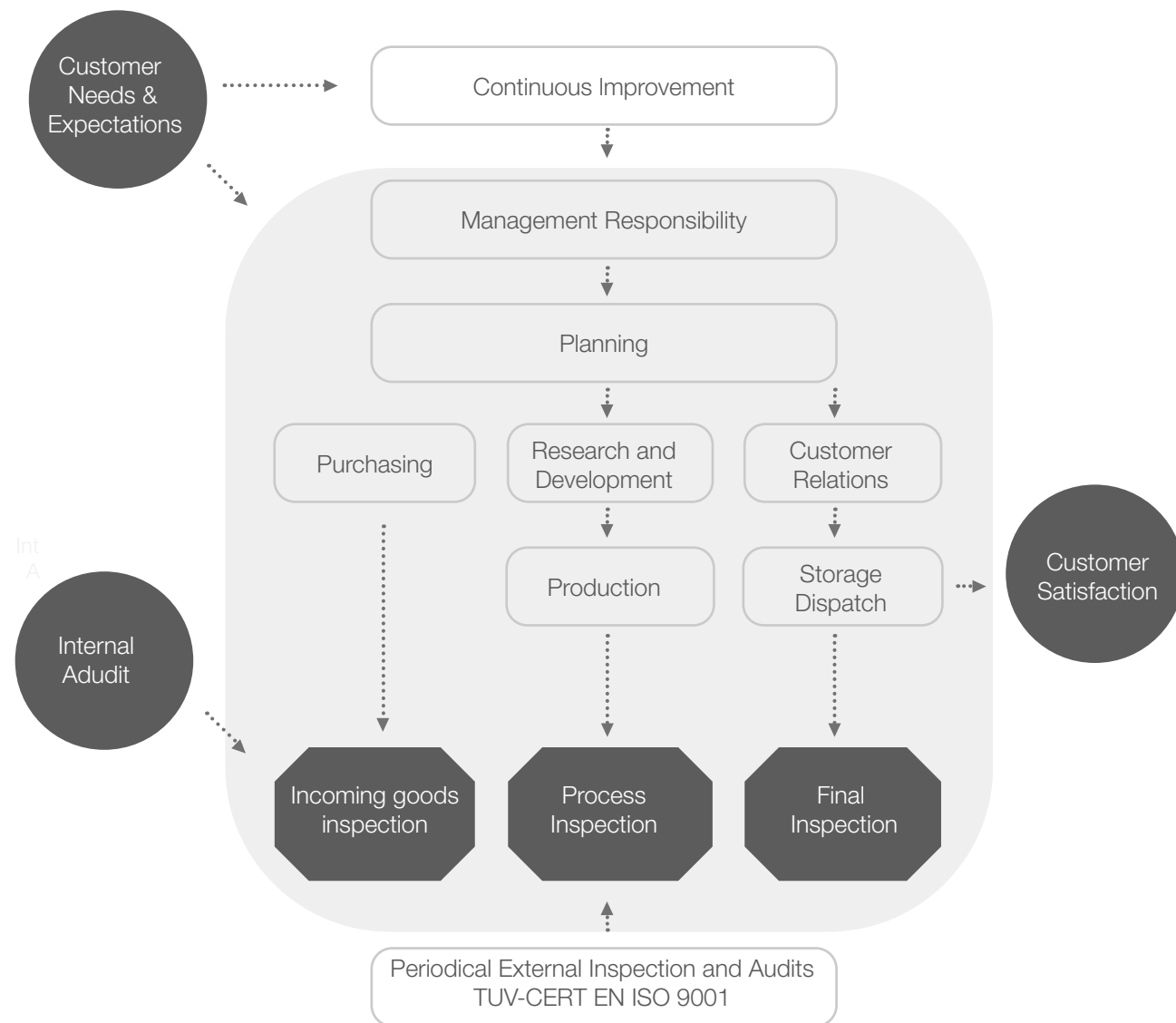


Production process of PP-R fittings:



Quality as the Strategic Focus

Quality is an integral part of everything RIFENG does. RIFENG's quality teams throughout the world are continually working to improve products, processes, and procedures to better meet customer's needs. We have researched and adapted the best methods of successful quality management systems to create our own RIFENG Quality System. The RIFENG Quality System is designed to be a cycle:



RIFENG holds several certifications, including TUV-CERT ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018. Updated certificates can be accessed online at RIFENG.com. Quality is built into RIFENG products throughout the entire manufacturing process. Our internal quality control involves three phases of inspection: incoming raw materials, production processes, and finished products. This combination of internal and external quality control ensures that RIFENG products meet standard requirements and satisfy customer demands.

Warranty

To uphold our commitment to providing high-quality and reliable solutions, RIFENG PP-R pipes and fittings are warranted against manufacturing defects for a period beginning on the manufacturing date printed on the product. For detailed warranty documentation, please contact our company.

WARRANTY SERVICES

Up to **25** Years
Warranty

Our products are backed by a warranty of up to 25 years. We guarantee high quality and provide long-term support through our extended warranty.

\$10 Million Liability
Insurance

We protect our customers' legal rights and interests by securing a product liability insurance policy with Allianz, one of the world's leading insurers, providing coverage of up to 10 million USD.

Further details about warranty terms and liability insurance are available in our official documents. For more information, please contact us at www.RIFENG.com or sales@RIFENG.com.



WELDING PROCESS

Socket Welding

Step 1:

Cut the pipe vertically.

Step 2:

Remove any burrs and clean the rough edges. Use a pencil and a RIFENG marker to mark the appropriate melting depth on the surface of the pipe ends.

Step 3:

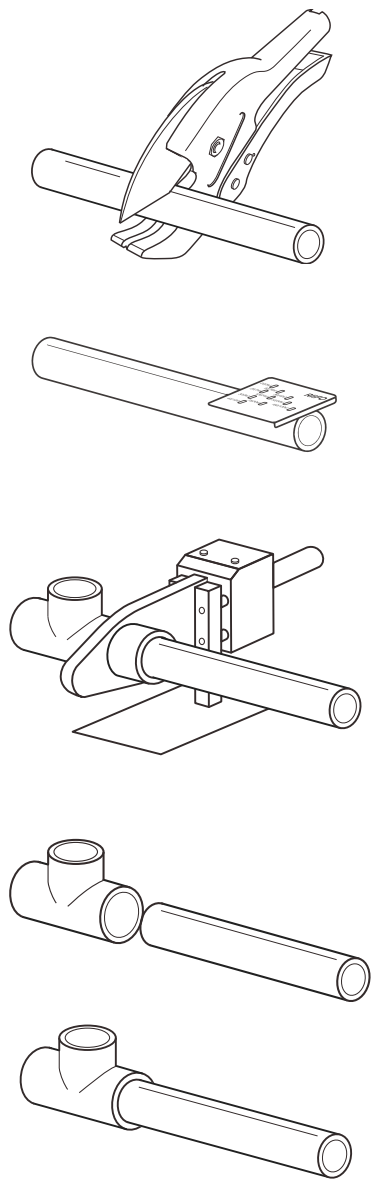
Simultaneously push and insert the pipe and fitting into the heating heads on the device. Push the fitting as far as possible and the pipe to the marked position. Note: If you push beyond the marked position or heat for longer than the specified time, the pipe may become constricted or clogged. Refer to the specified time in the table on the right.

Step 4:

Once the heating time has elapsed, quickly remove the pipe and fitting from the adaptors and align them coaxially.

Step 5:

Hold the pipe and fitting together for the specified connecting time until the welding is complete.

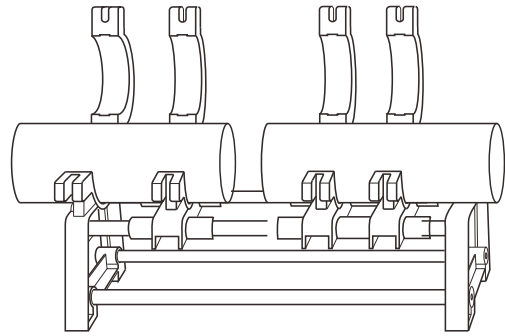


Nominal outer diameter (mm)	Minimum socket depth(mm)	Heating time (s)	Connection time (s)	Cooling time (min)
20	14	5	4	3
25	16	7	4	3
32	18	8	4	4
40	20	12	6	4
50	23	18	6	5
63	27	24	6	6
75	31	30	8	8
90	35	40	8	8
110	41	50	10	10
160	50	120	16	12

Note:

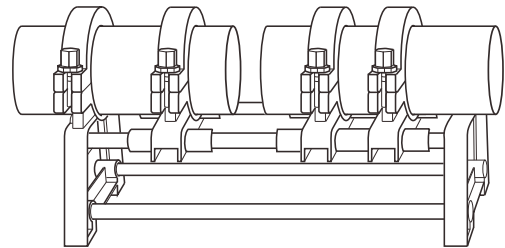
- 1. Applicable Ambient Temperature: 20°C. If the ambient temperature is below this, extend the heating time as needed. For temperatures lower than 5°C, increase the heating time by 50%.
- 2. The heating time starts when the pipe or fitting comes into contact with the heating head.

Butt-fusion Welding



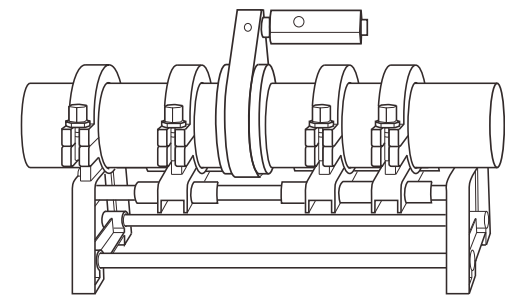
Step 1:

Set up the butt fusion machine on a flat surface, switch on the power, and heat up the iron.



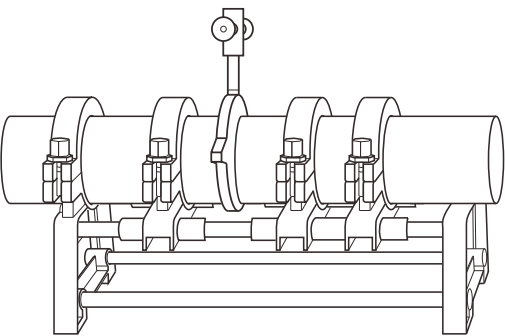
Step 2:

Fix the pipes in the clamps, leaving enough room for the facer. Bring the pipe ends together to check the alignment and adjust if necessary. Once aligned, proceed to the next step.



Step 3:

Position the miller between the pipes. Bring the pipe ends together to shave. Proper shaving will produce continuous and even strips. Once done, open the pipes and remove the miller.

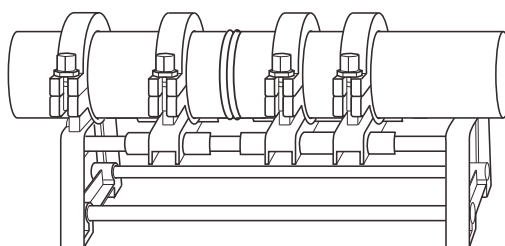


Step 4:

Bring the pipe ends together again to check the alignment and adjust if necessary. Open the pipes and position the heating iron between them, ensuring the temperature is set to $210 \pm 10^{\circ}\text{C}$. Close the pipes onto the heating iron with full pressure (including drag force and machine force).

Step 5:

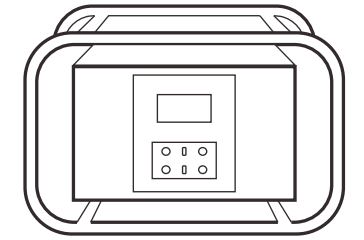
Once the head reaches the required height, remove the heating iron. Then, bring the pipe ends together to complete the fusion according to the specified time.



Electro Fusion Welding

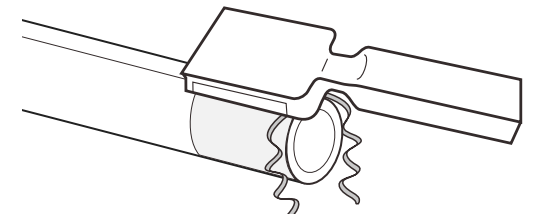
Step 1:

Set up the electrofusion machine, ensuring that necessary power requirements are met.



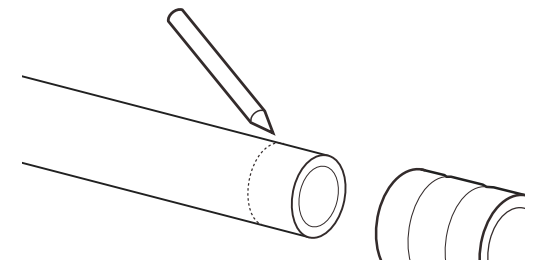
Step 2:

Cut the pipe squarely and remove any burrs and edges. Peel the outer layer from the ends of the pipe.



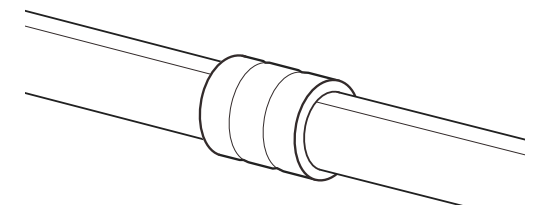
Step 3:

Ensure the fitting and pipe ends are free of dirt. Mark a line at half the depth of the fitting.



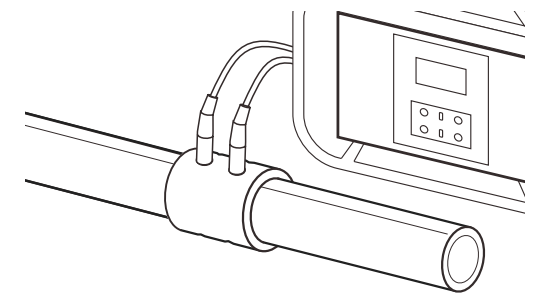
Step 4:

Insert the pipe into the fitting, and check the depth mark to ensure there is no gap inside the fitting.



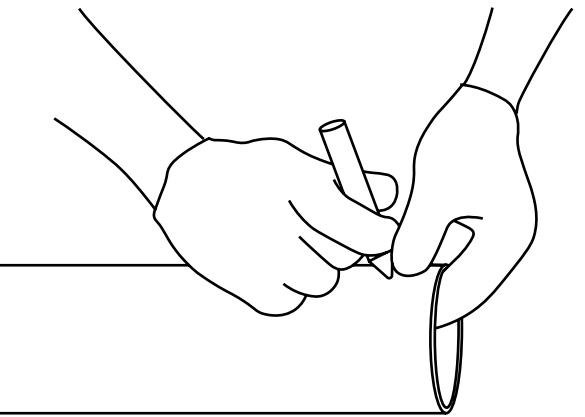
Step 5:

Remove the plug and connect the leads to the fittings. Scan the code and confirm that the information on the machine display matches the label. If needed, rescan or manually input the information. Follow the machine's instructions to begin heating. Once heating is complete, remove the leads and replace the plug on the connector.

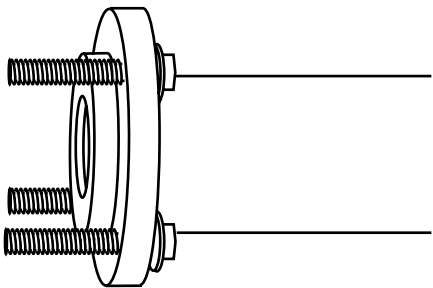


Flange Connection

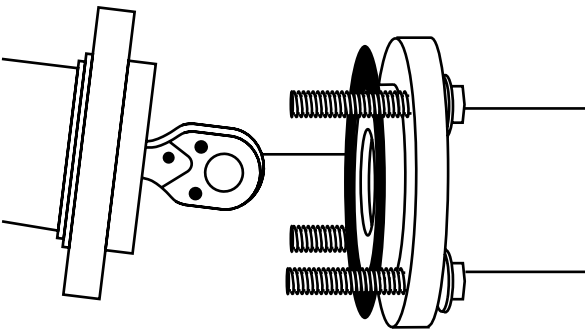
First, secure the two pipes, fittings, or equipment to a flange. Then, place a flange gasket between the two flanges. Finally, tighten the flanges with bolts to create a securely connected, detachable joint.



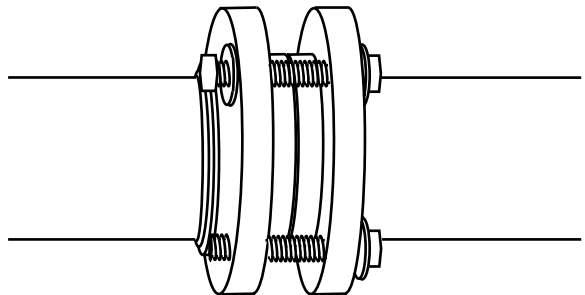
Step 1:
Mark the fusion depth



Step 2:
Fix flange onto the pipe.



Step 3:
Place a gasket between the flanges and insert the bolts.



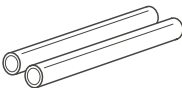
Step 4:
Tighten the bolts to complete the connection.

GENERAL INSTRUCTIONS

Installation Variations

T-fitting installation

T-fitting installations are the most commonly used method. The setup typically begins with a larger dimension that gradually reduces toward the last tap. Even though the piping effort is minimal, it's essential to install a single pipe from the T-fitting to the tap. This installation variant with T-fittings should only be used for taps that are in daily or regular use, as there is a minimal risk of hygiene issues due to stagnant water. Initially larger pipe dimensions can help minimize pressure losses in the system, ensuring that even at low operational pressure, consumers still experience a high level of comfort at the tap. The main advantage of this installation method is its cost-effectiveness.



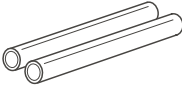
PP-R Pipe, Cold
DN20 x 28.75m



Elbow
F12-L20*20 x 13 pcs



Female Elbow
F12-L20*1/2F x 11pcs



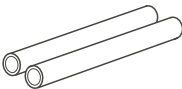
PP-R Pipe, Cold
DN25 x 2.20m



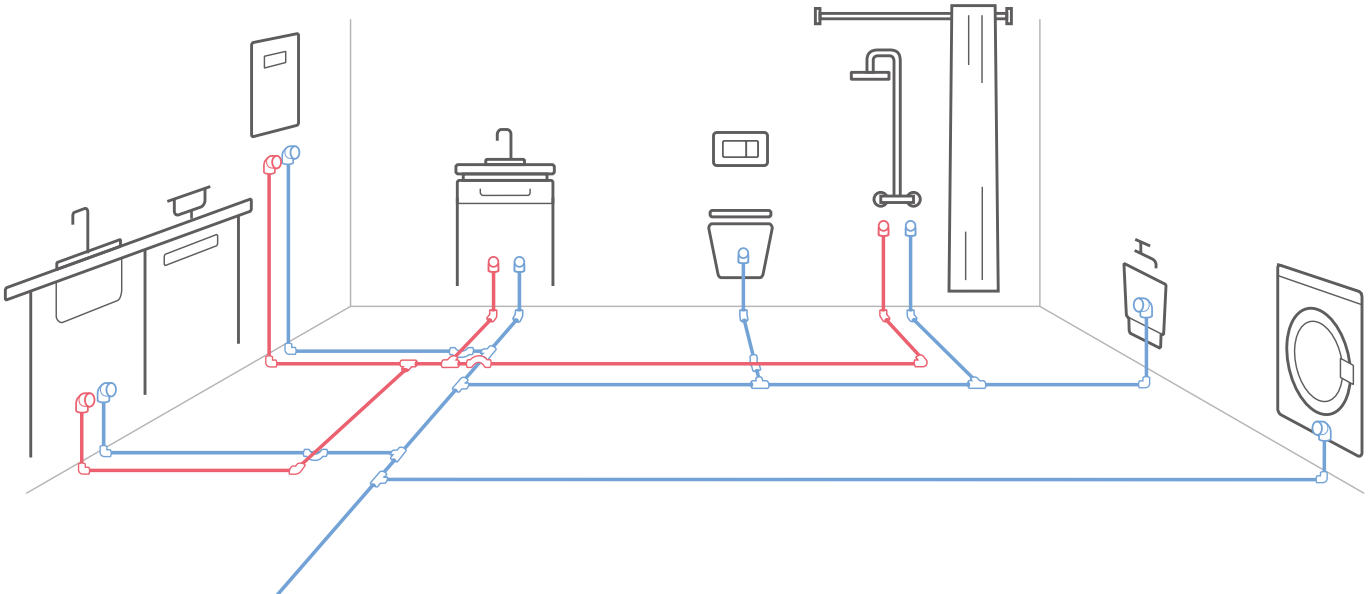
Tee
F12-T20*20*20 x 7pcs
F12-T25*20*20 x 1pcs



Bridge
F12-W20*20 x 4pcs

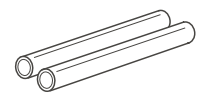


PP-R Pipe, Hot
DN20 x 15.71m



Loop installation

The U-profile Tap Elbow is used to connect taps to the loop installation, routing the PP-R pipe directly to the next tap. The piping is then routed back to the riser from the last fixture. This optimized water circulation makes the ring installation system impeccable in terms of hygiene. To maintain consistent hygienic flow in the loop installation, it is recommended to use pipes with the same diameter throughout, which should be smaller than those used in serial installations since the fixtures are supplied from both sides. The new U-profile Tap Elbow is ideal for hygiene-oriented and water flow rate-optimized installations using various loop installation methods.



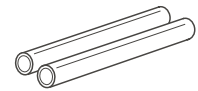
PP-R Pipe, Cold
DN20 x 43.36m



Elbow
F12-L20*20 x 39 pcs



U-profile Female Elbow
F12-L20*1/2F*20 x 11pcs



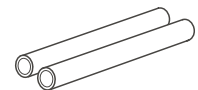
PP-R Pipe, Cold
DN25 x 1.12m



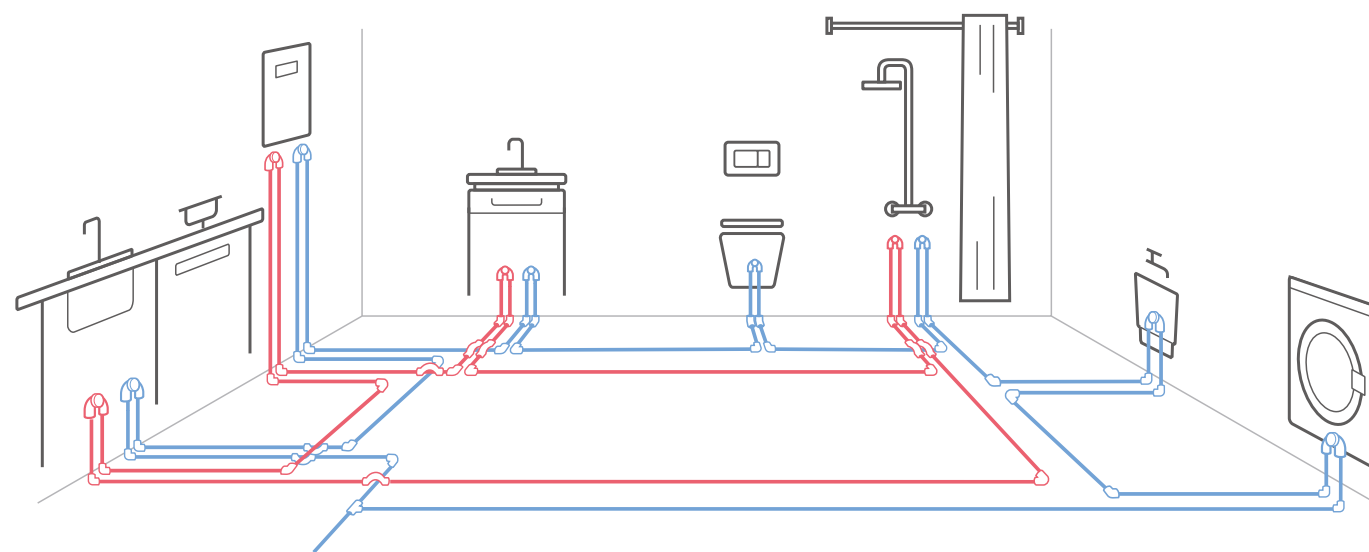
Reducing Tee
F12-T25*20*20 x 1pcs



Bridge
F12-W20*20 x 8pcs



PP-R Pipe, Hot
DN20 x 30.28m



Installation

Buried Installation

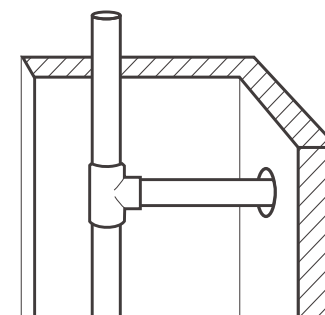
Even with buried installation, longitudinal expansion does not necessarily need to be considered. If the system requires insulation according to relevant regulations, the insulation will absorb the longitudinal expansion without causing any issues. In other words, the installation space only needs to accommodate the thickness of the insulation.

Problems caused by vertical expansion are generally not a concern. The pipes do not require insulation and can be laid within floor toppings, concrete, or buried beneath plaster, provided they are properly clamped. No additional measures are needed to compensate for longitudinal expansion, as the material will absorb the expansion caused by heat.

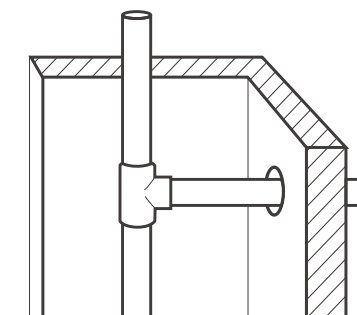
Exposed/Surface Installation

Fundamentally, RIFENG PP-R pipe networks can always be laid in an open and visible manner. Since exposed or surface-laid piping systems are always visible, high aesthetic standards are typically required. Due to its high dimensional stability and reduced longitudinal expansion, RIFENG PP-R pipes are particularly well-suited for exposed installations. With a longitudinal expansion coefficient of 0.05 mm/m.K, fiber pipes generally do not require compensation measures unless the pipeline's free length is exceptionally long. The expansion coefficient for RIFENG standard pipes is 0.15 mm/mK, making them ideal for exposed cold water applications where longitudinal expansion is not a concern.

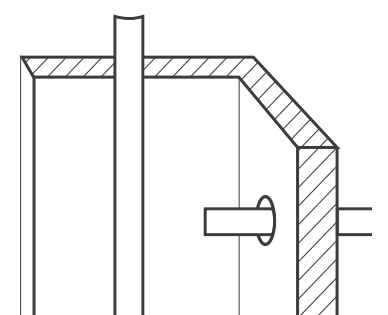
Outlets in shafts



Maintain sufficient distance from the wall pass-through point.



Allow for branch pipe movement at the wall pass-through point.



Create a compensating length to accommodate expansion along the riser line.

There are various methods for installing outlets in shafts. In addition to the pipes supplying individual floors, there may also be pipes leading to a water tank at the top of the building, resulting in multiple outlet points within a shaft. Longitudinal expansion must be managed as with any other installation, so it is important to account for it. The length of the pipes between clamps should not exceed 3 meters. Additionally, wall openings should be large enough to accommodate the pipeline and provide space for insulation materials when necessary.

Linear Thermal Expansion

Linear thermal expansion refers to the change in length of a material when exposed to a certain external pressure as the temperature varies. The coefficient of linear expansion is the ratio of the material's length change to its original length under standard laboratory conditions at 20°C. Linear thermal expansion is influenced by various factors, including the raw materials used, installation temperature, and operating temperature.

The coefficient of linear expansion is normally a positive value. If this coefficient is higher, the linear expansion will be greater when the pipe is subjected to heat. The difference between the max working temperature and the installation temperature is calculated as ΔT = Twork - Tinstallation. The length of the straight pipe without any turns or branches.

The following is the coefficient of leaner expansion for PP-R pipe:

Type of PP-R pipe	Coefficient of Linear Expansion (α)(mm/m.K)
S5 and S2.5 PP-R pipe	0.15
S25 Fiber Composite PP-R pipe	≤0.05

Calculation of Linear Thermal Expansion

When a straight pipe is to be subjected to a thermal environment, the linear thermal expansion needs to be calculated according to the following equation.

ΔL=ΔT*L*α
ΔL = linear expansion (mm)
α= coefficient of linear expansion [mm/(m.K)]
L=length of the pipe (m)
ΔT = Twork-Tinstallation (K)

Example:

If a S2.5 PP-R pipe with a length of 15 meters and a thermal expansion coefficient of 0.15 mm/m.K is used for transporting hot water at 70°C, with an installation temperature of 30°C, how much will the pipe expand?

Condition: α=0.15 mm/m.K
L=15m
ΔT=(70-30)= 40K
ΔL= ΔT · L · α = 40x 15 x 0.15= 90mm

Answer: The pipe will expand by 90 mm, which represents an expansion of 0.6%.

Under normal room temperature, PP-R pipes typically do not experience linear thermal expansion. However, when the pipes are used in thermal conditions, such as for transporting hot or warm water, or in environments with fluctuating temperatures, the following factors should be carefully considered:

If we switch to a fiber composite PP-R pipe, which has a coefficient of 0.05 mm/m.K—only one-third that of a standard S2.5 PP-R pipe—we can calculate the expansion using the same equation:

ΔL= ΔT · L · α = 40x 15 x 0.05= 30mm

In other words, under the same conditions, a fiber composite PP-R pipe would expand by only 0.2%. Using the equation, we can calculate the following table.

Table of linear expansion of S5 and S2.5 PP-R pipe:

Pipe Length L (m)	Temperature difference ΔT (K)							
	10	20	30	40	50	60	70	80
	Linear expansion ΔL (mm)							
5	7.5	15	22.5	30	37.5	45	52.5	60
10	15	30	45	60	75	90	105	120
15	22.5	45	67.5	90	112	135	157	180
20	30	60	90	120	150	180	210	240
25	37.5	75	112	150	187	225	262.5	300
30	45	90	135	180	225	270	315	360
35	52.5	105	157	210	262.5	315	367.5	420
40	60	120	180	240	300	360	420	480
45	67.5	135	202.5	270	337.5	405	472.5	540
50	75	150	225	300	375	450	525	600

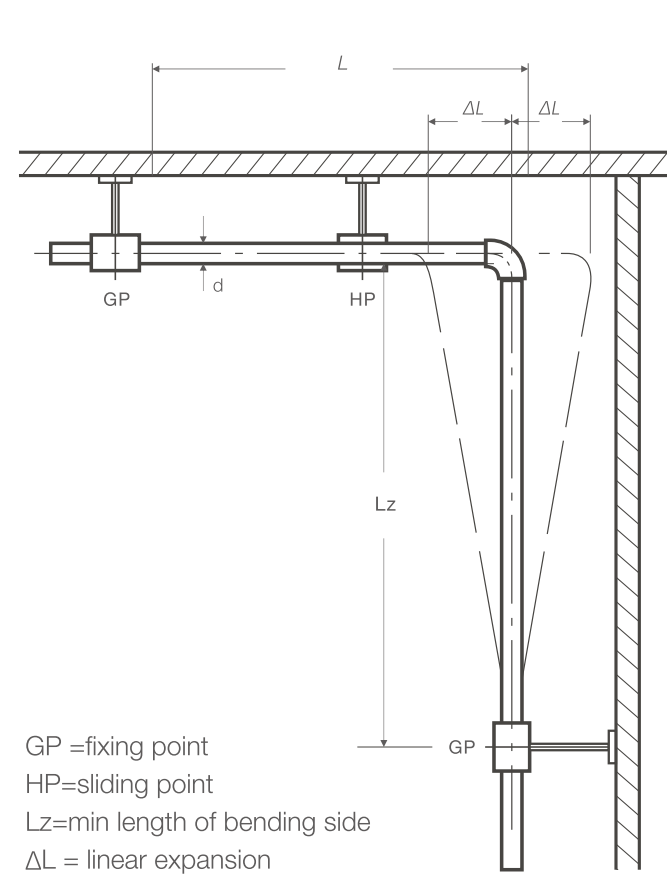
Table of linear expansion of S2.5 fiber composite PP-R pipe: PP-R fiber S2.5

Pipe Length L (m)	Temperature difference ΔT (K)							
	10	20	30	40	50	60	70	80
	Linear expansion ΔL (mm)							
5	7.5	15	22.5	30	37.5	45	52.5	60
10	15	30	45	60	75	90	105	120
15	22.5	45	67.5	90	112	135	157	180
20	30	60	90	120	150	180	210	240
25	37.5	75	112	150	187	225	262.5	300
30	45	90	135	180	225	270	315	360
35	52.5	105	157	210	262.5	315	367.5	420
40	60	120	180	240	300	360	420	480
45	67.5	135	202.5	270	337.5	405	472.5	540
50	75	150	225	300	375	450	525	600

Allowance or Linear Thermal Expansion

As mentioned above, when exposed to heat while transporting warm or hot water, PP-R pipes will undergo linear thermal expansion. To accommodate this expansion, allowances are made to create space. The main methods include:

- Bending the pipe to one side
- Using an expansion loop
- Bending the pipe with pre-stress



Bending side
This method involves using an L-shaped turn to create space for the linear thermal expansion of the straight pipe. When using the bending side method, it's important to calculate the minimum required length for the bend. The bending side should not be shorter than this calculated minimum length.

Equation:

$L_z = K \cdot \sqrt{\Delta L \cdot d}$

Lz =min length of bending side (mm)
K= material specific constant = 15.0
ΔL = linear expansion (mm)
d= outside diameter of the pipe

Example:

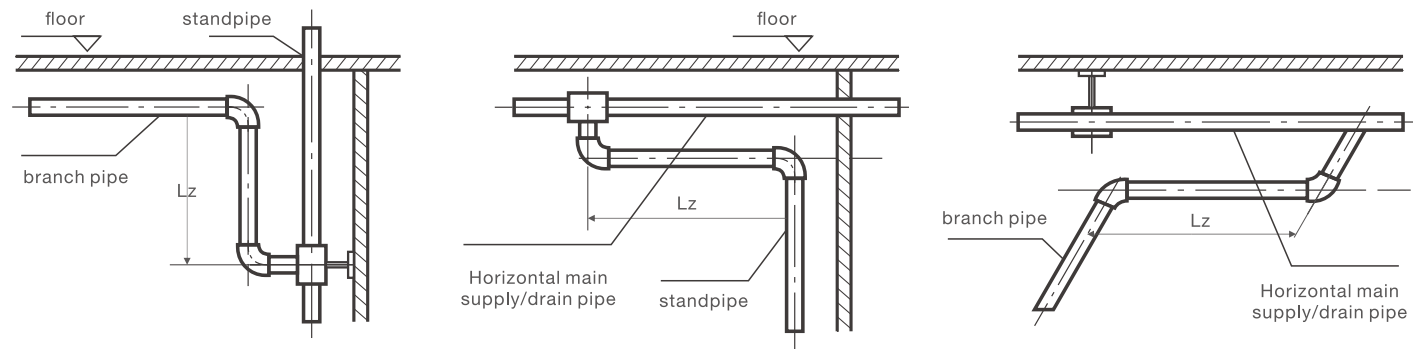
If an S2.5-90 pipe is used as a hot water pipeline with a diameter of 90 mm and a total length of 15 meters, installed at a temperature of 30°C and operating at 70°C, we can determine from the previous table that L = 90 mm. Using this, we can now calculate the minimum length of the bending side:

$L_z = K \cdot \sqrt{\Delta L \cdot d} = 15 \times \sqrt{90 \times 90} = 135\text{mm}$

In this case, the bending side should be set with a minimum length of 135 mm.

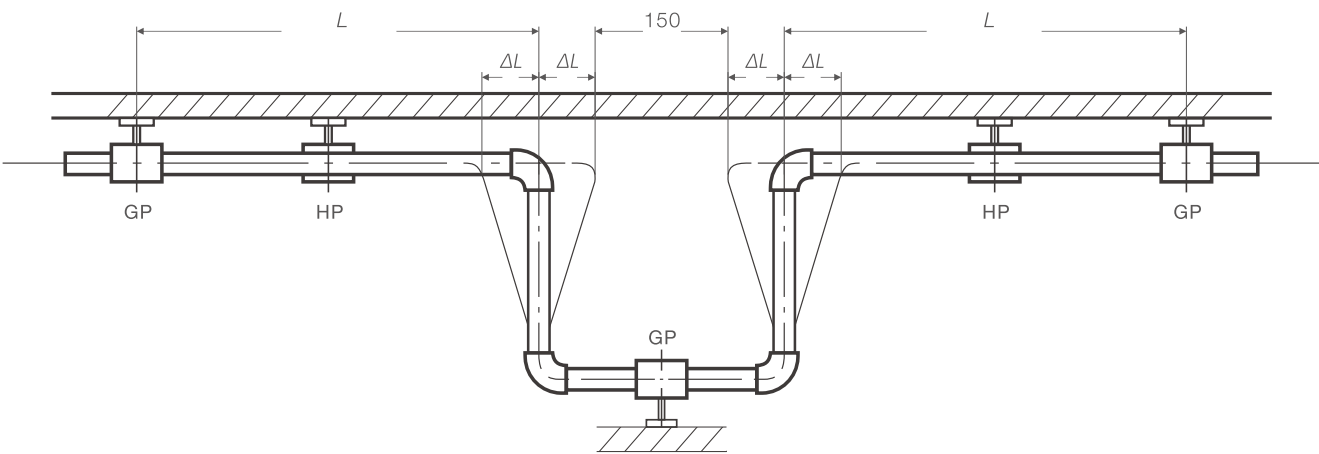
Bending Side for Standpipe and Branch Pipe

In situations where the main standpipe connects to the branch pipe of each floor, or when the main horizontal pipe connects to the standpipe or horizontal branch pipe, the bending side should also be calculated using the same method.



Expansion Loop

If the bending side does not provide sufficient allowance, an expansion loop can be installed in the middle of the straight pipe. This involves using an Ω-shaped expansion loop to accommodate linear thermal expansion, as shown in the diagram below.



GP=fixing point
HP=sliding point
ΔL=linear expansion
Lz=min length of bending side

Equation:

Width of expansion loop (mm)=ΔLx2+150

Example:

If two S2.5-90 pipes are used as hot water pipelines, each with a nominal diameter (dn) of 90 mm and a total length of 15 meters, installed at 30°C with a working temperature of 70°C, we can determine from the previous table that ΔL = 90 mm. The minimum length of the bending side would then be 150 mm. When placing an expansion loop in the middle, the width of the expansion loop should be calculated as:

Support Intervals

When setting the supports for PP-R pipe, the intervals are determined by the size of the pipe and the difference between the installation temperature and the working temperature.

Table of support intervals for S5 and S2.5 PP-R pipe:

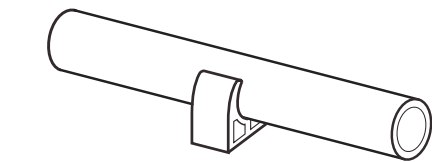
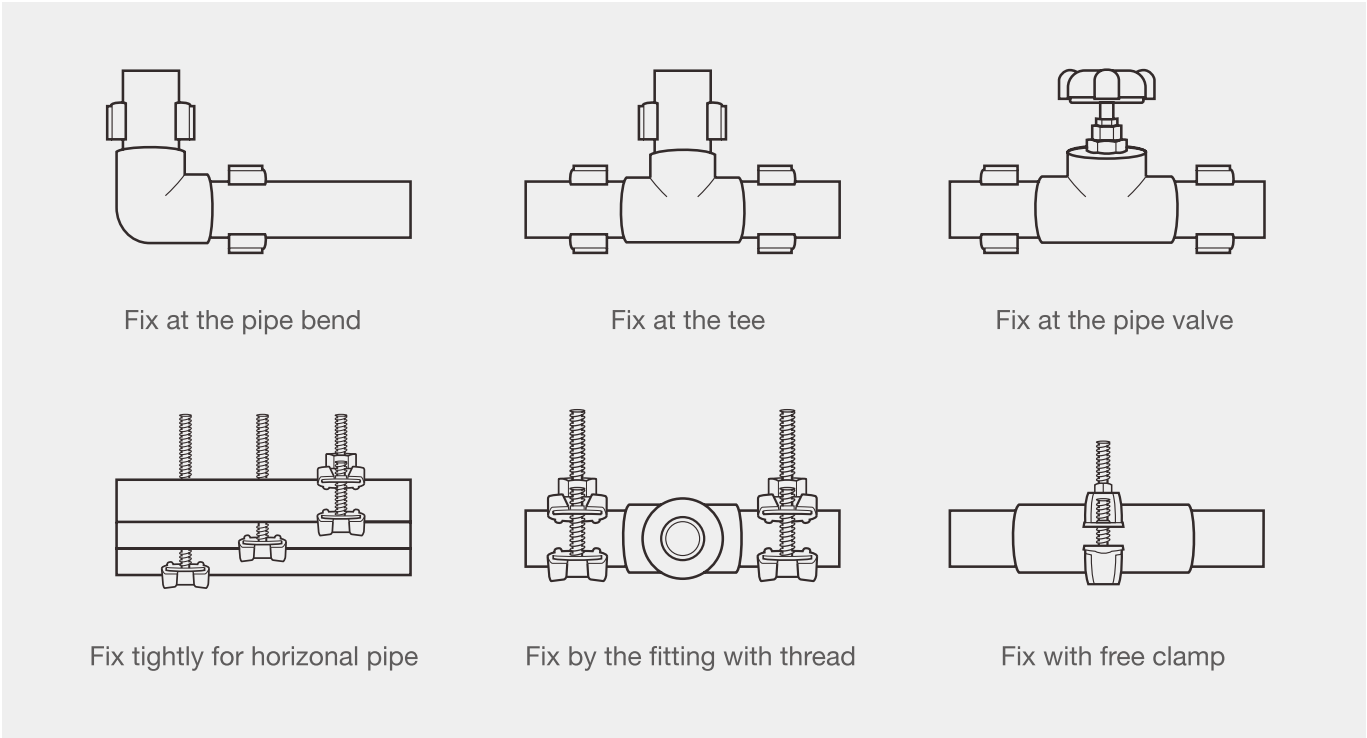
Temperature difference (ΔT)	Outside diameter of pipe (dn) (mm)									
	20	25	32	40	50	63	75	90	110	160
	Support intervals (m)									
0	0.85	1.05	1.25	1.40	1.62	1.90	2.05	2.20	2.50	2.60
20	0.60	0.75	0.90	1.00	1.20	140	1.50	1.60	1.80	2.20
30	0.60	0.75	0.90	1.00	1.20	140	1.50	1.60	1.80	2.20
40	0.60	0.70	0.80	0.90	1.10	1.30	1.40	1.50	1.70	2.10
50	0.60	0.70	0.80	0.90	1.10	1.30	1.40	1.50	1.70	2.10
60	0.55	0.65	0.75	0.85	1.00	1.15	1.25	1.40	1.60	2.00
70	0.50	0.65	0.75	0.85	1.00	1.15	1.25	1.40	1.60	2.00
80	0.50	0.60	0.70	0.80	0.95	1.05	1.15	1.25	1.40	1.70

Table of support intervals for S5 and S2.5 PP-R pipe:

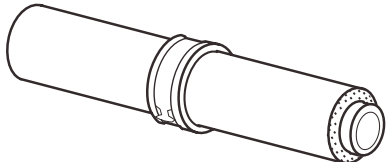
Temperature difference (ΔT)	Outside diameter of pipe (dn) (mm)									
	20	25	32	40	50	63	75	90	110	160
	Support intervals (m)									
0	1.20	1.40	1.60	1.80	2.05	2.30	2.45	2.60	2.90	3.40
20	0.90	1.05	1.20	1.35	1.55	1.75	1.85	1.95	2.15	2.70
30	0.90	1.05	1.20	1.35	1.55	1.75	1.85	1.95	2.10	2.45
40	0.85	0.95	1.10	1.25	1.45	1.65	1.75	1.85	2.00	2.35
50	0.85	0.95	1.10	1.25	1.45	1.65	1.75	1.85	1.90	2.05
60	0.80	0.90	1.05	1.20	1.35	1.55	1.65	1.75	1.80	1.95
70	0.70	0.80	0.95	1.10	1.30	1.45	1.55	1.65	1.70	1.85

Pipe Fixing

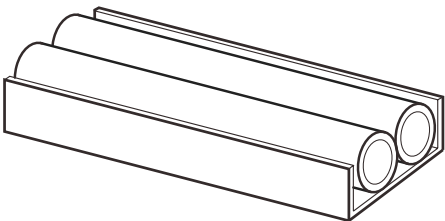
Pipeline Installation in Floors, Walls, and Shafts:
When planning routes for internal water supply mains and heating distribution lines, it is essential to consider the materials of the distribution lines, the expansion characteristics of the materials, the need for expansion compensation, the specific operating conditions (including pressure and temperature), and the selected welding method. Pipes must be secured at specific intervals using fixed points (FP) and sliding points (SP) to manage the expected expansion.



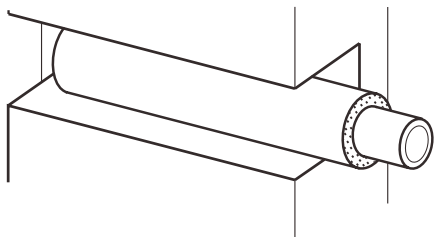
Suitable for cold water distribution lines



Suitable for hot water distribution lines with insulation



Install pipes in free ducts



Install pipes under plaster

Pressure Testing

The pressure test should be conducted after the acceptance inspection and at least 24 hours after the last welding was performed. Testing standards may vary by region. Below is a reference guide:

- For cold water pipelines, the testing pressure should be 1.5 times the design working pressure and no less than 0.9 MPa.
- Fill the pipeline with water to expel the air inside. Once the air has been exhausted, close the air outlet and begin checking for water tightness.
- For hot water pipelines, the testing pressure should be 2.0 times the design working pressure and no less than 1.2 MPa.
- Gradually increase the pressure, ensuring the process takes no less than 10 minutes. After reaching the required pressure, maintain it for one hour. During the first 30 minutes, up to two additional boosts are allowed, but the pressure should not exceed the required level. There should be no leakage, and the pressure drop should not exceed 0.06 MPa.
- The total length of the pipeline for each pressure test should be limited to 100 meters.
- The outlets of the piping system should be exposed and sealed with male plugs. Apart from valves, no other sanitary ware, taps, or water equipment should be installed before the test is completed.
- Then, reduce the pressure to 1.15 times the design working pressure and maintain it for two hours. If there is no leakage and the pressure drop is within 0.03 MPa, the pressure test is considered passed.
- The pressure gauge of the testing pump should be installed at the lowest point. If not installed at the lowest point, the pressure must be adjusted based on the altitude difference. The gauge should have a precision of 0.01 MPa.
- The above guidance is provided as a reference. In actual practice, it is recommended to follow local customs or the specific project requirements.

Anti-UV

PPR pipes should not be installed outdoors. When it is unavoidable, effective shielding should be adopted to prevent ultraviolet radiation.

Take anti-ultraviolet measures:

- a. Add PVC or other casing;
- b. Use anti-ultraviolet paint on the surface of the pipeline;
- c. The cement solidifies.

Pipe Antifreeze

Anti-freezing measures are required for pipes installed in areas where freezing is possible

Hot Water Pipe Insulation

Surface-mounted hot water pipes need to be insulated with an insulation layer

Thermal conductivity of insulation material （W/m·℃ ）	0.030	0.035
Nominal outside diameter of pipe	Recommended minimum insulation thickness	
20	6mm	10mm
25	6mm	10mm
32	10mm	13mm
40	10mm	13mm
50	10mm	13mm
63	13mm	20mm
75	20mm	20mm
90	20mm	25mm
110	20mm	32mm

PACKAGING

Marking

The pipe shall have a readable and permanent marking, the interval shall be no more than 1m.
The marking information shall include trade name, material, dimension, operating pressure, standard and production date. For example:

DVGW

 **RIFENG** PP-R DIN 8077/DIN 8078 S2.5 Outer diameter x Wall thickness (S2.5 25x4.2) DVGW DW-8317CU0153 10bar/67°C/50years Production date
Production code 000m

NSF

 **RIFENG** PP-R DIN 8077/DIN 8078 NSF®-61 Class A Size (S2.5-20x3.4) Class1/10Bar; class 2/8bar PN20 Production date Production code 000m

CE

 **RIFENG** CE EN 15874 PP-R Class A Size S2.5-20x3.4 Class1/10Bar; class 2/8bar ;class 4/10bar ; class 5/6bar Production date Production code 000m

ANEOR

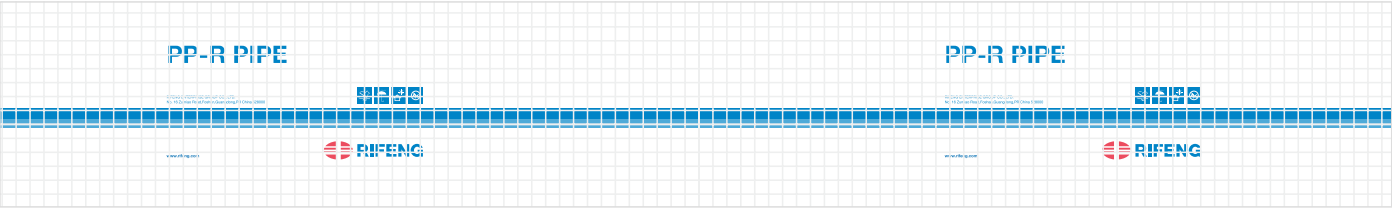
 **RIFENG** 001/000423 UNE-EN ISO15874 PP-R Class A Size (S2.5-20x3.4) Class1/10Bar ; class 2/8bar ;class 4/10bar ; class 5/6bar Opaque Production date
Production code 000m

 **RIFENG** F-PP-R DIN 8077/DIN 8078 NSF®-61 Class A Size (S2.5-20x3.4) Class1/10bar ; class 2/8bar PN 20 Production date Production code 000m

Packaging

PP-R Pipe-Woven Bag

Packing	Size
Woven Bag	4.2mx0.3m



PP-R Fitting-Carton

Outer diameter	Box	Carton
≤32	270mmx200mmx100mm	560mmx415mmx330mm
> 32	/	420mmx285mmx330mm

