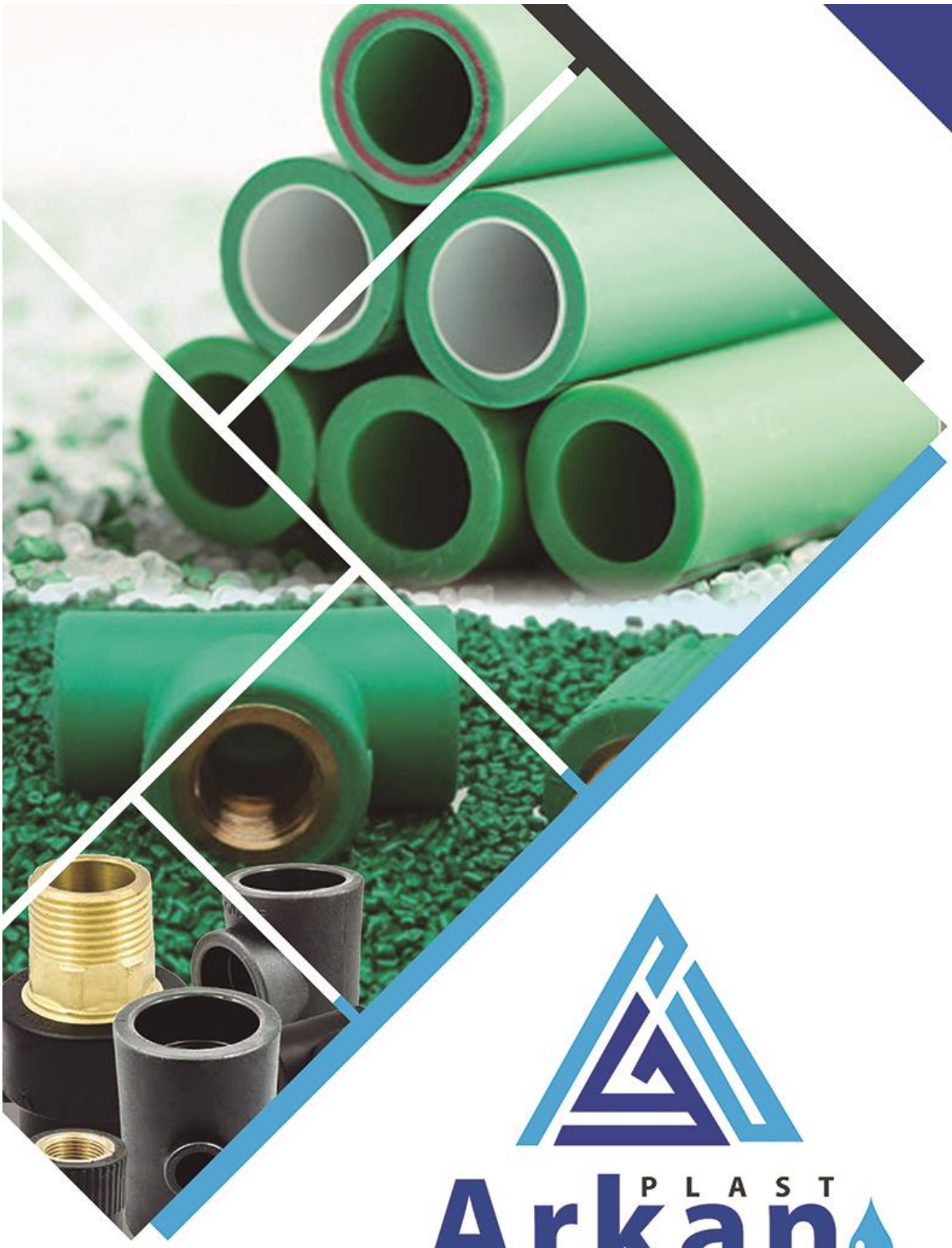
PLAST
Arkan



Arkan PLAST

Arkan PLAST

INTRODUCTION

More than 25 years of experience in the field of plastic manufacturing, we have been able to build a good reputation and confidence for Arkan plast, which makes us proud in front of all our clients in different markets. That was a great motivation to us to set up Arkan factory that has been created to keep up with the last updates reached by plastic pipe technology and its accessories that are made from pvc and ppr material. The company manufactures PVC pipes for all purposes, pressure pipes for transporting the drinking water and sanitation, drainage pipes and irrigation pipes, and telephone and electric cables. The diameters of which start from 20 mm till 400 mm.

Arkan Pipes are Produced according to the following specification:

German specification for drinking water and irrigation DIN8026-8061
American specification ASTM D -2241 SDR SERies
American specification ATM D - 1785 SCH40 - SCH80.
British specification BS 3505

INDEX *Pages*

Environmentally-friendly

Before polypropylene was invented, the gaseous waste from oil such as propylene and ethylene were simply burned, because they were useless. Today, these gases are used to produce polypropylene, thus drastically reducing atmospheric pollution. The production process also eliminates the potential pollution of rivers, streams and lakes, due to the use of water in a closed cooling cycle.

Recyclable

Polypropylene is commonly recycled, and has the number "5" as its resin identification code, allowing efficient separation of different polymer types for recycling The raw material. The recycled raw materials has to meet the manufacturing requirements of the environment commission, which stipulate that there is a minimum use of natural resources, reduced emissions, a long working lifespan and optimum re-use. We recycle all production waste and cut-offs, noting that there is a high demand for polypropylene for recycling purposes as it can be recycled more than 50 times without any reduction in strength.

Superior

Polypropylene (PP), also known as polypropene, is a thermoplastic polymer used in a wide variety of applications, it is unusually resistant to many chemical solvents, bases and acids. This allows polypropylene to be used as an engineering plastic. Polypropylene is most commonly used for plastic moldings: it is injected into a mold while molten, forming complex shapes at relatively low cost and high volume, such as pipes and fittings.

Durable

Polypropylene products last much longer than those made from most similar materials. They are easy to wipe clean, hard wearing and withstand aging and extreme temperatures. Being more durable than alternative materials, products made from polypropylene don't need to be replaced as often, which means saving cost, resources, our environment and our future. Arkan PPR is designed for hot and cold water application and it is the latest a most suitable system for all plumbing applications. Besides plumbing, also it can be used for a variety of applications like air distribution, radiator heating, etc. The specific chemical structure of Arkan provides well balanced mechanical properties and superior long term heat resistance, ensuring the water flowing through which does not have any negative biological effect.

Customer Care

We support our customers in making cost effective and correct use of our pipes and fittings range. This involves assistance in planning, installation, training, troubleshooting, maintenance, upgrading, and
product disposal. Our sales and service representatives basic goal is not only to satisfy our customers, but to offer them an experience that exceeds their expectations. We aim to extend our automated customer services through our internet website, providing service 24-hours a day.
Whatever the situation may be, our call center staff make sure that they don't
leave our customers with unanswered questions.

Customer and Partner Training

Train your customers better - and your results will be better. We increase customer satisfaction and product awareness and knowledge through training services to our customers. Customers who get full utility out of the products and services they have purchased are simply more likely to repeat purchases and refer others. Providing education and information on our pipes and fittings simplifies a customer's decision-making process on what solutions to best fit their needs this improves our product adoption and effectively reflects on our increased sales.

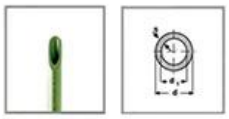
PP-R pipes PN20 SDR 6

D	di	s	Water content Lit/m	Kg/m	m/bag
20 mm	13.2	3.4	0.137	0.172	160
25 mm	16.6	4.2	0.216	0.266	100
32 mm	21.2	5.4	0.353	0.438	60
40 mm	26.6	6.7	0.555	0.680	40
50 mm	33.4	8.3	0.876	1.055	20
63 mm	42	10.5	1.385	1.681	20
75 mm	50	12.5	1.963	2.382	12
90 mm	60	15	2.826	3.430	8
110 mm	73.4	18.3	4.229	5.116	8

Material: PP-R
Pipe series: SOR 6 *IS* 2.5
Standard:
DIN 8077/DIN 8078
DIN EN ISO 15874
Color: Green
Form Supplied: 4 meter straight length
Fields of application:

- Cold and hot potable water application
- Swimming pool installations
- Rainwater application
- Compressed air system
- Pipelines for industrial use.
- Heating systems

PP-Rpipes PN16 SDR 7.4



D	di	s	Water content Lit/m	Kg/m	m/bag
20 mm	14.4	2.8	0.163	0.147	160
25 mm	18	3.5	0.254	0.229	100
32 mm	23	4.5	0.415	0.377	60
40 mm	29	5.5	0.660	0.578	40
50 mm	36.2	6.9	1.029	0.907	20
63 mm	45.8	8.6	1.647	1.426	20
75 mm	54.4	10.3	2.323	2.032	12
90 mm	65.4	12.3	3.358	2.914	8
110 mm	79.8	15.1	4.999	4.369	8

Material: PP-R
Pipe series : SOR 7.4/S 3.2
Standard: DIN 8077/DIN 8078, DIN EN ISO 15874
Color: Green *I* Laser Labelling system
Form Supplied: 4 meter straight length, also in coils for some diameters Fields of application:

- Cold and hot potable water application
- Heating systems
- Compressed air system
- Swimming pool installations
- Pipelines for industrial use
- Rainwater application

PP-R Black Fiber pipes SDR 7.4 PN 16

D	di	s	Water content Lit/m	Kg/m	m/bag
20 mm	14.4	2.8	0.163	0.160	160
25 mm	18	3.5	0.254	0.242	100
32 mm	23	4.5	0.415	0.392	60
40 mm	29.0	5.5	0.660	0.597	40
50 mm	36.2	6.9	1.029	0.949	20
63 mm	45.8	8.6	1.647	1.434	20
75 mm	54.4	10.3	2.323	2.172	12
90 mm	65.4	12.3	3.358	2.956	8
110 mm	79.8	15.1	4.999	4.320	8

Material: PP-R
with integrated fiber reinforced layer and external polypropylene layer
Pipe series: SOR 7.4 /S 3.2
Standard: DIN 8077/DIN 8078, DIN EN ISO 15874
Color: internal layer is green and outer layer is black
Pipe: black pipes with laser labelling system
Form Supplied: 4 meter straight length Fields of application:

- Cold and hot potable water application for indoor and Outdoor

Advantages:
1. Linear expansion coefficient is only 20-30% of ordinary PP-R pipe, completely resolves the stretching problem of common plastic pipe.
2. Enhances pipe rigid, prevents droop down phenomenon, and also reduces the density and number of supporting points, thus cuts down the total cost of installation.
3. Higher pressure resistant level and longer working life under usual vibration.
4. Better high temperature resistance, and obvious energy saving effect; FR-PPR used in water heating systems, the normal temperature is up to 95-100 degrees, It not only increases the medium temperature.
5. Solves the oxygen permeability of the pipeline, the inner surface is non-toxic, fine sealing and sphagnum will not appear. The middle layer of FR-PPR pipe completely prevents outside air from infiltration into pipe inside, thereby inhibits algae growth, and maintains fresh pure water.

PP-RCT Pipe PN20- SDR 7.4


D	di	s	Water content Lit/m	Kg/m	m/bag
20 mm	14.4	2.8	0.163	0.147	160
25 mm	18	3.5	0.254	0.229	100
32 mm	23	4.5	0.415	0.377	60
40 mm	29	5.5	0.660	0.578	40
50 mm	36.2	6.9	1.029	0.907	20
63 mm	45.8	8.6	1.647	1.426	20
75 mm	54.4	10.3	2.323	2.032	12
90 mm	65.4	12.3	3.358	2.914	8
110 mm	79.8	15.1	4.999	4.369	8

Material: PP-RCT
Pipe series: SOR 7.4 /S 3.2
Standard: DIN 8077/DIN 8078, DIN EN ISO 15874
Color: Green
Form Supplied: 4 meter straight length, also in coils for some diameters
Applications :
• Cold and hot potable water applications
• Heating systems
• Compressed air system
• Swimming pool installations
• Pipelines for industrial use
• Rainwater application

Black fiber PP-RCT Pipe PN 24 SDR 7.4


D	di	s	Water content Lit/m	Kg/m	m/bag
20 mm	14.4	2.8	0.163	0.160	160
25 mm	18	3.5	0.254	0.242	100
32 mm	23	4.5	0.415	0.396	60
40 mm	29	5.5	0.660	0.597	40
50 mm	36.2	6.9	1.029	0.949	20
63 mm	45.8	8.6	1.647	1.434	20
75 mm	54.4	10.3	2.323	2.172	12
90 mm	65.4	12.3	3.358	2.956	8
110 mm	79.8	15.1	4.999	4.320	8

Material: PP-RCT with integrated fiber reinforced layer and external polypropylene layer Pipe series:
SOR 7.4 /S 3.2
Standard: DIN 8077/DIN 8078, DIN EN ISO 15874
Color: internal layer is green and outer layer is black
Form Supplied: 4 meter straight length, also in coils for some diameters Applications:
• Cold and hot potable water application for indoor and outdoor

Advantages:

1. Linear expansion coefficient is only 20-30% of ordinary PP-RCT pipe, completely resolves the stretching problem of common plastic pipe.
2. Enhances pipe rigid, prevents droop down phenomenon, and also reduces the density and number of supporting points, thus cuts down the total cost of installation.
3. Higher pressure resistant level and longer working life under usual vibration.
4. Better high temperature resistance, and obvious energy saving effect; FR-PP-RCT used in water heating systems, the normal temperature is up to 95-100 degrees, It not only increases the medium temperature.
5. Solves the oxygen permeability of the pipeline, the inner surface is non-toxic, fine sealing and sphagnum will not appear. The middle layer of FR-PP-RCT pipe completely prevents outside air from infiltration into pipe inside, thereby inhibits algae growth,
and maintains fresh pure water.

PP-R Fittings
EIBOW 45°

Dn	d	D	l	z	Piesces/Box
20	19.5	29	21	6	120
25	24.5	34	24	8	100
32	31.5	43	28	10	50
40	39.4	52	32	11	30
50	49.4	65	37	13	18
63	62.5	82	44	16	24
75	74.7	99	50	20	15
90	89.7	120	58	25	8
110	109.7	148	69	32	4

EIBOW 90°

Dn	d	D	l	z	Piesces/Box
20	19.5	29	28	13	120
25	24.5	34	32	16	80
32	31.5	43	38	20	80
40	39.4	52	44	23	50
50	49.4	65	52	28	30
63	62.5	84	62	34	20
75	74.7	101	71	41	12
90	89.7	120	83	50	6
110	109.7	148	99	62	3

Tee 90°

Dn	d	D	l	z	Piesces/Box
20	19.5	29	28	13	80
25	24.5	34	32	16	50
32	31.5	43	38	20	30
40	39.4	52	44	23	40
50	49.4	65	52	28	20
63	62.5	84	62	34	6
75	74.7	100	71	41	10
90	89.7	120	83	50	6
110	109.7	148	99	62	2

Wall inlet plug

Dn	O-Ring	H	D	Piesces/Box
20	20.5x3	11	28.5	100

Reducing Tee 90°

Dn - Dn1 - Dn2	d - d_1 - d	D	D_1	D_2	l	l_1	z	Z_1	Piesces/Box
25 - 20 - 25	24.5 - 19.5 - 24.5	34	29	34	32	32	16	17	140
32 - 20 - 32	31.5 - 19.5 - 31.5	43	34	43	38	36	20	21	80
32 - 25 - 32	31.5 - 24.5 - 31.5	43	34	43	38	36	20	20	80
40 - 20 - 40	39.4 - 19.5 - 39.4	52	43	52	44	39	24	24	60
40 - 25 - 40	39.4 - 24.5 - 39.4	52	43	52	44	40	23	24	50
40 - 32 - 40	39.4 - 31.5 - 39.4	52	43	52	44	40	23	22	50
50 - 20 - 50	49.4 - 19.5 - 49.4	65	43	65	52	46	28	31	30
50 - 25 - 50	49.4 - 24.5 - 49.4	65	43	65	52	46	28	30	30
50 - 32 - 50	49.4 - 31.5 - 49.4	65	43	65	52	46	28	28	30
50 - 40 - 50	49.4 - 39.4 - 49.4	85	85	85	62	62	39	35	30
63 - 20 - 63	62.5 - 19.5 - 62.5	85	43	85	62	62	35	48	16
63 - 25 - 63	62.5 - 24.5 - 62.5	85	43	85	62	62	35	46	16
63 - 32 - 63	62.5 - 31.5 - 62.5	85	43	85	62	62	35	44	16
63 - 40 - 63	62.5 - 39.4 - 62.5	85	85	85	62	62	35	42	16
63 - 50 - 63	62.5 - 49.4 - 62.5	85	85	85	62	62	35	39	16
75 - 20 - 75	74.7 - 19.5 - 74.7	100	43	100	71	71	41	57	12
75 - 25 - 75	74.7 - 24.5 - 74.7	100	43	100	71	71	41	55	12
75 - 32 - 75	74.7 - 31.5 - 74.7	100	43	100	71	71	41	53	12
75 - 40 - 75	74.7 - 39.4 - 74.7	100	65	100	71	71	41	51	12
75 - 50 - 75	74.7 - 49.4 - 74.7	100	65	100	71	71	41	48	12
75 - 63 - 75	74.7 - 62.5 - 74.7	100	101	100	71	71	41	44	12
90 - 63 - 90	89.7 - 62.5 - 89.7	120	120	120	83	83	50	55	6
90 - 75 - 90	89.7 - 74.7 - 89.7	120	120	120	83	83	50	53	6
110 - 63 - 110	109.7 - 62.5 - 109.7	148	85	148	99	99	62	71	4
110 - 75 - 110	109.7 - 74.7 - 109.7	148	100	148	99	99	62	69	4
110 - 90 - 110	109.7 - 89.7 - 109.7	148	120	148	99	99	62	66	4

Socket

Dn	d	D	l	z	Piesces/Box
20	19.5	29	34	5	150
25	24.5	34	37	5	120
32	31.5	43	41	5	60
40	39.4	52	46	5	80
50	49.4	65	52	5	70
63	62.5	84	60	5	36
75	74.7	99	65	5	32
90	89.7	120	76	10	14
110	109.7	148	80	6	7

Reducer

Dn - Dn1	d	d_1	D	D_1	l	z	Piesces/Box
25 - 20	24.5	19.5	34	29	36	22	10
32 - 20	31.5	19.5	43	29	37	23	10
32 - 25	31.5	24.5	43	34	39	23	10
40 - 20	39.4	19.5	52	34	43	28	10
40 - 25	39.4	24.5	52	34	43	27	10
40 - 32	39.4	31.5	52	43	45	27	10
50 - 20	49.4	19.5	65	43	51	36	10
50 - 25	49.4	24.5	65	43	51	35	10
50 - 32	49.4	31.5	65	43	51	33	10
50 - 40	49.4	39.4	65	52	53	33	10
63 - 20	62.5	19.5	80	34	56	42	5
63 - 25	62.5	24.5	80	34	56	40	5
63 - 32	62.5	31.5	80	43	58	40	5
63 - 40	62.5	39.4	80	52	60	40	5
63 - 50	62.5	49.4	80	65	63	40	5
75 - 50	74.7	49.4	100	65	67	44	3
75 - 63	74.7	62.5	100	80	71	44	3
90 - 63	89.7	62.5	110	80	78	51	1
90 - 75	89.7	74.7	110	99	81	51	1
110 - 75	109.7	74.7	148	100	90	60	2
110 - 90	109.7	89.7	148	110	93	61	1

Crossover

Dn	d	s	H	L	Pieces/Box
20	19.5	3.4	53	365	100
25	24.5	4.2	56	370	70
32	31.5	5.4	68	370	50

Short Crossover

D	D_1	H	l	S	Pieces/Box
20	28	42	90	4.3	60
25	35	47	100	4.8	50
32	42	67	130	5.8	20

Cross Tee

D	H	L	S	B	Pieces/Box
25	16	60	4.4	90°	100
32	18	75	5.8	90°	50

Union

D	H	L	S	Pieces/Box
20	20	45	4.3	140
25	23	51	4.8	100
32	27	61	5.5	60

Cap

Dn	d	D	l	Pieces/Box
20	19.5	29	25	250
25	24.5	34	28	150
32	31.5	43	32	100
40	39.4	52	36	60
50	49.4	65	41	120
63	62.5	79	48	70
75	74.7	99	54	16
90	89.7	120	66	8
110	109.7	148	79	8

Flange

Dn	d	D	D_1	l	Z	h	Pieces/Box
63	62.5	89.5	75.6	40.9	12.9	15.5	24
75	74.7	105	89	37	7.5	15	18
90	89.7	125.5	110	43.5	9.5	19.5	10
110	109.7	158	132	51	13.35	18	7

Elbow 90° male thread

Dn-Rp	d	D	l	l1	Z	Z1	SW	Piesces/Box
20-½	19.5	29	28	34	14	49	36	60
20-¾	19.5	34	32	40	18	56	44	50
25-½	24.5	34	32	38	16	53	36	40
25-¾	39.4	34	32	40	16	56	44	40
32-1	31.5	43	38	48	20	66	51	30

Bracket Female thread

Dn-Rp	d	D	D1	L	L1	h	T	z	z1	Piesces/Box
20-½	19.5	35	29	35	27	15	40	21	11	70
25-½	24.5	35	29	37	30	17	40	23	14	60
25-¾	24.5	43	34	43	35	22	50	28	19	30
32-¾	31.5	43	43	43	35	22	50	28	17	30

Flange

Dn-Rp	d	D	D1	l	l1	h	z	z1
20-½	19	37	29	33	28	15	16	13
25-½	24	37	34	36	33	17	20	17
32-1	30	52	43	49	38	21	28	20

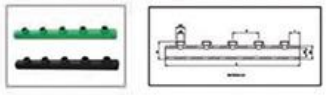
Double Elbow

Dn-Rp	D	H	H1	l	l1	S	Piesces/Box
20 *½	20	41	46	186	150	4.4	48
25 *½	25	53	47	186	150	4.8	32

Adjustable Water battery

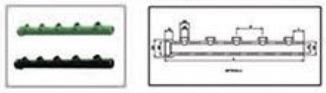
Dn-Rp	Ladjustable	D	SW	L1	S	H	h	Piesces/Box
20-½	100-135-150	20	38	220.3	4.4	19	30.5	28
25-½	100-135-150	25	38	220.7	4.8	21	37.75	20

Manifold welding without end socket



Dn-Dn1	D1	d1	D2	d2	L	P	I	H
50-32	50.2	33.2	43	31.1	650	123	50	70
63-32	63.2	42	43	31.1	650	123	50	83

Manifold welding - end socket



Dn-Dn1	D1	d1	D2	d2	D3	d3	L	P	I	I2	H
50-32	50.2	33.2	43	31.1	66	49	650	123	50	31.5	78
63-32	63.2	42	43	31.1	83	61.9	650	123	50	37.5	93

Tee male thread

Dn-Rp	SW	H	I	S	D_1	Piesces/Box
20-½	38	14.5	56	4.4	20	60
20-¾	45	14.5	56	4.4	20	40
25-½	38	16	61	4.9	25	40
25-¾	45.2	16	69	4.9	25	40

Adaptor socket male thread

Dn-G	d	L	Z	Piesces/Box
20-½	19.5	50	34	60
20-¾	19.5	53	38	60
25-½	24.5	51	35	80
25-¾	24.5	54	38	60
32-1	31.5	62	43	40
40-1¼	39.4	72	51	27
50-1½	49.4	77	53	24
63-2	62.5	88	60	12
75-2½	74.7	102	71	2
90-3	89.7	143	111	4
110-4	109.7	161	124	3

Adaptor socket Female thread

Dn-Rp	d	D	D_1	I	Z	SW	Piesces/Box
20-½	19.5	35	29	40	11	36	60
25-½	19.5	35	34	41	11	36	60
25-¾	24.5	43	34	42	11	44	50
32-¾	24.5	43	43	44	11	44	60
32-1	31.5	50	43	48	12	51	40
40-1¼	39.4	62	52	54	13	63	36
50-1½	49.4	69	64	57	14	70	27
63-2	62.5	84	79	68	19	85	12
75-2½	74.7	113	99	82	22	114	7
90-3	89.7	129	124	92	27	-	8
110-4	109.7	160	151	165	27	-	4

Union female thread

Dn-Rp	d	L	I	I_1	Z	SW	SW_1	Piesces/Box
20-1/2	19.5	37.5	20.5	15.5	11	40	25	80
25-3/4	24.5	41	22.5	16.75	12	47	30	72
32-1	31.5	48.5	27	20	13.7	56	37	36
40-1 1/4	39.4	52	29.5	20.35	16	68	46	24
50-1 1/2	49.4	57.5	32.8	23	20	85	53	16

Tee 90° Female thread

Dn-Rp	d	D	I	I_1	Z	Z_1	SW	Piesces/Box
20-½	19.5	29	28	34	14	20	36	60
25-½	24.5	34	32	38	16	24	36	50
25-¾	24.5	34	32	40	16	25	44	40
32-¾	31.5	43	38	45	20	30	44	20
32-1	31.5	43	38	48	20	30	51	20

Union male thread

Dn-Rp	d	L	I	I_1	Z	SW	SW_1	Pieces/Box
20 -½	19.5	47.8	26.0	20.3	13.0	40	21	64
25 -¾	24.5	51.0	27.0	22.0	13.5	47	27	48
32 -1	31.5	60.5	31.7	27.0	14.5	56	34	36
50 -1½	49.4	75.0	41.5	32.0	20.5	85	50	12

Socket with loose nut

Dn-Rp	D_1	H	SW_1	SW_2	L	S	Pieces/Box
20 -½	20	14	36	23	35	4.4	60
20 -¾	20	14	36	31	35	4.8	60
25 -¾	25	14	36	31	35	4.8	60

Y Filtter Femal thread

Dn - Rp	D_1	H	H_1	I	S	B	Pieces/Box
20-1/2"	20	14.5	14.5	70	4.4	45°	100
25-3/4"	25	16	16	80	4.9	45°	80
32-3/4"	32	18	18	80	4.8	45°	60

Concealed valve

Dn-Rp	d	D	D_1	Z	N	H
20-¾	19.5	34	45	46	75	112
25-¾	24.5	34	45	43	75	112
32-¾	31.5	43	45	39	75	112

Straight seated valve

Dn-Rp	d	D	D_1	Z	L	H	Pieces/Box
20-1/2"	19.5	34	45	46	75	69	150
25-3/4"	24.5	34	45	46	75	69	150
32-3/4"	31.5	43	45	39	75	69	150

Ball valve

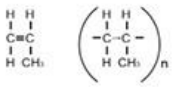
d	d_1	d_2	D	L	S
20	19.5	28.5	33.85	20.55	4.6
25	24.5	33.2	38.8	22.7	5.5
32	31.5	43	44.2	27	6.1
40	39	54.5	61.2	29.5	7.7
50	49	67.7	77	32.2	9
63	61.9	87	96	36	11
75	73.4	103	115	43.7	13.15
90	88.2	117	131	45.7	15
110	108	145	162.25	48	16

Raw materials

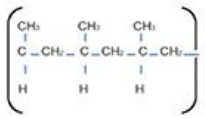
Pipes and fittings of system are made of polypropylene random copolymer, type 3 (PP-R).

This material is known for its strength, stability and resistance to high temperatures. Physical and chemical properties of the material meet the special requirements of drinking water supply and heating systems.

Polypropylene (PP) is a thermoplastic polymer and is non-hazardous to human health. It is manufactured in the chemical industry by polymerization which is a process of combining many small molecules known as monomers into a covalently bonded chain or network of repeated polypropylene monomer as seen in the below diagram:



Monomer of PP



Polypropylene Random Co-Polymer

Features

The Scope

products offer a superior German quality that could be equally installed in the residential and the industrial field:
Sanitary applications.
Heating & air-conditioning systems.
Compressed air installations.
Watering systems for greenhouses and gardens.
Transporting liquid material.
Vacuum installations.
In chemical industry for the flow of variovs floids

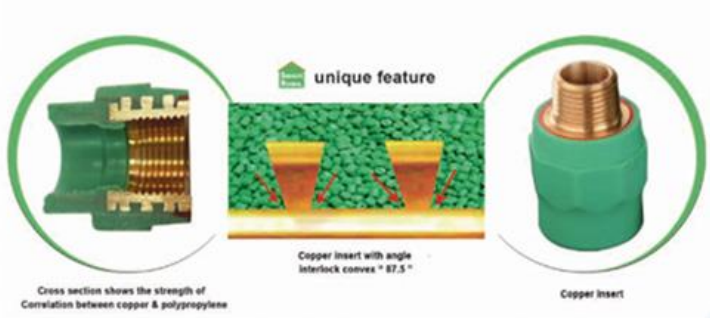
For calculating the resistance, lifespan & safety of the system, depending on the average working temperature:

PN20	10bar	60° C
PN20	10bar	70° C

The Rsystem should last for a minimum of 50 years. under continuous duty at pressure of 10 bar and temprature of 60°C for pn 20 pipes.

is an excellent choice for piping of clean hot & cold water. (fig. A)
is using the best unique thread design in our fittings makes the strongest correlation feature between PP-R & copper.

Unlike other products, this correlation gets more and more stronger once the temperature increases, these features reflect on lifetime durable products.



chemical resistance
Arkan is a polyolefin polymer that features a high molecular weight. Therefore, it is more resistant to chemicals such as acid, lime or cement, See (fig. E). The resistance of products which are not submitted to the following factors: mechanical stress, various fluids, 20°c 60°c and 100°c temperatures according to ISO TR7471.

resistance to current strays
Like most thermoplastic products, Arkan is a poor electrical conductor. Therefore, there is no risk of stray currents occurring.

Soundproofing
The elasticity of Arkan pipes makes it viable to absorb and eliminate almost all vibrations that would normally occur in the traditional cast iron pipes. Therefore, Arkan is highly soundproof at no extra cost.

low thermal conductivity
Arkan has a low thermal conductivity (0.24 W/ m.K) that reduces the heat dispersion of the fluid that it conveys. Also, it reduces the condensation, which is normally formed on the outside of the generic metal pipes, under specific hygrometric conditions.

Low pressure loss
The inside surface of Arkan is sleek, smooth with very few irregularities (0.0070 μ), which convey a significant reduction in pressure loss. As a result, limestone cannot be built up inside the pipe.

No toxicity
The raw material used for the production of Arkan is absolutely non-toxic and complies with the most up-to- date national and international regulations.

Easy workability
One of the major attractions of the Arkan system is that it is extremely light and easy to weld and install. Our pipes, with diameters ranging from 20 mm to 110 mm, are extremely simple to assemble, providing the suitable polyfusion device. (See chapters 3 & 4)

UV Resistance
Arkan black coated pipes are UV-resistant but must not be installed in an exposed area.
Arkan pipes and fittings are equipped with a stabilizer which allows for safe transport and installation. However, they should not be stored for more than six months in the open air.

Cracking Resistance under Stress
The values determining the time resistance capacity of the Arkan system are the following:

Mechanical stress = Pressure
Thermal strain = Temperature
Stress duration = Time

The relationship between the above parameters can be controlled through regression curves. Arkan minimum resistance values have been determined through internal pressure tests, at various temperature intervals: 20, 40, 60, 80, 95, 120 °C. A logarithmic graphic representation shows the comparative tensions, the lifetime (in years), and the regression curves at various temperatures according to the DIN 8078 standard. See (fig. A)

Advantages of Arkan Piping System

provides all the necessary parts, for a complete and easy installation, from the beginning to the end, saying goodbye to the conventional problems of the past. It is guaranteed to feel and see the difference with the Arkan piping system.

Arkan is manufactured with Superior German quality.

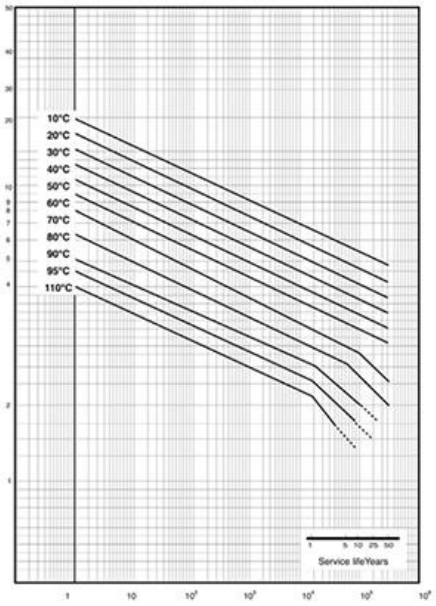
Arkan is made of corrosion resistant material, putting an end to old corrosion complications.

Unlike the alternatives, Arkan is made of opaque polypropylene, which is a nonpolluting material, preventing algae from growing.

Arkan is completely recyclable, with no risk of air pollution, making it an environmentally-friendly system.

- Long lifetime thanks to their resistance to environmental influences; non-corrosive even after 50 years.
- They reduce the risk of condensation to a minimum, which is the characteristic of the metal installation.
- Great welding ability as all parts can be connected with a welder or electrical socket.
- Low weight (9 times lighter than steel) which makes it easier for transportation and handling.
- High resistance to inner pressure.
- No harmful gas emission from burning.
- High cracking resistance under stress.

Diagram of pressure tests of Arkan Pipes



Utilization section for pipes and fittings of Smart Home according to DIN 8078

Cold water supply:
Permanent operating temperature up to 20°C
Permanent operating pressure up to 20 bar

Hot water supply:
Permanent operating temperature up to 70°C
Permanent operating pressure up to 10 bar

Heating supply:
Permanent operating temperature up to 70°C
Permanent operating pressure up to 3 bar

The utilization of at least 50 years

Physical Characteristics

CHARACTERISTICS	METHODS	UNITS	VALUES
Specific weight	ISO/R 1183	g/cm3	0,897
Melt index at 190°c with 5 KG.	ISO 1133	g/10 min	0,5
Melt index at 230°with 2, 16 KG.	ISO 1133	g/10 min	0,3
Melting point	Polarizing-microscope	°c	140-150

Thermal Characteristics

CHARACTERISTICS	METHODS	UNITS	VALUES
Thermal conductivity at 20°	DIN52612	W/m°K	0,24
Specific heat at 20°C	Adiabatic calorimeter	KJ/Kg°K	2,0
Linear expansion coefficient	VDE 0304	K1	1,5x 10
Heart deflection temperature B (0.45 MPa)	ISO 758-1.-2	°c	70
Vicat softening temperature(A/50)	ISO 306	°c	132
OIT (200 °C)	EN 1451	Min	58

Mechanical Characteristics

CHARACTERISTICS	METHODS	UNITS	VALUES
Yield strength	ISO/R 527	N/mm2	21
Ultimate tensile strength	DIN 53455	N/mm2	40
Ultimate elongation	DIN 53455	%	600
Modulus of elasticity	ISO 178	N/mm,	800
Hardness test	ISO 2039	N/mm	40
Impact strength 0°C	DIN 8078		Does not break
Charpy Impact Strength. notched(23°C)	180179/1 eU	KJ/m	20
Charpy Impact Strength. Notched (-0°C)	180179/1 eU	KJ/m	3.5
Charpy Impact Strength. notched(-20°C)	180179/1 eU	KJ/m	2
Charpy Impact Strength. unnotched (23°C)	180179/1 eU		Does not break
Charpy Impact Strength. unnotched (0°C)	180179/1 eU		Does not break
Charpy Impact Strength. unnotched (-2D°C)	180179/1 eU	KJ/m	40
Shore hardness D	ISO 868	R Scale	65

Material Properties of PP-R

Properties	Measuring technique	Unit	PP-R Value
Melting index	ISO/Rll33		
MFR 190/5		g/10 min.	0.5
MFR 230/2.16		g/10 min.	0.24 - 0.36
Density	ISO IR 1183	g/cm'	0.895
Melting range	Polarizing microscope	°c	140 - 150
Yield stress	ISO/R527	N/mm'	21
Tensile strength	Feed speed	N/mm'	40
Tensile expansion	Test bar	%	600
Bending stress at 3.5%	ISO 178	N/mrn'	20
Marginal fiber Expansion	Test specimen 5.1		
Modulus of elasticity	ISO 178	N/mrn'	800
Mechanical properties			
Following impact			
Bending test at O°C	DIN 8078		No fraction
Expansion coefficient	VDE 0304		1. 5 x 10·4
	Part 1 §4	K-'	
Thermal conductivity at 20°c	DIN 52612	W/mK	0.24
Specific heat at 20'(	Adiabatic calorimeter	KJ/Kg K	2
Pipe friction factor			0.007

Quality Assurance

System Standards
DIN 8077 Polypropylene Pipes, Dimensions.
DIN 8078 Polypropylene Pipes, General Quality Requirements and Testing.
DIN 16962ff Pipe Joint Assemblies and Fittings for Polypropylene Pressure Pipes.
DIN 2999 Pipe Threads For Tubes and Fitting.
Various highly accredited and independent institutions confirm our superior German quality standards.

System Control
The production of superior German quality piping system calls for the regulation and control of all areas of the operations. All results are documented and archived:

- Testing and accepting incoming goods.
- Process control.
- In-process inspection.
- Final inspection tests.

ARKAN is a highly qualified and experienced manufacturer in extrusion and injection moulding.
ARKAN is also the market leader and pioneer in the manufacturing of polypropylene supply systems in Egypt. This is reflected in our internal quality standards and procedures, which are illustrated by the constant quality of our products.

Internal Control
A team of highly trained and qualified QC engineers, equipped with a state of art laboratory, ensurte that all tests are carried out in compliance with our quality control policies, which includes:

- Testing all raw material.
- Measuring and inspecting our production equipments.
- Auditing our production procedures.
- A final inspection for the quality of our finished products.
- All internal quality audits are documented and archived in accordance with the highest standard quality control policies.

ARKAN laboratory
ARKAN laboratory serves one of the most important functions in our production and process control. A significant portion of the ARKAN regulations pertain to the quality control laboratory and product testing to be able producing the highest quality products. ARKAN laboratory have the most advanced equipment with the highest technology like: -

- Universal Testing Machine.
- Hydrostatic Pressure Tester.
- Falling Dart Impact Tester.
- Full Notch Creep Tester.
- Melt Flow Tester- Melt Flow Indexer - MFI.
- Specific Gravity Tester - Densimeter.
- Thermo bath.
- Thermo oven.

Technical Information

Material:
PP-R (Polypropylene Random-Co- polymerisate) of high molecular weight and stabilized to high tem- perature. The material corresponds to KTW-recommendation of the German Board of Health.

Jointing:
Welding joints
Socket-welding by heating-ele- ments according to DVS (German Welding Inst.) specifications: lea- flet 2207, part 11, section 3.2.
Tools and devices for socket-wel- ding by heating-elements accor- ding to DVS leaflet 2208, part 1, section 5, schedule 2, type A.

Threaded joints:
The threaded joint of adaptor pipe-fittings correspond to the re- quirements of DIN EN 10226, i. e. cylindrical female thread, conical male thread.
Male threads for connecting back- nuts correspond to the require- ments of DIN-ISO 228, part 1.

Dimensions:
Pipes: According to DIN 8077 (Pipes of polypropylene PP). Fittings: According to DIN EN ISO 15874, (Pipe connections and fit- tings
for polypropylene PP) injec- tion moulded fittings, z-dimensions tolerance ± 3 mm, we reserve the right to modify dimensions without previous notice

Quality:
Pipes: according to DIN 8078 for PP-R (polypropylene PP pipes). General quality standards, test.
Fittings: according to DIN EN ISO 15874
(Pipe connections and fittings for polypropylene PP pressure pipe- line.)
General quality standards, test.

Operating pressure:
For cold water at 20° C: up to 20 bar1.)
for hot water at 70° C: up to 10 bar1.)
for heating at 70° C: up to 3 bar. The regulations and guide-lines- dealing with the different fields of application are to be observed.

Chemical Resistance:
Detailed information on the chemi- cal resistance of polypropylene pipes and pipelines is available in DIN 8078.

Orders:
When ordering, kindly always state the dimensions and the order number in addition to the designa- tion of the piece required.
Example: Elbow 90°, d 32, No. 351020003

Marking:
The fittings are marked as follows: Example: , d, PP-R, P
Signs and Symbols:
d = nominal size = pipe diameter
R = male thread-conical
Rp = female thread-cylindric
Rc = femalethread-conical
G = male thread-cylindric
Stp = standard packing
® = registered trade mark
AL =numberofscrewholes

Utilization:
The system of tubing of PP-R, as described in this catalogue, has primarly been developped for ap- plication in the sanitary field for cold and hot water.
This system can be applied as well in the industrial section.
Tubes and fittings are dimensioned in a way to assure, according to actual results of long-term tests a utilisation of at least 50 years, based on max. 10 bar and a con- stant temperature of 70 degrees Celsius.
For hot water piping, made accor- ding to DIN 1988, the tube row 6 (PN 20) according to DIN 8077 is valid, for dimensions according to table 1.
Tubes are available in lenghts of 4 m.
Plastic pipes and fittings of PP-R generally have all advantages which have been registered in all sections of industry and of installa- tion technics. Most of all the excel- lent resistance of corrosion gives proof
of an extensively long utiliza- tion
of installation tubing in the building technic, without risk of da- mages known from metallic materi- als.

Therefore PP-R as installation-material represents an excellent choice for piping of cold and hot water.

Properties	Measuring technique	Unit	PP - R Value	PP - RCT Value
Melting index MFR 190/5 MFR 230/2,16	ISO / R 1133	 g/10 min. g/10 min.	 0,5 0,24 – 0,36	 0,5 0,24 – 0,36
Density	ISO / R 1183	g/cm³	0,895	0,905
Melting range	polarizing microscope	0°C 0°F	140 – 150 289 – 302	140 – 150 284 – 302
Yield stress Tensile strength Tensile expansion	ISO / R 527 feed speed Test bar	N/mm² N/mm² %	21 40 600	25 45 300
Bending stress at 3,5% Marginal fibre expansion	ISO 178 test specimen 5.1	N/mm²	20	23
Modulus of elasticity	ISO 178	N/mm²	800	900
Mechanical properties following impact bending test at 0° C	DIN 8078		no fracture	no fracture
Expansion coefficient	VDE 0304 Part 1 § 4	K^{-1}	$1,5 \times 10^{-4}$	$1,5 \times 10^{-4}$
Thermal conductivity at 20° C/58° F	DIN 52612	W/m K	0,24	0,24
Specific heat at 20° C68° F	adiabatic calorimeter	kJ/kg K	2,0	2,0
Pipe friction factor	–	–	0,007	0,007

Chemical Resistance

Selected chemical-resistance classification data for PP according to ISO/TR 10358

Concentration and/or purity of the fluid	**Dil Sol.**	Dilute aqueous solution at a concentration equal to or less than 10%
	Sol.	Aqueous solution at a concentration higher than 10% but not saturated
	Sat Sol.	Saturated aqueous solution, prepared at 20°C
	tg	At least technical grade purity
	tg-s	Technical grade, solid
	tg-l	Technical grade, liquid
	tg-g	Technical grade, gas
	Work Sol.	Working solution of the concentration usually used in the industry concerned.
	Susp.	Suspension of solid in a saturated solution at 20°C
Chemical resistance	**S**	**Satisfactory resistance** The pipes can be used for applications in which they are not subjected to pressure or other stresses; for applications in which they are exposed to pressure, the final assessment shall be on the basis of subsequent test under pressure.
	L	**Limited resistance** The pipes can be used for applications in which they are not subjected to pressure or other stresses, but in which a certain amount of corrosion can be accepted; for applications in which they are exposed to pressure, the final assessment shall be on the basis of subsequent test under pressure.
	NS	**Resistance not satisfactory** The pipes are seriously attacked: they shall not be used for either pressure or non-pressure applications. There is no point in conducting tests under pressure as the pipes would be certain to fail these tests.

• **Keys for chemical resistance table**

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
5	Acetone	-95	56	5	100	
				10	50	
		-95	56	tg-l	20	S
				tg-l	50	
				tg-l	60	S
11	Air			tg-g	20	S
				tg-g	50	
				tg-g	60	S
				tg-g	100	S
16	Aluminum Chloride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	80	
				Sat Sol.	100	
17	Aluminum Fluoride	250		Susp.	20	S
				Susp.	50	
				Susp.	60	S
				Susp.	100	
18	Aluminum Hydroxide			Susp.	20	S
				Susp.	50	
				Susp.	60	S
				Susp.	100	
19	Aluminum Nitrate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
20	Aluminum Oxychloride			Susp.	20	S
				Susp.	50	
				Susp.	60	S
21	Aluminum Potassium Sulphate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	80	
				Sat Sol.	100	
22	Aluminum Sulphate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
23	Ammonia, aqueous			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
24	Ammonia, Dry Gas	-78	-34	tg-g	20	S
				tg-g	50	
				tg-g	60	
25	Ammonia, Liquid	-78	-34	tg-g	20	S
				tg-g	50	
				tg-g	60	
26	Ammonium, Acetate			Sat Sol.	20	S
				Sat Sol.	60	S
				Sat Sol.	100	
28	Ammonium Carbonate (Dec. at 58°C)			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
				Sat Sol.	120	
29	Ammonium Chloride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
34	Ammonium Nitrate	170		Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
36	Ammonium Phosphate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	
				Sat Sol.	120	
37	Ammonium Sulphate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
41	Amyl Alcohol	-79	137	tg-1	20	S
				tg-1	50	
				tg-1	60	S
				tg-1	100	S
43	Aniline	-6	184	Sat Sol.	20	
				Sat Sol.	50	
				Sat Sol.	60	
				tg-1	20	S
				tg-1	50	
				tg-1	60	S
47	Apple Juice			Work Sol.	20	S
				Work Sol.	50	
				Work Sol.	60	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
50	Barium Bromide			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
51	Barium Carbonate			Susp.	20	S
				Susp.	50	
				Susp.	60	S
				Susp.	100	S
52	Barium Chloride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
53	Barium Hydroxide	78		Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
54	Barium Sulphate			Susp.	20	S
				Susp.	50	
				Susp.	60	S
				Susp.	100	S
55	Barium Sulphide			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
				Sat Sol.	120	
58	Benzene	6	80	tg-1	20	L
				tg-1	50	
				tg-1	60	NS
				tg-1	100	NS
59	Benzonic Acid	122	250	Sat. Sol.	20	S
				Sat. Sol.	50	
				Sat. Sol.	60	S
				tg-s	120	
61	Benzoyl Alcohol	-15	205	tg-1	20	S
				tg-1	50	
				tg-1	60	L
62	Benzyl Chloride	-39	179	tg-1	20	
				tg-1	50	
				tg-1	60	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
65	Boric Acid			Dil Sol.	20	S
				Dil Sol.	50	
				Dil Sol.	60	
				Dil Sol.	100	
				Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	
				Sat Sol.	100	
66	Boron Trifluoride	-129	-101	Sat Sol.	20	S
				Sat Sol.	60	
68	Bromine Gas	-7	58	tg-g	20	NS
				tg-g	50	
				tg-g	60	NS
				tg-g	100	NS
69	Bromine Liquid	-7	58	tg-1	20	NS
				tg-1	50	
				tg-1	60	NS
				tg-1	100	NS
73	Butane Gas	-135	-0.5	tg-g	20	S
				tg-g	50	
				tg-g	60	
74	n-Butanol	-80	117	tg-1	20	S
				tg-1	50	
				tg-1	60	L
				tg-1	80	
				tg-1	100	
83	Calcium Carbonate			Susp.	20	S
				Susp.	50	
				Susp.	60	S
				Susp.	100	S
84	Calcium Chlorate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	120	
85	Calcium Chloride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	80	
				Sat Sol.	100	S
88	Calcium Nitrate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	80	
				50	100	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
101	Chlorine Dry Gas			tg-g	20	NS
				tg-g	50	
				tg-g	60	NS
				tg-g	100	NS
102	Chlorine Water			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	L
				Sat Sol.	80	
				Sat Sol.	100	
103	Chlorine Wet Gas			tg-g	20	
				tg-g	50	
				tg-g	60	
				tg-g	80	
105	Chlorobenzene	-45	132	tg-1	20	
				tg-1	50	
				tg-1	60	
				tg-1	80	
				tg-1	100	
107	Chloroform	-64	62	tg-1	20	L
				tg-1	50	
				tg-1	60	NS
				tg-1	100	NS
110	Chlorosulphonic Acid	68	147	50	20	
			in	50	20	NS
			vac.	tg-s	50	
				tg-s	60	NS
				tg-s	100	NS
141	Diesel Fuel			Work Sol.	20	
				Work Sol.	60	
				Work Sol.	100	
155	Ethanol	-114	78	40	20	
				40	50	
				40	60	
				95	20	S
				95	50	
				95	60	S
				tg-1	20	
				tg-1	50	
				tg-1	60	
				tg-1	100	
176	Formaldehyde	-92	-19	Dil Sol.	20	
				Dil Sol.	60	
				Dil Sol.	80	
				30 to 40	20	S
				30 to 40	50	
				30 to 40	60	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
199	Hydrochloric acid	-112	-85	Up to 10	20	S
				Up to 10	50	
				Up to 10	60	S
				Up to 10	80	
				Up to 10	100	S
				20	20	S
				20	50	
				20	60	S
				20	80	
				20	100	S
				10 to 20	20	S
				10 to 20	50	
				10 to 20	60	S
				10 to 20	80	
				10 to 20	100	S
				Up to 25	20	S
				Up to 25	60	
				Up to 25	80	
				Up to 25	100	
				30	20	S
				30	60	L
				30	100	L
				>30	20	S
				>30	60	
				>30	80	
				>30	100	
				36	20	S
				36	50	
				36	60	
				36	80	
				38	100	
		-112	-85	Conc.	20	S
				Conc.	50	
				Conc.	60	
				Conc.	80	
200	Hydrochloric Acid, Dry Gas			tg-g	20	S
				tg-g	50	
				tg-g	60	S
201	Hydrochloric Acid, Wet Gas			tg-g	20	S
				tg-g	50	
				tg-g	60	S
204	Hydrofluoric Acid, Gas			tg-g	20	
				tg-g	40	
				tg-g	60	
205	Hydrogen			tg-g	20	S
				tg-g	60	
				tg-g	120	
213	Iodine, in Alcohol	114	183	Work Sol.	20	S
				Work Sol.	60	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
216	Isooctane		99	tg-1	20	L
					60	NS
					100	NS
220	Kerosene		150	Work Sol.	20	
			to 250	Work Sol.	100	
239	Mercurous Nitrate			Sol.	20	S
				Sol.	50	
				Sol.	60	S
				Sol.	100	
				Sat Sol.	20	S
				Sat Sol.	60	S
				Sat Sol.	100	
240	Mercury			tg-1	20	S
					60	S
					120	
244	Methyl Acetate	-98	57	tg-1	20	S
				tg-1	50	
				tg-1	60	S
245	Methyl Alcohol	-97	65	5	20	S
				5	50	
				5	60	L
				5	100	L
		-97	65	tg-1	20	S
				tg-1	50	
				tg-1	60	
				tg-1	80	
254	Milk			Work Sol.	20	S
				Work Sol.	50	
				Work Sol.	60	S
				Work Sol.	100	S
260	Nickel Acetate			Sat Sol.	20	
				Sat Sol.	40	
				Sat Sol.	60	
261	Nickel Chloride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
262	Nickel Nitrate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	120	
263	Nickel Sulphate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
265	Nitric acid			5	20	S
				5	50	
				5	60	
				5	80	
				10	20	S
				10	50	
				10	60	NS
				10	80	
				10	100	NS
				20	20	S
				20	50	
				20	60	NS
				20	80	
				20	100	NS
				25	20	S
				25	50	
				25	60	NS
				25	80	
				25	100	NS
				30	20	S
				30	50	
				30	60	NS
				30	80	
				30	100	NS
				30	120	
				35	20	
				35	50	
				35	60	NS
				35	80	
				35	100	NS
				40	20	
				40	50	
				40	60	
				40	80	
				40	120	
				up to 45	20	
				up to 45	50	
				up to 45	60	
				up to 45	80	
				50	20	L
				50	50	
				50	60	NS
				50	80	
				50	100	NS
				>50	20	NS
				>50	50	
				>50	60	NS
				>50	100	NS
				65	120	
				85	20	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
266	Nitrobenzene	6	210	tg-1	20	S
				tg-1	50	
				tg-1	60	L
272	Oxalic Acid (Subl.)	102		Dil Sol.	20	
				Dil Sol.	60	
				Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	L
				Sat Sol.	10	NS
				50	100	
273	Oxygen, Gas			tg-g	20	S
				tg-g	50	
				tg-g	60	
				tg-g	100	
283	Petroleum Ether (Ligroin)			Work Sol.	20	L
				Work Sol.	60	L
				Work Sol.	100	
284	Phenol	41	182	Sol.	20	
				Sol.	60	
				Sol.	80	
				5	20	S
				5	60	S
				5	120	
				50	80	
				90	20	S
				90	40	
				90	60	
		41	182	tg-s	20	
				tg-s	50	
				tg-s	60	
287	Phosphine	-134	-88	tg-g	20	S
				tg-g	40	
				tg-g	60	S
288	Phosphoric Acid	42		Up to 50	20	S
				Up to 50	50	
				Up to 50	60	S
				Up to 50	80	
				Up to 50	100	S
				50 to 75	20	S
				50 to 75	50	
				50 to 75	60	S
				50 to 75	80	
				50 to 75	100	
				25 to 85	20	S
				25 to 85	50	
				25 to 85	60	S
				25 to 85	80	
				25 to 85	100	S
				98	100	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
328	Propane, Gas	-190	-45	tg-g	20	S
				tg-g	120	
329	Propionic Acid	-20	141	50	20	
				50	60	
				>50	20	S
				tg-1	20	
				tg-1	60	
335	Silicone Oil			tg-1	20	S
				tg-1	60	S
				tg-1	100	S
340	Sodium Acetate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
				tg-s	80	
341	Sodium Acid Sulphate (See346)					
342	Sodium Antimonate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
343	Sodium Arsenite			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
344	Sodium Benzoate			Sat Sol.	20	
				Sat Sol.	40	
				Sat Sol.	60	
				35	20	S
				35	60	L
				50	100	
345	Sodium Bicarbonate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S
346	Sodium Bisulphate			Sat Sol.	20	S
				Sat Sol.	40	
				Sat Sol.	50	
				Sat Sol.	60	S
				50	100	
347	Sodium Bromide			Sat Sol.	20	S
				Sat Sol.	40	
				Sat Sol.	50	
				Sat Sol.	60	S
				50	120	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
348	Sodium Carbonate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	80	
				Sat Sol.	100	
				25	20	S
				25	50	
				25	60	S
				25	80	
				25	100	
				Up to 50	20	S
				Up to 50	50	
				Up to 50	60	S
				Up to 50	80	
				Up to 50	100	L
349	Sodium Chlorate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	80	
				Sat Sol.	100	
350	Sodium Chloride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	80	
				Sat Sol.	100	
				10	20	S
				10	50	
				10	60	S
				10	80	
				10	100	S
351	Sodium Chlorite			Dil Sol.	80	
				2	20	S
				2	60	L
				2	100	NS
				20	20	S
				20	40	
				20	60	L
				20	100	NS
352	Sodium Chromate			Dil Sol.	20	S
				Dil Sol.	50	
				Dil Sol.	60	S
				Dil Sol.	80	
357	Sodium Fluoride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
362	Sodium Hydrogen Sulphite			Sat Sol.	20	S
				Sat Sol.	60	
				50	100	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
363	Sodium Hydroxide			Sol.	20	S
				Sol.	50	
				Sol.	60	S
				Sol.	80	
				Sat Sol.	20	
				Sat Sol.	60	
				1	20	S
				1	50	
				1	60	S
				1	100	S
				5	20	
				10 to 35	20	S
				10 to 35	50	
				10 to 35	60	
				10 to 35	80	
				30	80	
				40	20	S
				40	50	
				40	60	
				40	80	
				10 to 60	20	S
				10 to 60	50	
				10 to 60	60	S
				10 to 60	100	S
364	Sodium Hypochlorite			2	100	
				5	20	S
				5	50	
				5	60	S
				10 to 15	20	S
				10 to 15	50	
				10 to 15	60	
366	Sodium Nitrate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
367	Sodium Nitrite			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
371	Sodium Phosphate, Acid			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
372	Sodium Phosphate, Neutral			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	S

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
373	Sodium silicate			Sol.	20	S
				Sol.	50	
				Sol.	60	S
				Sat Sol.	20	
				Sat Sol.	50	
				Sat Sol.	60	
				50	100	
374	Sodium sulphate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
				0,1	20	S
				0,1	50	
				0,1	60	S
375	Sodium sulphide			Sat Sol.	20	S
				Sat Sol.	60	
376	Sodium sulphite			Sat Sol.	20	S
				Sat Sol.	60	S
				Sat Sol.	100	
				40	20	S
				40	60	S
				40	100	S
380	Sulphar dioxide, dry gas	-73	-10		20	S
					60	
381	Sulphar dioxide, wet gas	-73	-10		20	S
					40	
					60	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
383	Sulphuric acid			up to 10	20	S
				up to 10	50	
				up to 10	60	S
				up to 10	80	
				up to 10	100	S
				15	20	S
				15	50	
				15	60	
				15	80	
				15	100	
				10 to 30	20	S
				10 to 30	60	S
				10 to 30	80	
				10 to 50	20	S
				10 to 50	60	
				10 to 50	80	
				10 to 50	120	
				50	20	S
				50	50	
				50	60	L
				50	80	
				50	100	L
				60	120	
				50 to 75	20	
				50 to 75	60	
				50 to 75	80	
				80	120	
				50 to 90	20	
				50 to 90	60	
				50 to 90	80	
				90	100	
				75 to 90	20	
				75 to 90	50	
				75 to 90	60	
				75 to 90	80	
				95	20	
				95	50	
				95	60	
				95	80	
				95	100	
				96	20	S
				96	50	
				96	60	L
				96	80	
				96	100	NS
				98	20	L
				98	40	
				98	50	
				98	60	NS
				98	80	
				98	100	NS
				fuming	20	L
				fuming	50	
				fuming	60	NS
				fuming	100	NS

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
393	Toluene	-95	111	tg-1	20	L
				tg-1	50	
				tg-1	60	NS
				tg-1	100	NS
394	Trichloroacetic Acid	58	197	Up to 50	20	S
				Up to 50	40	
				Up to 50	60	S
				tg-s	40	
396	Trichloroethylene	-85	87	tg-1	20	NS
				tg-1	50	
				tg-1	60	NS
				tg-1	80	
				tg-1	100	NS
401	Turpentine			tg-1	20	NS
				tg-1	50	
				tg-1	60	NS
				tg-1	100	NS
402	Urea	133		Sol.	20	
				Sol.	50	
				Sol.	60	
				Sol.	80	
				Sol.	100	
				Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	
				Sat Sol.	80	
		133		10	20	
				10	50	
				10	60	
				10	80	
				10	100	
404	Urine			10	20	S
				10	50	
				10	60	S
406	Vinegar			Work Sol.	20	S
				Work Sol.	60	S
408	Water				20	S
					50	
					60	S
					80	
					100	S
					120	

No.	Chemical	m.p. °c	b.p °c	Concentration %	T °c	Resistance
420	Zinc Carbonate			Susp.	20	S
				Susp.	50	
				Susp.	60	S
				Susp.	100	
421	Zinc Chloride			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
				58	20	S
				58	50	
				58	60	S
422	Zinc Chromate			Sat Sol.	20	
				Sat Sol.	60	
423	Zinc Cyanide			Sat Sol.	20	
				Sat Sol.	60	
424	Zinc Nitrate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	
425	Zinc Oxide			Susp.	20	S
				Susp.	50	
				Susp.	60	S
				Susp.	100	
426	Zinc Stearate	125		Susp.	20	
				Susp.	50	
				tg-s	100	
427	Zinc Sulphate			Sat Sol.	20	S
				Sat Sol.	50	
				Sat Sol.	60	S
				Sat Sol.	100	

Testing and Accepting Incoming Goods

All incoming goods are carefully inspected, to ensure that the raw material conforms with the set requirements. Goods that have not been tested do not get released for production. The incoming raw material is tested according to ISO l l 33.

In-Process Inspection

The quality plan requires that all inspections are carried out at the beginning as well as during production. As production starts all relevant data are checked by the Quality Assurance Department. Pre-production samples are tested by the laboratory technicians for:

- Surface finish.
- Dimensional accuracy.
- Check Marking.
- Data from extrusion and injection moulding machines.
- The product is only released if optimal test results are achieved.

Final inspection
QC requires that inspections and tests are carried out on all finished products. The results are all documented. Finished products are only released to storage when all tests and inspections have conformed to the authorized procedures and specifications. The final inspection test includes a time laps procedure. This measures the usability of the products in their field of application, as well as removing production weaknesses. These inspections are the method for quality assurance during production and
for design tests. The results document the system quality and serve to optimize the manufacturing process.

The final inspection covers the following main Tests:

Dimensional
This test includes measuring of outside diameter, inside diameter, thickness, length and ovality according to DIN 8077 standard.MF! (Melt Flow Index) TestThis test is used for simulating the flow movement of the material in extruder and injection machines before processing. The test provides unit temperature and time based information on the material' s flow index. Test results provide information on possible
behavior of the material during manufacturing process. This test carried out according to ISO 1133 standard.

Density Test
Density tested according to DIN EN ISO 1183 standards. The material is passed through MFI device and its weight is determined separately in air and in a fluid with known density according to standard.
After these weight values are obtained, the density of the material is determined.

Impact Test
This test determines the amount of energy absorption and possible applicable force on a unit area by free fall of materials with different weight. This test provides information about the behavior of material against various loads in sudden impacts. This involves measuring the ability to absorb impact energy of 10 product samples. The greater the energy absorbed, expressed in Joules, the greater is the resistance to impact.
The impact strength test carried out according to DIN 8077 and DIN EN ISO 179-1 standard.

Long-term hydrostatic test
Hydrostatic internal pressure resistance test for system in performed according to DIN 8078. Arkan system didn't brust or leak during the stressing period .Time and temperature values must be as showing at the following parameters:-

Test Temperature(° C}	Test Medium	Hoop stress (MPa}	Stressing period (Hour}
20	Water	19	1
95	Water	3.8	165
95	Water	3.5	1000
110	Air	1.9	8760

Heat reversion test

Heat reversion test is used for determine a percent of linear shrinkage of profiles at elevated temperature and it determined according to DIN EN ISO 2505. Dimensional stability is an excellent indicator of any internal or residual stresses in the profile that may have resulted from the extrusion process. In use shrinkage can lead to distortion of profiles, It consists of placing a test piece of a specified length in an oven at 135 ° C for 120 Min. A marked length of this test piece is measured under identical conditions, before and after heating in the oven. The heat reversion is calculated as the percentage change of the final length relative to the initial length per pair of marks.

Heat deflection temperature

Heat deflection temperature is defined as the temperature at which a standard test bar deflects a specified distance under a load. It is used to determine short-term heat resistance. It distinguishes between materials that are able to sustain light loads at high temperatures and those that lose rigidity over a narrow temperature range. The bars are placed under the deflection measuring device. A load of 0.45 MPa is placed on each specimen. The specimens are then lowered into a silicone oil bath where the temperature is raised at 2° C per minute until they deflect 0.25 mm; once deflection happen the
device calculate heat deflection temperature. This test carried out according to ISO 75B standard

Vicat softening temperature

The Vicat softening temperature is the temperature at which a flat-ended needle penetrates the specimen to the depth of 1 mm under a specific load. The temperature reflects the point of softening to be expected when a material is used in an elevated temperature application.A test specimen is placed in the testing apparatus so that the penetrating needle rests on its surface at least 1 mm from the edge. A load of 1ON or SON is applied to the specimen. The specimen is then lowered into an oil bath at 23 degrees C. The bath is raised at a rate of 120° C per hour until the needle penetrates 1 mm,
once penetrate happen the device calculate Vicat softening temperature. This test carried out according to ISO 306 standard.

External Control

External supervision consists of measuring the fixed scope at fixed intervals. The respective supervising institutions appoint the appropriate authorized inspection organization to carry out external supervision. Inspection includes:

- External tests of products.
- Internal audit of quality assurance system and test procedures.
- Calibration of the test equipment.
- Hygienic and toxicity tests.

Test Plan for A R K A N Pipes

Incoming inspection of	Check and control measures	Requirements	Measures carried out by	Intervals of measures taken	Documentation of results	Measures for defective products	Measure or control means
raw material	Manufacturer's certificate on raw material delivery according to ISO 1133 From Supplier	Does Manufacturer's certificate comply with agreements made with raw material supplier?	Laboratory staff	Each delivery and batch	Signing of manufacturer's certificate depository laboratory EG Ql3	Blocking by laboratory staff	--------
	Melt· Flow index Din ISO 1133 MFR 230/C/ 2.16kg	s0.06g/l Omin s0.03g/ 10 min 9S°C/16 Sh/3.8Nlmm²	Laboratory staff	Each delivery and batch	Ql3	Blocking by laboratory staff	MFR device No (Te04)
	Shrinkage from drying	0.03%	Laboratory staff	Each delivery and batch	K2 control card Ql3	Blocking by laboratory staff	Exicator No (Te 06) and oven No (Te 01)
Pipe Product control in production	Labeling	Q3	Laboratory staff	Permanent	K1 control card each 2h	Blocking by control staff, information to production manager	---·-·-
	Surface quality condition for delivery	Smooth internal and outer surface clean cut edge DIN 8077	Laboratory staff	Permanent	K1 control card each 2h	Blocking by control staff, information to production manager	-------··
	Dimensional accuracy	DIN 8077 / 8078 Dimensions and tolerance given on card by laboratory staff	Laboratory staff	Permanent	K1 control card each 2h	Blocking by control staff, information to production manager	Caliper gage NO (Md 15) Circumeter NO (Md 03)
	Ovality	DIN 8077 /78	Laboratory staff	Each Day	K2 control card (Q4)	EG laboratory staff	Caliper gage No (Md 02)
Pipe Product laboratory control	Flow Melt - low index DIN ISO 1133 MFR 230°C / 2.16kg	Max 30% difference to raw material	Laboratory staff	Each dimension or each batch or each week	K2 control card	Blocking by laboratory staff	MFR device No (Te 04)
	Change after heat treatment 135°C	DIN 8078 <2%	Laboratory staff	3 times a week	K2 control card	Blocking by laboratory staff	Oven No (Te 01) and marking gauge No (Ae 01)
	Impact bending test	DIN 8078 <10%	Laboratory staff	Each Day	K2 control card	Blocking by laboratory staff	Pendulum impact tester NO (Te 05)
	Resistance internal pressure test	95.C / 165h/3.8 N/mm'	Laboratory staff	Each dimension or each batch or each week	K2 control card (Ql2)	Retest 95°C /1 OOOh/3.5 N/mm' Blocking by laboraton, staff	Pressure test equipment No (Te 03)
	Homogeneity	0.02 mm'	Laboratory staff	Each month	K2 control card	Blocking by laboratory staff	Microscope No (Te 03)

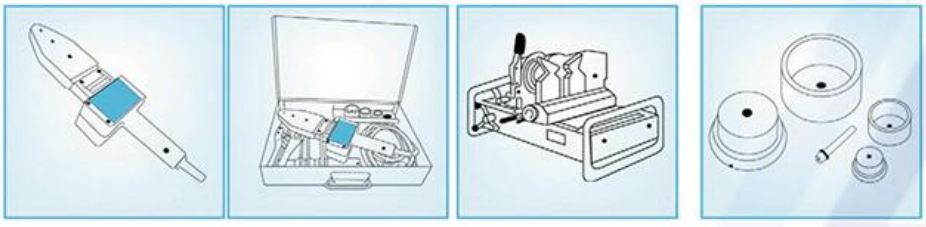
Guarantee
always maintains the highest standards of quality for its customers.
To support this, Arkan warrants a 10-year guarantee for all its piping network components from the date of purchase. (Please ask your local representative for details).The guarantee is valid under conditions of proper operation compliance with proper rules of engineering, installation, storage and transportation Arkan is responsible for damage, to cover costs connected the specific, good and repair any direct damage by its products under its direction or undertake their expenses, after Arkan checks and approves the estimated liability.

WELDING

pipes-dimensions.	DIN 8077
Quality Requirements for	DIN 8078
Quality Requirements for	pr EN 12202-2
The pr EN 12202-2 is valid in the following European Committee Standardization (CEN) member states: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.	
Joints and fittings for the pressurized pipes	DIN 16962
Welding of thermoplastic materials through heating.	DYS 2207
Machines and devices to weld thermoplastic materials	DYS 2208
Threads for pipes and fittings. Cylindrical internal and external tapered thread dimensions.	DIN 2999
Pipe threads for non-sealing coupling thread designation, dimensions and tolerance limits.	ISO 228
Cold and hot water supply and distribution installations Criteria of design,testing and management.	UNI 9182

Note:
Arkan is not liable for damages due to faliure to respect the above described references and/or failure to use a Arkan approved welding devices.

Heating Tools



Polyfusion Device

Our polyfusion device is fed by a 220 Voltage (110 V upon request) and 1000 W power. It is equipped with a fixed bulb-type thermostat with a+ 5·c, tolerance, Bushes must be heated at 260'C ± 10'C for whatever pipe diameter and/or under any weather condition. Welding must not take place in very windy areas, especially when it is cold, because it can produce a variation that exceeds 50·c, in this case, the thermostat will not be able to be adjusted in time

Welding Procedure

The pipework is coupled by socket fusion. The welded pipes and fittings have a longitudinally overlapping connection. The heating of the pipes' ends and fitting faucets is done by a heating element with bushes. After the necessary welding temperature is reached, the joining process is dine. The pipe and fitting faucets diameters, as well as the respective heating bush diameters, are matched to build up the necessary pressure during the joining process. The heating element is electrically heated it complies with DVS Directive 2208 part 1 in construction and accuracy.

Preparations

First, cutting pipes square into sections, with both joints, the pipe end and fitting faucet, to be thoroughly cleaned with absorbent paper. Second, marking the bush depth on the pipe while bringing the heating element to 260˚C (remember that the temperature tolerance is ±10˚ C) by checking the integrated thermometer on the heating element. Otherwise the temperature must be controlled and measured by an appropriate measuring device.

NOTE: Must not start heating the joint parts before reaching the set temperature of 260˚C. Also cleaning the mandrel and bush before each use.

Welding

Starting with pushing the pipe and fitting ends, quickly and axially, up to the stop of the mandrel and the marked insertion depth, respectively fast without torsion. The heating of the joint faces is done according to the table in (fig. A). When the heating period is up, the pipe and fitting ends are pulled abruptly from the heating element and joined immediately without torsion, minding the correct insertion depth (fig. B).

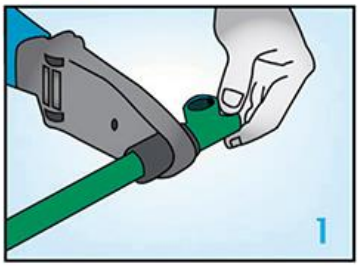
NOTE: We recommend fixing the tow joint part again for a certain time (the heating period). Do not expose the welded joint to mechanical stress until after the cooling period is done.

Note:
On the welding process the heating elements (mandrel and bush) must correspand to DVS 2208 (excluding mechanical working of pipe). (Fig A, B) schematically
show the 3 welding process stages.

Fig. A

Pipe ∅	Heating S	Maximum Interval S	Cooling Time min.	Depht of Pocket mm.
20	5	4	2	14.5
25	7	4	2	16
32	8	6	4	18
40	12	6	4	20.5
50	18	6	4	23.5
63	24	8	6	27.5
75	30	8	6	31
90	40	8	6	35.5
110	50	10	8	41.5

Fig. B



1. The pipe end and the soket of fitting are pushed to heaters in axial direction. Pipe and fitting should be heated simultaneously.

2. At the end of the heating period fitting and pipe end are separated from the heating elements.

3. Fitting and pipe are quickly joined together in the axial direction. During joining, the pipe end should not be turned around its axis in the socket

Note:
Standard values for socket fusion welding at a room temperature of 20˚c. With a room temperature below +5ºC, the heating phases should be increased up to 100%.

Installation

is unrivalled as it is a unique poly-fusion connection system. It can be installed in no time; for instance, a 20 mm. external diameter pipe takes only 9 seconds to install.

Thermal Instalation of Cold Water Pipes

As stipulated in section 2 of the DIN 1988 Standard, drinkable water facilities must be protected from heat and condensation. The diagram below reports the standard values for minimum insulation thickness. Those figures can be applied to all types of pipes, including . (See fig. A)

Example for concealed piping

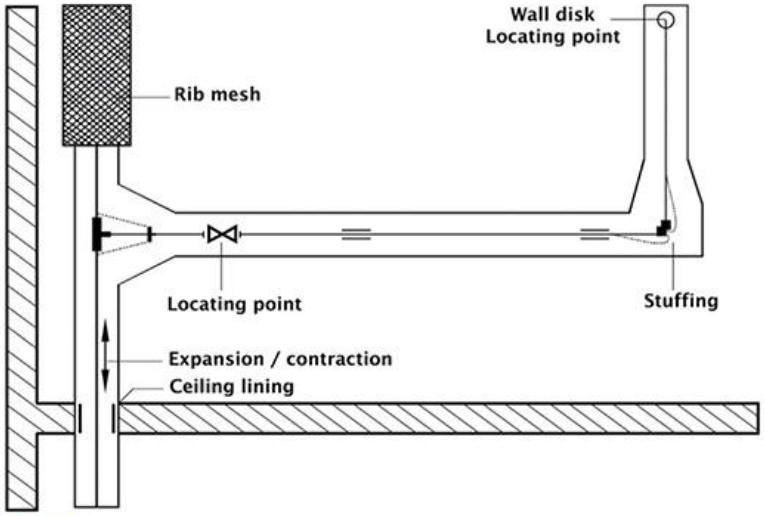


Fig. A

Applications in Sanitary Installation Shaft:

When installing an apartment's pipe connections from the main pipe, the following techniques can be applied to compensate for the pipe's thermal expansions: See (Fig. B)

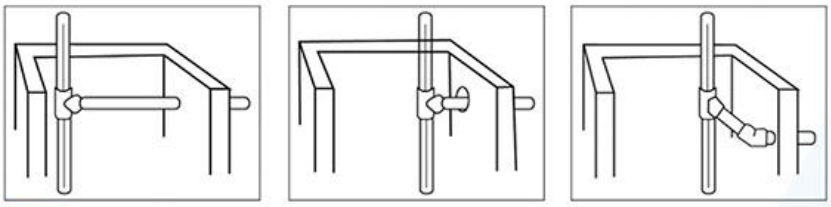


Fig. B

Pipe connection can be made at some distance (a), away from the wall.

Connecting pipe can be passed through a hole much larger than the pipe diameter.

Appartment connection can be made through a branch pipe to provide flexibility.

Design and Realization

Realization and installation must be performed according to the specific standards of the countries of application.

Loss Pressure Values

Straight pipes can be deducted from the diagram below (fig. C)

Loss Pressure in Pipes

The data of the chart below can be used to calculate the resistance rate of each fitting. Those figures are approximate. The resistance of the joints must be globally evaluated. 3-5% can be added to the total loss pressure to obtain an approximate value.

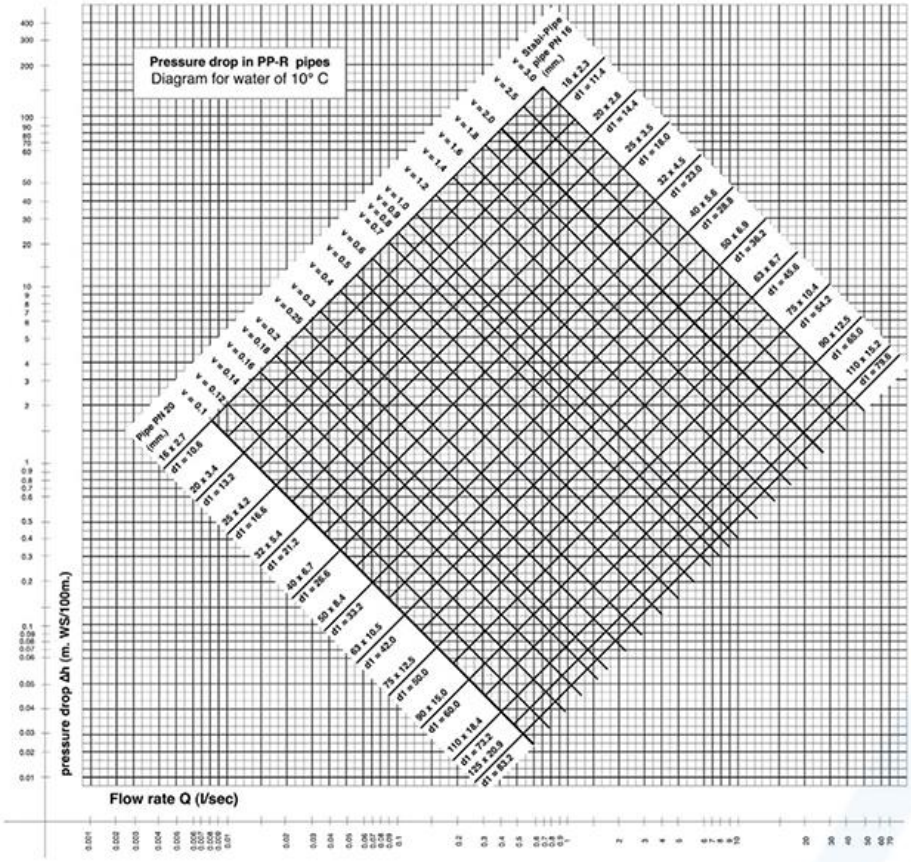


Fig. C

Table of Lifetime Under Uninterrupted Operating Conditions at Various Temperatures and Pressures (PN 20). See (Fig.D)

long-term duriability PN 20
Max. pressure (bar)
security factor 1.25 acc.
to DIN 8078

Years of Service	Temperature	B.R Standard Pipe SDR 11	B.R Standard Pipe SDR 7.4	B.R Standard Pipe SDR 6
		PN10	PN16	PN20
1	10	17.5	27.8	35.1
	20	15.0	23.7	29.9
	30	12.7	20.2	25.4
	40	10.8	17.1	21.6
	50	9.1	14.5	18.2
	60	7.7	12.2	15.4
	70	6.5	10.3	12.9
	80	5.4	8.6	10.8
	95	3.8	6.1	7.6
5	10	16.5	26.2	33.0
	20	14.1	22.3	28.1
	30	11.9	18.9	23.8
	40	10.1	16.0	20.2
	50	8.5	13.5	17.0
	60	7.1	11.3	14.3
	70	6.0	9.5	12.0
	80	4.8	7.6	9.6
	95	2.6	4.1	5.2
10	10	16.1	25.6	32.2
	20	13.7	21.7	27.4
	30	11.6	18.4	23.2
	40	9.8	15.5	19.6
	50	8.2	13.1	16.5
	60	6.9	11.0	13.9
	70	5.8	9.2	11.6
	80	4.0	6.4	8.1
	95	2.2	3.4	4.3
25	10	15.6	24.7	31.1
	20	13.2	21.0	26.4
	30	11.2	17.7	22.3
	40	9.4	15.0	18.8
	50	7.9	12.6	15.9
	60	6.6	10.5	13.3
	70	5.0	8.0	10.0
	80	3.2	5.1	6.5
50	10	15.2	24.1	30.3
	20	12.9	20.4	25.7
	30	10.9	17.2	21.7
	40	9.2	14.5	18.3
	50	7.7	12.2	15.4
	60	6.4	10.2	12.9
	70	42	6.7	8.5

Type of installation	Installation thickness
Pipe laocated in an accessible unheated place.	4mm.
Pipes located in an accessible heated place.	9mm.
Pipes located in a ventilation system, far from hot water pipes.	4mm.
Pipes located in a ventilation system, near a hot water pipes.	13mm.
Pipes located in a ventilation system close to water pipes.	4mm.
Pipes located in a riser pipe set close to water pipes.	13mm.
Pipes located on a concrete slab.	4mm.

INSTALLATION

Description	Symbol	Coefficient of resistance (r)
Coupling pipe		0.25
90° Elbow		2.00
45° Elbow		0.60
identical 90° Tee		1.80
Reduced 90° Tee		3.60
Identical 90° Tee		1.30
Reduced 90° Tee		2.60
Identical 90° Tee		4.20
Reduced 90° Tee		9.00
Identical 90° Tee		2.20
Reduced 90° Tee		5.00
Male threaded 90° Tee		0.80
Concentric reduction pipe up 2 dim.		0.55
Concentric reduction pipe up 3 dim.		0.85
Male threaded joint		0.40
Reduced male threaded joint		0.85
Male threaded elbow		2.20
Reduced male threaded elbow		3.50

Fig. E

Distance Between the Supporting Points:

The type and number of the pipe fixings, depend on the type of structure and on the longitudinal expansion. The fixed points must divide the pipe into sections in which contraction or expansion would take place; at any rate expansion must never occur on the inserts or on the fillings. The different pipe sections are maintained by sliding hinges. The distance between those fixings, i.e. the distance between the supporting points, depend on the working conditions and on the weight of the pipes (including that of the fluid which is conveyed). On a practical point of view, the distance between the supporting points reported in the following table (fig. F) have been found to be valid.

Distance Between the Supporting Points in CM. at Different Temperatures

Ø mm.	20°C	30°C	40°C	50°C	60°C	70°C	80°C
16	75	70	70	65	65	60	55
20	80	75	75	70	65	60	60
25	25	85	85	80	75	75	70
32	100	95	90	85	80	75	70
40	110	110	105	100	95	90	85
50	125	120	115	110	105	100	90
63	140	135	130	125	120	115	105
75	150	150	140	140	125	115	105
90	165	160	150	150	140	125	115
110	190	180	170	170	160	140	130

Fig. F

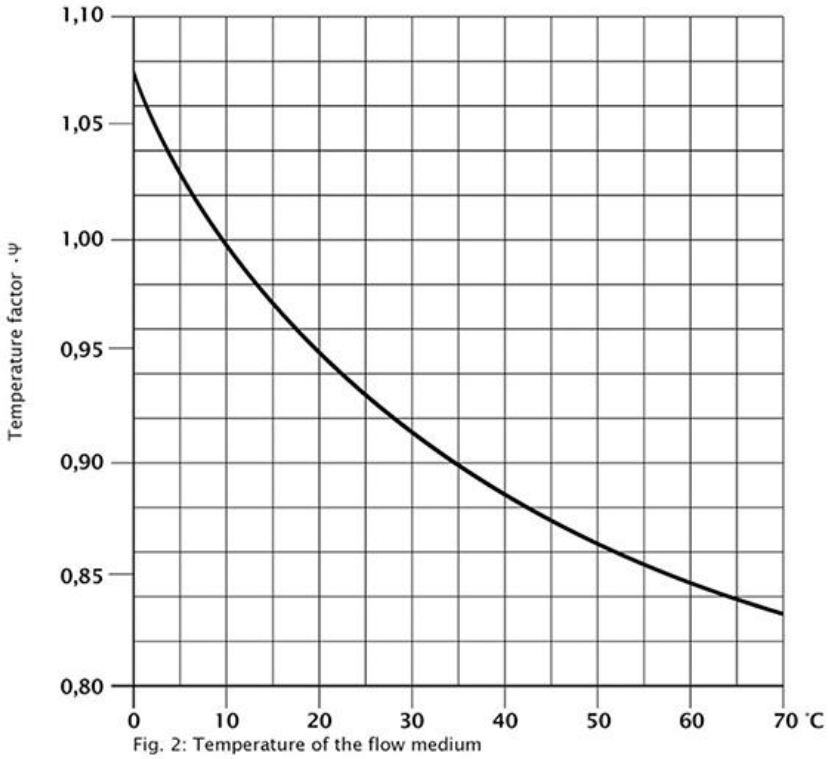


Fig. 2: Temperature of the flow medium

For the individual fitting resistance values given in the chart below (fig.3) can be applied by approximation. The individual joint resistance values can be determined altogether. As a standard value add an extra of 3% to 5% to the overall pressure drop.

Outside pipe diameter d mm	16 20 25	32 40	50 63	≥63
Fitting Type	Drag coefficient ζ			
	1,5	1,0	0,6	0,5
	2,0	1,7	1,1	0,8
	0,3			
	1,5			
 Steam in	0,5			
 Steam out	1,0			

Minimum flow pressures

Reference values for the minimum flow pressures and calculated flows for generally used drinking water service points

Minimum flow pressure $P_{min\ Fl}$ bar	Type of drinking water service points		Calculated flow for outlet of		
			Mixed water		Either cold or hot water
			Volume flow cold l/s	Volume flow hot l/s	Volume flow l/s
	Outlet valve				
0.5	without air whirler	DN 15	–	–	0.30
0.5		DN 20	–	–	0.50
0.5		DN 25	–	–	1.00
1.0	with air whirler	DN 10	–	–	0.15
1.0		DN 15	–	–	0.15
1.0	shower heads for clinsing showers	DN 15	0.10	0.10	0.20
1.2	Pressure riner in acc. to DIN 3265 part 1	DN 15	–	–	0.70
1.2	Pressure riner in acc. to DIN 3265 part 1	DN 20	–	–	1.00
0.4	Pressure riner in acc. to DIN 3265 part 1	DN 25	–	–	1.00
1.0	Pressure riner for urinals	DN 15	–	–	0.30
0.5	corner valve for urinals	DN 15	–	–	0.30
1.0	household dishwasher	DN 15	–	–	0.15
1.0	household dishwasher machine	DN 15	–	–	0.25
	mixer for				
1.0	showers	DN 15	0.15	0.15	–
1.0	bath tubs	DN 15	0.15	0.15	–
1.0	kitchen sinks	DN 15	0.07	0.07	–
1.0	wash-stands	DN 15	0.07	0.07	–
1.0	bidet	DN 15	0.07	0.07	–
1.0	mixer	DN 20	0.30	0.30	–
0.5	flushing box acc. to DIN 19542	DN 15	–	–	0.13
	heater for drinking water for supply of service point (incl. fitting for mixed outlet)				
1.0	electric water boiler	DN 15	–	–	0.10*
	electric hot water tank and boiler				
1.1**	with nominal contents 5 - 15 l	DN 15	–	–	0.10
1.2**	with nominal contents 30 - 150 l	DN 15	–	–	0.20
	electric flow water heater with hydraulic test without flow limitation				
1.5	normal capacity	12 KW	–	–	0.06
1.9		18 KW	–	–	0.08
2.1		21 KW	–	–	0.09
2.4		24 KW	–	–	0.10
1.0	gas flow water heater	12 KW	–	–	0.10

* with fully opened throttle valve - **values under unfavourable conditions (shower)
Note: Service points which are not included in the table and devices of similar kind with larger flow of fittings than indicated are to be taken into account according to the recommendations of the producer as far as determination of pipe diameter is concerned.

Linear deformation of PP-R pipes under heat influence

Thermoplastic plastics PP-R pipes are exposed to thermal expansion. The linear extension of such pipes is higher than with steel pipes. This fact must be all means be taken into consideration in the laying process. Already in the pipe arrangement planning stage each possibility should therefore be ultilized fully to compensate all extension process within a pipe section.

The linear thermal expansion coefficient for PP-R and PP-RCT pipes is:

$$\varepsilon t = 1.5 \cdot 10^{-4} \quad (K^{-1})$$

Polypropylene pipes mechanically stabilized by an aluminium coating on the pipe periphery (Stabi-Rohr/Stabi-Pipe) have a reduced thermal expansion coefficient. The aluminium coating prevents linear extension at about 4/5

The linear thermal expansion coefficient for PP-R Stabi-Pipes can by approximation assumed as:

$$\varepsilon t = 0.3 \cdot 10^{-4} \quad (K^{-1})$$

The linear thermal expansion coefficient for PP-RCT Fibre-Pipes is:

$$\varepsilon t = 0.35 \cdot 10^{-4} \quad (K^{-1})$$

Δl = Linear extension in (mm)

εt = Thermal expansion coefficient in $(\frac{mm}{m \cdot °C})$

L = Pipe length (m)

Δt = Temperature difference (°K)

The linear deformation of a pipe is thus calculated according to the following formula:

$$\Delta l = \varepsilon t \cdot L \cdot \Delta t \quad (mm)$$

The calculation of the linear deformation is based on the laying temperature. The following example gives you an idea of how to calculate.

Example for a pipe length of 8 m :

1- Lowest pipe wall temperature + 9° C (cold-water pipe)

Difference 7° K

2- Laying temperature + 16° C

Difference 54° K

3- Highest pipe wall temperature + 70° C (hot-water pipe)

To 1. Shortening of the pipe: 8m · 7° · 0.03 = 1.68 mm

To 3. Extension of the pipe: 8m · 54° · 0.03 = 12.96 mm

Diagram and chart to establish the temperature-dependent linear expansion of PP-R and PP-RCT - Pipes

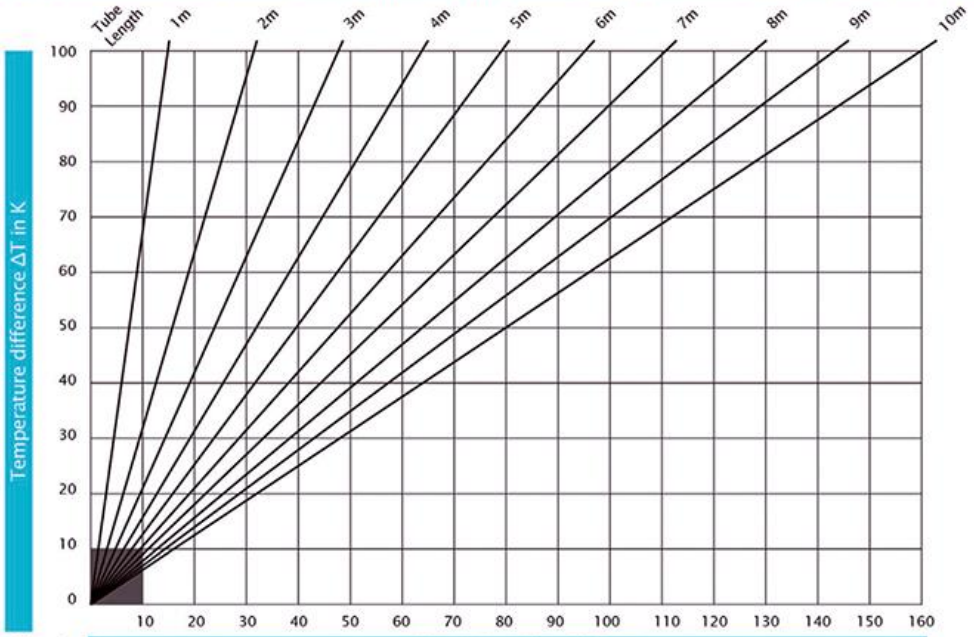


Fig. 4

	Temperature difference ΔT in K									
Tube Length	10	20	30	40	50	60	70	80	90	100
0.1m	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50
0.2m	0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00
0.3m	0.45	0.90	1.35	1.80	2.25	2.70	3.15	3.60	4.05	4.50
0.4m	0.60	1.20	1.80	2.40	3.00	3.60	4.20	4.80	5.40	6.00
0.5m	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
0.6m	0.90	1.80	2.70	3.60	4.50	5.40	6.30	7.20	8.10	9.00
0.7m	1.05	2.10	3.15	4.20	5.25	6.30	7.35	8.40	9.45	10.50
0.8m	1.20	2.40	3.60	4.80	6.00	7.20	8.40	9.60	10.80	12.00
0.9m	1.35	2.70	4.05	5.40	6.75	8.10	9.45	10.80	12.15	13.50
1.0m	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00	13.50	15.00
2.0m	3.00	6.00	9.00	12.00	15.00	18.00	21.00	24.00	27.00	30.00
3.0m	4.50	9.00	13.50	18.00	22.50	27.00	31.50	36.00	40.50	45.00
4.0m	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00
5.0m	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00
6.0m	9.00	18.00	27.00	36.00	45.00	54.00	63.00	72.00	81.00	90.00
7.0m	10.50	21.00	31.50	42.00	52.50	63.00	73.50	84.00	94.50	105.00
8.0m	12.00	24.00	36.00	48.00	60.00	72.00	84.00	96.00	108.00	120.00
9.0m	13.50	27.00	40.50	54.00	67.50	81.00	94.50	108.00	121.50	135.00
10.0m	15.00	30.00	45.00	60.00	75.00	90.00	105.00	120.00	135.00	150.00

Fig. 4a — Linear expansion ΔL in mm

Length Variation of Pipes Due to Heat (Thermal Stress)

pipes are subject to a relatively high thermal expansion whenever they are exposed to temperature variations.
The longitudinal thermal expansion of these pipes is about 11 times more important than in steel pipes.
This fact must be taken into account during the starting-up phase.
Therefore, as early as in the Design phase, all the alternatives regarding the position or the path of the pipes must be throughly examined in order to compensate thermal expansion in the various pipe sections.
The coefficient of longitudinal thermal expansion for pipes is:
£t = 1,5 * 10^{-4} (K^{-1}). See (Fig. G)

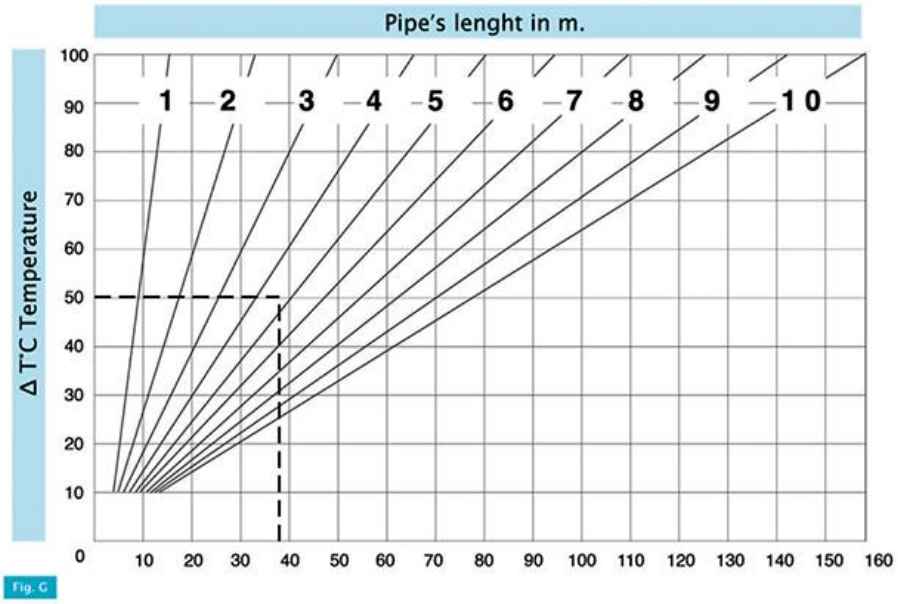


Fig. G

Example: pipe ∅ 40 L.5 m. - Length variation : ΔL = 0.15x5x50 = 37.15 mm.

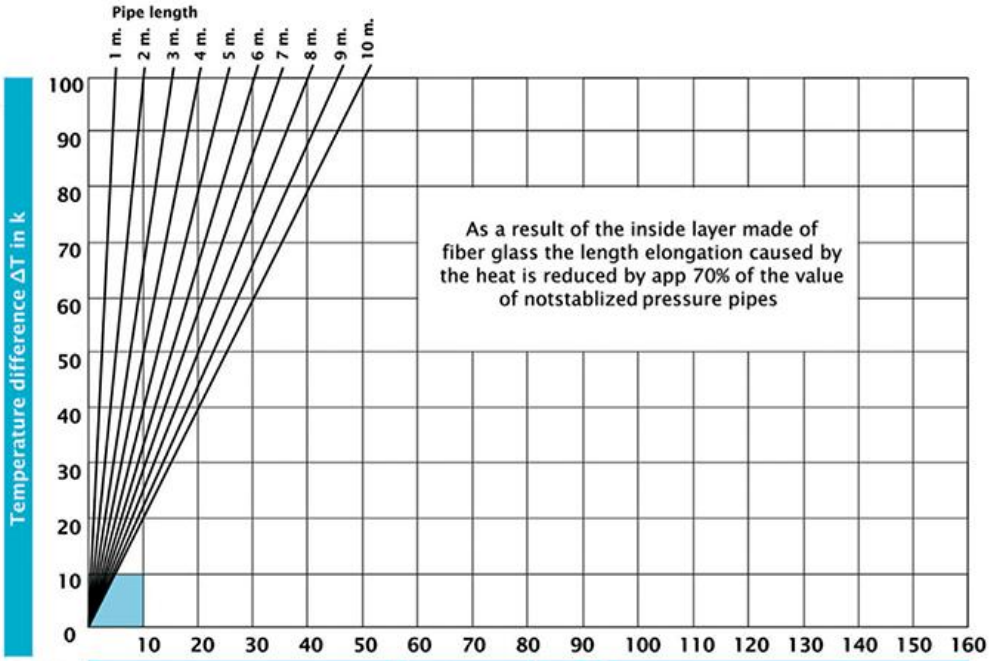


Fig. H

	Temperature difference ΔT in k									
Pipe length	10	20	30	40	50	60	70	80	90	100
0,1 m	0,0 5	0,10	0,15	0,20	0,25	0,30	0,35	0,40	0,45	0,50
0,2 m	0,10	0,20	0,30	0,40	0,50	0,60	0,70	0.80	0,90	1,00
0,3 m	0,15	0,30	0,45	0,60	0,75	0,90	1,05	1,20	1,35	1,50
0,4 m	0,20	0,40	0,60	0,80	0,00	1,20	1,40	1,60	1,80	2,00
0,5 m	0,25	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50
0,1 m	0,30	0,60	0,90	1,20	1,50	1,80	2,10	2,40	2,70	3,00
0,7 m	0,35	0,70	1,05	1,40	1,75	2,10	2,45	2,80	3,15	3,50
0,8 m	0,40	0,80	1,20	1,60	2,00	2,40	2,80	3,20	3,60	4,00
0,9 m	0,45	0,90	1,35	1,80	2,25	2,70	3,15	3,60	4,05	4,50
8,0 m	0,50	1,00	1,50	2,00	2,50	3,00	3,50	4,00	4,50	5,00
7,0 m	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00
6,0 m	1,50	3,00	4,50	6,00	7,50	9,00	10,50	12,00	13,50	15,00
5,0 m	2,00	4,00	6,00	8,00	10,00	12,00	14,00	16,00	18,00	20,00
4,0 m	2,50	5,00	7,50	10,00	12,50	15,00	17,50	20,00	22,50	25,00
3,0 m	3,00	6,00	9,00	12,00	15,00	18,00	21,00	24,00	27,00	30,00
2,0 m	3,50	7,00	10,50	14,00	17,50	21,00	24,50	28,00	31,50	35,00
2,0 m	4,00	8,00	12,00	16,00	20,00	24,00	28,00	32,00	36,00	40,00
9,0 m	4,50	9,00	13,50	18,00	22,50	27,00	31,50	36,00	40,50	45,00
10,0 m	5,00	10,00	15,00	20,00	25,00	30,00	35,00	40,00	45,00	50,00

Fig. I — Linear expansion ΔL in mm.

Calculating the length variation:

The following example clarifies the method of caculation.
Example for a 9 meter pipe with a predicted temperature of +16˚C:

1. Minimum temperature of pipe walls = +8˚C (for instance for cold water pipes) difference Dt = 16˚C -8˚C = 8˚C

2. Maximum temperature of pipe walls = + 70˚C (for instance hot water pipes) difference Dt = 70˚C - 16˚C = 54˚C

In the first case: contraction pipe = 9 m. x 8˚C x 0.15 = 10.8 mm.
In the second case : expansion pipe = 9m. x 54˚C 0.15 = 72.9 mm.
In most cases the length variation can be compensated by changing the direction of the pipe.
Attention must be given to the fact that pipes must be free to move along their axial direction.
If compansion cannot be achieved through a change of direction, expansion curves will have to be installed.
Axial Compensators are generally not adapted for this purpose, besides they are expensive.
In order to achieve compensation, one needs to caculate the length of the curve arm of the pipe.
The folowing formula can be used for caculation:
$LB = C. \sqrt{d. \Delta.L}$ (mm.)

in which :
LB = length of the arm (mm.)
d = outside diameter pipe (mm.)
ΔL = length variation (mm.)
C = Constant, depending on which material is used (PP = 30)

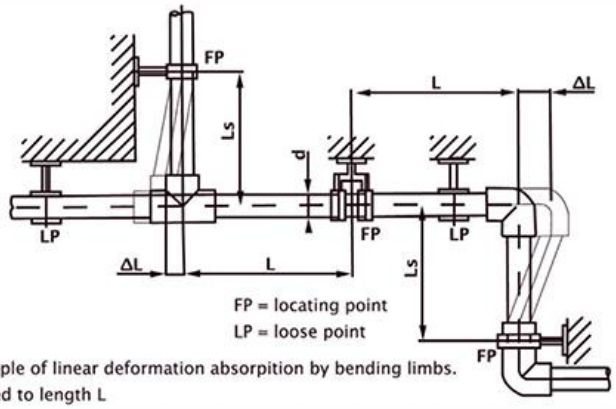
Linear extension compension of pp-r pipes

The linear extension of a PP-R pipe can in most of the cases be compensated by a change in direction. with this. see to free mobility of the piping in axial direction. Should linear extension compensation by directalional change not be possible . The fitting in of an expansion bend is required. Axial bellow expension joints are mostly unfit and uneconomical for oplimum resiliency of the pipe the size bending limb is important this calculated by the opposite formula.

$$L_s = C \cdot \sqrt{d \cdot \Delta L} \quad (mm)$$

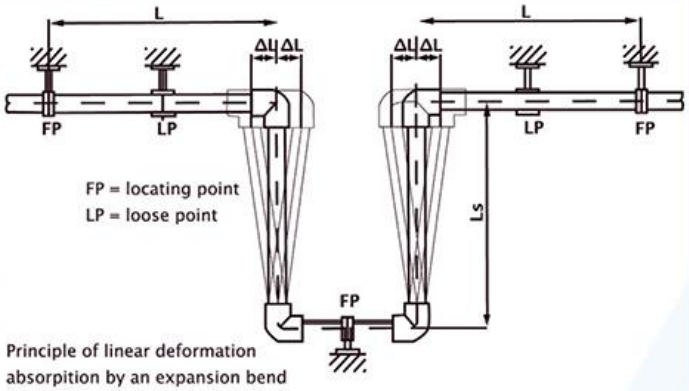
L_s = Length of bending limb (mm)
d = Outside pipe diameter (mm)
DL = Linear deformation (mm)
C = Material depending constant for pp-r = 20

The figures J and K show the effects of the linear deformation and its compension with regard bending limbs LS make sure to chose the correct locating points.



Principle of linear deformation absorpition by bending limbs. related to length L

Fig. J



Principle of linear deformation absorpition by an expansion bend

Fig. K

Construction of expension bends:

Expansion bends can easily be made right at the site.
Beside the required pipe length 4 elbows (8090) or 4 pipe bends (8002a) are needed.
To construct an expansion bend, the bending limb L_s is calculated in dependence on the linear deformation ΔL. As standard value, the L_s value given in the Fig. M diagram can be used.
Spacing B should be at least 10 • d.

Expansion bend, made of pipe and 90° elbow. See (Fig. L)

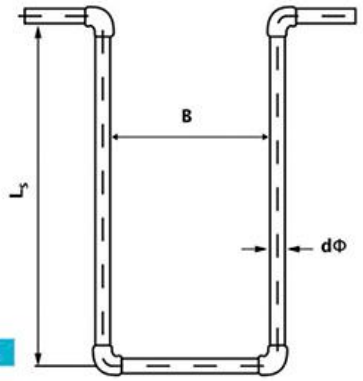


Fig. L

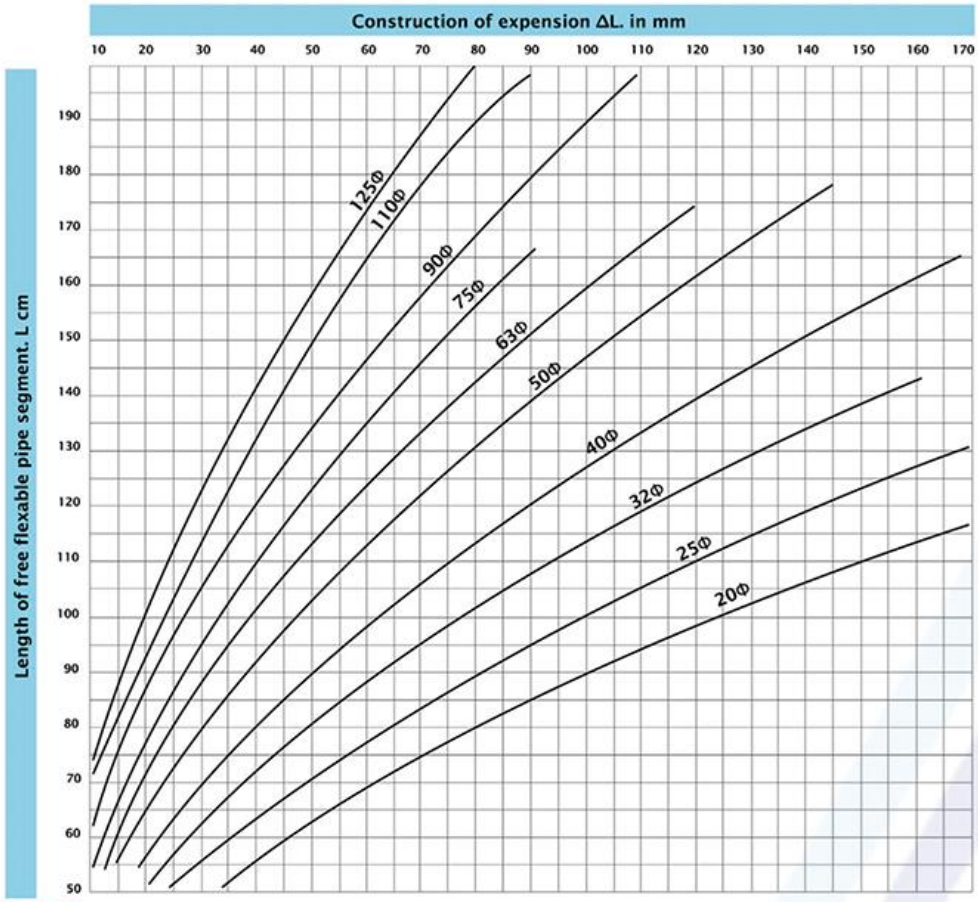


Fig. M

Connection Between Fittings and Metal Tubes

In order to connect a fitting to an iron installation, it is better to use a male threaded fitting, inserting an additional metal coupling. It would be dangerous to use a female threaded fitting to realize the connection (fig. N).

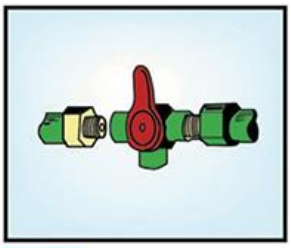


Fig. N

Connection Between Fittings and Embedded Taps

In order to join an embedded tap a PP-R pipe, only male fitting must be used.
Do not use female threaded fitting and tapered nipples (Fig.O).

Fig. O

Pressure Test

After installing Suitable PP-R piping system, it is necessary to go through a pressure test. Unlike metal pipes, Suitable PP-R pipe like all other plastic pipe systems has to follow different pressure test procedure owing to their mechanical properties of expansion when subject to pressure, temperature difference and coefficient of expansion.

A change in temperature of 10 ° C corresponds to a pressure change of 0.5-1.0 bar.
Thus, the test medium shall as far as possible, be kept at a constant temperature throughout the test.

Test Procedure (According to DIN 1988 Part 2 or BS 6700: 1977)

Preparation for Filling Testing the System

For pressure testing, pressure gauges that allow reading of changes in pressure of 0.1 bar shall be used fitted at the lowest possible point in the system. Pressure testing for leakages must be conducted while pipe works are still accessible and before concealing or plastering. Finished pipe work must be completely fitted with filtered water and vented.

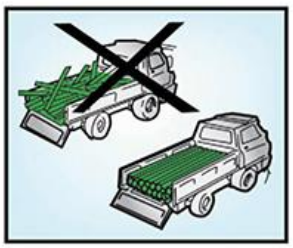
Procedure

After pipe work is filled with water and completely vented to release air locks in the system, testing can begin:

1.Test pressure = (permissible working pressure + 5 bar) shall be produced 2 times within 30 minutes at 10 minute intervals. Note: restore by hand pump to required test pressure after the 10 minute interval if the pressure drops. If leakage is detected, rectify the leakage are and repeat procedure. 2.If no leakage is detected, for the next 30 minutes, check if the pressure has dropped by more than 0.6 bars and if there is any visible signs of leakage. Note: If leakage is detected, rectify the leakage area and repeat procedure. If pressure drops by more than 0.6 bars within this period, leakage must have occurred. Detect and rectify. 3.If pressure drop is within 0.6 bar and no leakage detected, continue the test without restoring the required pressure for the next 120 minutes. During this time, it shall be checked if the pressure drop is more than 0.2 bars and no leakage is detected. Note: If leakage is detected, rectify the leakage area and repeat procedure. If pressure drops by more than 0.2 bars within this period, leakage must have occurred. Detect, rectify and repeat procedure. 4.Pressure test is successful when the entire above are met and the readings should be recorded.

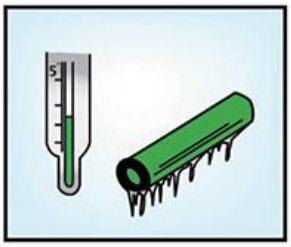
Transportation

During the various working phases, the surface of may be exposed nicks or cuts. In order to avoid dangerous situations due to possible cuts, all handling must be made with the upmost care. It is strongly prohibited to install damaged pipes or fittings.



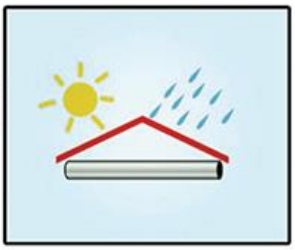
Low Temperatures

When temperatures get close to 0°C, tend to become more fragile. Whenever working at low temperatures, it is advised to be extra careful during all the working phases (as was mentioned earlier, special attention should be paid when cutting the pipes). It is generally recommended to empty the pipes whenever water might freeze. In case of a significant volume increase, the installation is more likely to break.



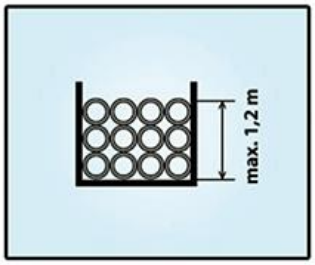
Exposure to UV Rays

is a new product which was designed and built to be used for years. Although the material is adequately stabilized, it nonetheless fears UV rays; therefore it is advised to avoid installing PP-R pipes in areas that are exposed to sunrays without proper protection. The system components must be protected against ultraviolet radiation, weather and contamination. UV radiation is damaging to polypropylene.Long – term exposure to sunlight can degrade the operating properties of the system. When the elements are stored in outdoors area or installed unprotected on outdoor wall surface, they must be taken to indoor storage or be covered with a suitable insulation black coated pipes only can be used when sunrays introduced.

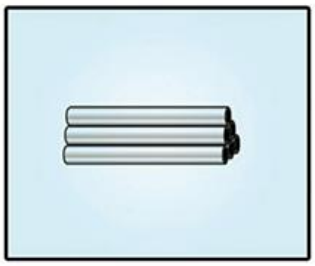


Storage Instructions

Plastic pipe and fittings are usually stored in sacks or on palettes or are freely loaded in boxes, containers, baskets, etc. Maximum storage height of 1.5 m must be respected if plastic pipes are kept in plastic sleeves and/or pipe fittings in plastic sacks. Different types of pipes and fittings are stored separately.



When stacked Plastic pipes must be supported along their whole length or protected against deflection in another suitable way.



The pipes are put into protective covers (pipes in polyethylene bags, pipe fittings also in sacks or cardboard boxes) and it is recommended to let them stay in there as long as possible before the installation works start (as a protection against dirt).

Handling

- Handle pipes with core , and avoid hard impact at the end of the pipes
- Use suitable sharp cutting loads to cut the pipe with no burrs
- Do not twist the pipe or the fitting after joining together. Alignment up to 5 degrees relative to the axis of the pipe can be done immediately after joining
- Use Teflon sealing tapes where necessary
- Avoid heavy and sharp load on the pipe
- Follow the instruction for joining process
- Always protect the pipes from direct exposure to sunlight by proper insulation or printing

Registration Certificate

This is to certify that the management system of

Ak Arkan Plast

have been assessed by AJA EGYPT and registered against the requirements of

ISO 9001:2015

Scope of Registration

Production of (PVC & PPR) Pipes & Fittings.

Sites Registered

Plot Number 17, Block 12002, North Extension, Industrial Zone, El Obour City, Al Qaliyubia, Egypt.

Certificate Number:	AJAEG/22/10038Q	Date Original Registration:	12th October 2022
Expiry Date:	11th October 2025	Date of Re-registration:	N/A
Previous Expiry Date:	N/A	Next Re-Audit Due Date:	11th September 2025
Revision Date:	N/A	EAC:	14

Operation Manager, AJA EGYPT

EGAC Accredited QMS Certification CAB # 012207

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

AJA

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