Since 1967
ASUNG Plastic Valve
Clean Flow Tech

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ASUNG

PVDF pipe & fitting

November 2019
Vol. 001

Since
1967

ROCKSOLID

KYNAR BY ARKEMA

Since **1967**

ASUNG of the World

- **South Korea**
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- **Africa**
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Contents

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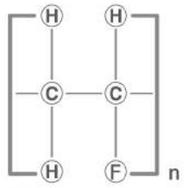
PVDF Pipe and Fittings

PVDF
Pipe and Fittings

PVDF (PolyVinyLidene Fluoride)

PVDF(Poly Vinylidene Fluoride) has the highest chemical resistance and heat resistance among PLASTIC materials of the fluorine-containing thermoplastics group, known as PTFE. PVDF material is widely used in various industries, particularly in manufacturing environments that use chemicals, such as sulfuric acid, hydrofluoric acid, and chlorine gas.



PVDF molecular structure

Features

1.Heat resistance, cold resistance

PVDF has excellent heat and cold resistance among PLASTIC materials and can be used at temperatures ranging from -40 ℃ to + 120 ℃ (based on water), depending on chemicals.

2.Chemical resistance

It is a material belonging to the fluorine-containing thermoplastic resin group. Due to the fluorine element, it has a chemical structure that is safer than other materials and can be used for highly toxic drugs.

3.Mechanical strength

The material is extremely durable with excellent tensile strength and shock absorption.

4.Ultra-pure water line

PVDF has a smooth, mirror-like surface on which microorganisms cannot grow. Due to its very low leaching of heavy metals, PVDF is widely applied for ultra-pure water used in the semiconductor industry, together with CLEAN PVC.

General property of PVDF

Item	Test method	Unit	PVDF
Gravity	ASTM D 792	-	1.78
Absorption rate	ASTM D 570	%	0.05
Tensile strength	ASTM D 638	kgf/cm²	560
Elongation	ASTM D 638	%	50
Flexural strength	ASTM D 790	kg/cm²	856
Impact strength	ASTM D 256	kgf/cm²	10~20
Fusion point	DIN 53 736	℃	177
VICAT Softening point	-	℃	145
Electrical resistance coefficient	ASTM D 177	W/km	0.19
Coefficient of liner expansion	ASTM 696	$℃^{-1}$	$12X10^{-5}$
Voltage withstand	ASTM D 149	KV/mm	40

Property comparison table of PLASTIC used for PIPE and FITTING

Service temperature and range of corrosion resistance

	Service temperature range								
	-40	-20	-10	60	85	90	100	105	120
PVC	X	X	△	O	X	X	X	X	X
PP	X	O	O	O	O	O	X	X	X
PPG	X	O	O	O	O	O	O	X	X
CPVC	X	O	O	O	O	O	X	X	X
PVDF	O	O	O	O	O	O	O	O	O

	Corrosion-resistance range							
	Weak acid	Strong acid	Oxidation component	Mixed acid	Weak alkaline	Strong alkaline	Organic solvent	Corrosive gas
PVC	O	O	O	O	O	O	X	X
PP	O	O	△	△	O	O	X	X
PPG	O	O	O	O	O	O	X	O
CPVC	O	O	O	O	O	O	X	O
PVDF	O	O	O	O	O	O	O	O

+ For more details, please refer to the CHEMICAL RESISTANCE ON ASUNG VALVE booklet.

PVDF
Pipe and Fittings

Property comparison table of PLASTIC used for PIPE and FITTING

O-Ring

		Service temperature range								
		-40	-20	-10	60	85	90	100	105	120~140
	Natural rubber	△	O	O	△	-	-	-	-	-
Synthetic rubber	CR, NBR	△	O	O	O	O	X	-	-	-
Synthetic rubber	EPDM, FPM	O	O	O	O	O	O	△	-	-
	PTFE	O	O	O	O	O	O	O	O	O

		Corrosion-resistance range								
		Weak acid	Strong acid	Oxidation component	Mixed acid	Weak alkaline	Strong alkaline	Organic solvent	Organic acid solvent	Corrosive gas
	Natural rubber	O	X	X	X	O	△	X	X	X
Synthetic rubber	CR, NBR	O	△	X	△	O	O	X	△	△
Synthetic rubber	EPDM, FPM	O	△	△	O	O	O	X	△	△
	PTFE	O	O	O	O	O	O	O	O	O

O : Usable △ : Usable on occasion X : Do not use

Comparison of Mechanical Properties

material / Special	UPVC	CPVC	PPH	PPG	PVDF	Test method
Tensile strength (kgf/cm²) (lb/in²)	500~550 (7,100~7,820)	500~550 (7,100~7,820)	300~350 (4,570~4,980)	700~750 (9,960~10,670)	500~600 (7,110~8,530)	ASTM D 638
Impact strength (kgf/cm²)	3~5	7~10	4~5	6~8	10~20	ASTM D 256
Coefficient of thermal expansion (10⁻⁵/℃)	6~8	6~8	11~12	4~5	11~12	ASTM D 696
Max. application temperature ℃(℉)	60(140)	90(195)	90(195)	100(210)	120(250)	

Piping method

1. Support gap

ASUNG PVDF PIPE has a narrower support interval than metal pipes, e.g. hard vinyl chloride pipes.
Please refer to the following table for support spacing of each nominal diameter.

unit : m

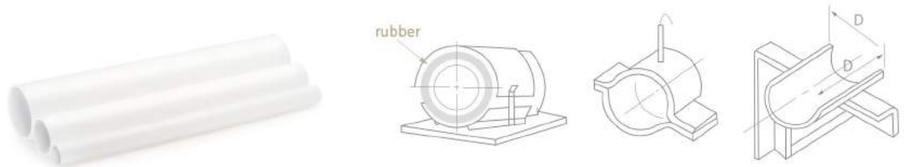
Temperature(℃)	Fluid \ Nominal diameter	16	20	25	40	50	65	80	100	125	150	200	250	300
Room temperature	Liquid	1.0	1.0	1.3	1.4	1.5	1.7	1.8	2.0	2.5	2.5	2.9	3.0	3.6
	Gaseous body	1.2	1.5	1.7	2.0	2.3	2.5	2.8	3.0	3.5	4.0	4.5	5.0	5.5
60	Liquid	0.7	0.8	0.9	1.0	1.1	1.2	1.4	1.6	1.7	1.8	2.1	2.2	2.5
	Gaseous body	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.5	3.0	3.1	3.5	3.9
80	Liquid	0.7	0.8	0.8	0.9	1.0	1.0	1.2	1.4	1.5	1.7	1.9	2.0	2.3
	Gaseous body	0.9	0.9	1.1	1.2	1.4	1.6	1.8	2.0	2.4	2.6	2.8	3.2	3.5
100	Liquid	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.2
	Gaseous body	0.8	0.8	1.0	1.3	1.3	1.5	1.7	1.9	2.2	2.3	2.4	3.0	3.3

* The above table assumes the room temperature at 30 ℃ except for indoor piping.

2. Support location

PIPE support positions are common to all PIPEs, but they tend to be concentrated on the dynamic loading line (pulsations, vibrations, and shocks), which need intensive check.

To support PIPE, use a shaft or PIPE band. The pressing band should be longer. Applying buffer materials in the band so as not to damage PIPE is recommended.

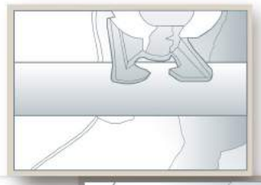


3. Handling and storage

Handling : - Be careful not to drop PVDF pipe during transportation or allow impact from tools during construction.

Storage : - When stored for long periods, keep the product on a level surface with good ventilation and no direct sunlight.
- When stored using sleepers, it is recommended using 5-6 sleepers to avoid PIPE from bending.
- Stacking in the open air is not recommended as of yet. If necessary, however, avoid direct pipe contact to the floor and protrusions, and direct sunlight.

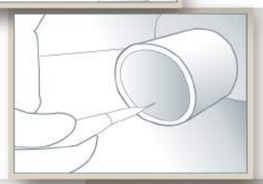
Work specification of PVDF welding piping



1. Cutting

Cut the PIPE at right angles and check the cut.

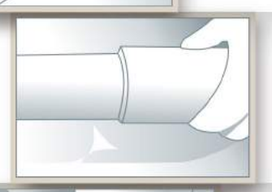
* Cut using cutting tools (wheel type, ratchet type, saw) or cast iron cutter



2. Chamfering (rounding)

Chamfer (rounding) the outer diameter of PIPE to 10° - 15°.

* Remove burr generated when chamfering



3. Insertion

Insert the chamfered PIPE to the FITTING and push all the way in

4. Temporary welding

Weld PIPE and FITTING by setting air temperature of the heating gun to 230℃ - 250℃.

* Temporary welding is to facilitate the main welding by lightly attaching the joint section to be welded.

5. The main welding

Maintain hot air temperature and ensure welding rod is at an angle of 60°-90°. Press it while welding.

After welding 1 welding rod, weld 2 welding rods on top in sequence.

* If the welding rod is burned or not welded during the main welding, piping failure may occur. Check if the temperature is correct.

*** Precaution ***

- When welding, PIPE, FITTING and welding rod should be made of the same material and from the same manufacturer.
- PLASTIC PIPE & FITTING welding should be performed by a trained welder.
- The nozzle tip end should be welded while turning the nozzle spirally at a distance of 3 - 5mm from the welding surface of the basic material.
- Hot air temperature may vary depending on the work environment and welding products

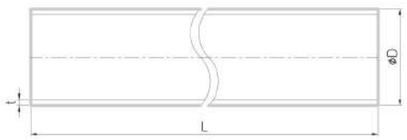
KYNAR BY ARKEMA

PVDF (PolyVinyLidene Fluoride)
Pipe & Fitting Product Systems

ROCKSOLID

PVDF
Pipe and Fittings

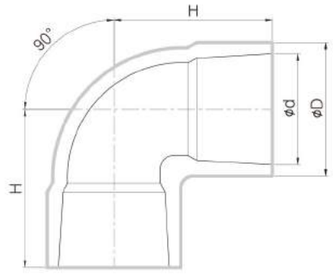
PIPE



DIMENSION
unit : mm

NOMINAL SIZE	D	t	L
15A	22	1.9	
20A	26	1.9	
25A	32	2.4	
32A	38	2.4	
40A	48	3.0	4,000
50A	60	3.0	
65A	76	3.6	
80A	89	4.3	
100A	114	5.3	

90° ELBOW

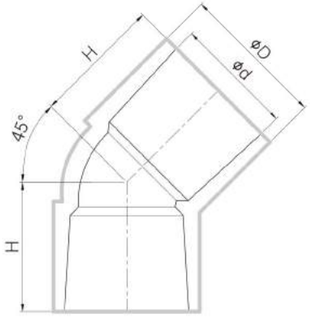


DIMENSION
unit : mm

NOMINAL SIZE	D	d	H
15A	30	22.4	38
20A	36	26.4	41
25A	42	32.4	51
32A	51	38.5	57
40A	60	48.5	64
50A	74	60.5	76
65A	89	76.8	88
80A	105	89.8	100
100A	130	114.9	119

PVDF
Pipe and Fittings

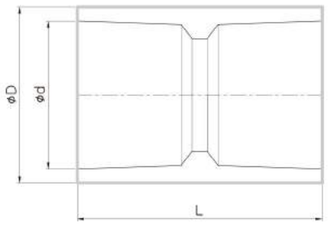
45°ELBOW



DIMENSION
unit : mm

NOMINAL SIZE	D	d	H
15A	29	22.4	34
20A	35	26.4	38
25A	42	32.4	45
32A	50	38.4	52
40A	62	48.5	63
50A	75	60.5	67
65A	90	76.8	76
80A	103	89.8	85
100A	130	114.9	116

SOCKET

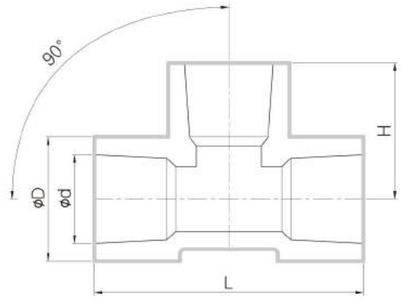


DIMENSION
unit : mm

NOMINAL SIZE	D	d	L
15A	30	22.4	53
20A	34	26.4	57
25A	42	32.4	62
32A	51	38.5	72
40A	59	48.5	75
50A	72	60.5	84
65A	91	76.8	111
80A	105	89.8	120
100A	130	114.9	125

PVDF
Pipe and Fittings

TEE

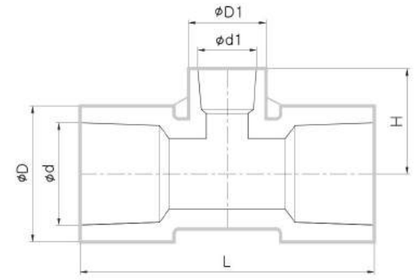


DIMENSION

unit : mm

NOMINAL SIZE	D	d	H	L
15A	30	22.4	37.0	74
20A	36	26.4	40.5	81
25A	44	32.4	49.0	97
32A	51	38.5	55.5	110
40A	61	48.5	61.5	121
50A	74	60.5	71.0	140
65A	88	76.8	89.0	176
80A	105	89.8	99.5	208
100A	132	114.9	132.5	259

REDUCER TEE



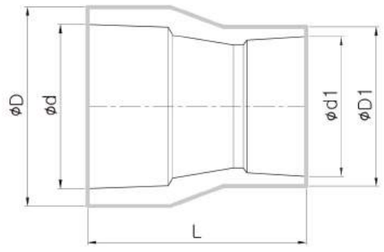
DIMENSION

unit : mm

NOMINAL SIZE	D	d	D1	d1	H	L
20Ax15A	36	26.4	30	22.4	40	80
25Ax15A	44	32.4	30	22.4	48	96
25Ax20A	44	32.4	36	26.4	48	96
32Ax25A	52	38.5	44	32.4	55	109
40Ax15A	61	48.5	30	22.4	59	120
40Ax20A	61	48.5	36	26.4	59	120
40Ax25A	61	48.5	44	32.4	59	120
40Ax32A	61	48.5	50	38.5	59	120
50Ax15A	71	60.5	28	22.4	66	139
50Ax20A	71	60.5	34	26.4	66	139
50Ax25A	74	60.5	44	32.4	69	140
50Ax40A	74	60.5	61	48.5	69	140
65Ax40A	88	76.8	59	48.5	90	175
65Ax50A	88	76.8	74	60.5	90	175
80Ax40A	105	89.8	61	48.5	86	209
80Ax50A	105	89.8	74	60.5	93	209
80Ax65A	105	89.8	88	76.8	93	209
100Ax50A	132	114.9	74	60.5	105	259
100Ax80A	132	114.9	105	89.8	115	259

PVDF
Pipe and Fittings

REDUCER

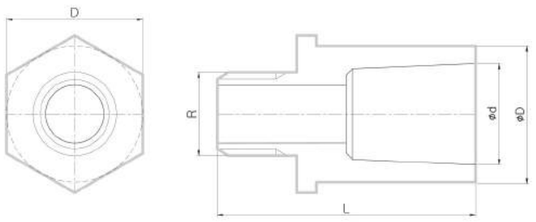


DIMENSION

unit : mm

NOMINAL SIZE	D	d	D1	d1	L
20Ax15A	33	26.4	28	22.4	55
25Ax15A	40	32.4	28	22.4	65
25Ax20A	40	32.4	33	26.4	65
32Ax25A	52	38.5	40	32.4	74
40Ax20A	58	48.5	33	26.4	75
40Ax25A	58	48.5	40	32.4	75
40Ax32A	58	48.5	52	38.5	77
50Ax25A	72	60.5	40	32.4	77
50Ax40A	72	60.5	58	48.5	92
65Ax50A	89	76.8	72	60.5	106
80Ax50A	104	89.8	72	60.5	106
80Ax65A	104	89.8	89	76.8	100
100Ax50A	132	114.9	72	60.5	110
100Ax80A	132	114.9	104	89.8	126

VALVE SOCKET



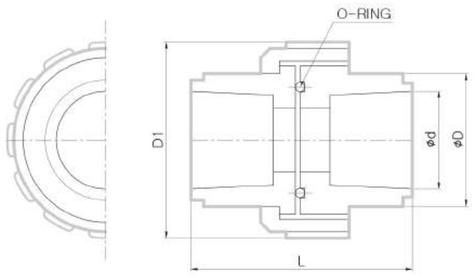
DIMENSION

unit : mm

NOMINAL SIZE	D	d	L	R
15A	29	22.4	46	R ½"
20A	33	26.4	54	R ¾"
25A	40	32.4	59	R 1"
32A	51	38.5	67	R 1-¼"
40A	57	48.5	75	R 1-½"
50A	70	60.5	86	R 2"

PVDF
Pipe and Fittings

UNION (SOCKET TYPE)

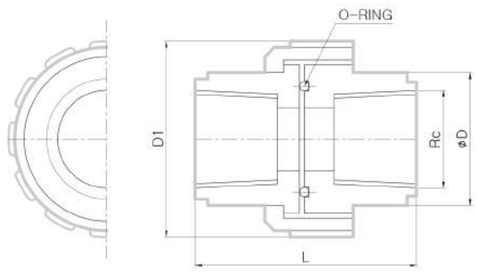


DIMENSION

unit : mm

NOMINAL SIZE	D	d	D1	L
15A	30	22.4	49	59
20A	36	26.4	60	68
25A	46	32.4	70	86
32A	54	38.5	80	84
40A	65	48.5	97	102
50A	75	60.5	106	114
65A	89	76.8	132	121
80A	105	89.8	153	148
100A	136	114.9	204	167

UNION (THREAD TYPE)



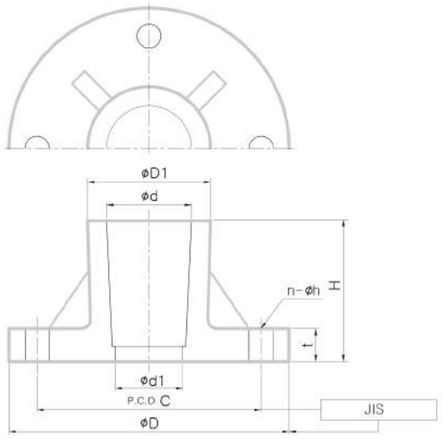
DIMENSION (JIS)

unit : mm

NOMINAL SIZE	D	L	D1	Rc
15A	32	48	49	Rc ½"
20A	38	56	60	Rc ¾"
25A	48	66	70	Rc 1"
32A	58	71	80	Rc 1-¼"
40A	67	84	97	Rc 1-½"
50A	78	94	106	Rc 2"
65A	89	121	132	Rc 2-½"
80A	105	148	153	Rc 3"
100A	136	167	204	Rc 4"

PVDF
Pipe and Fittings

TS FLANGE (JIS FLANGE TYPE)

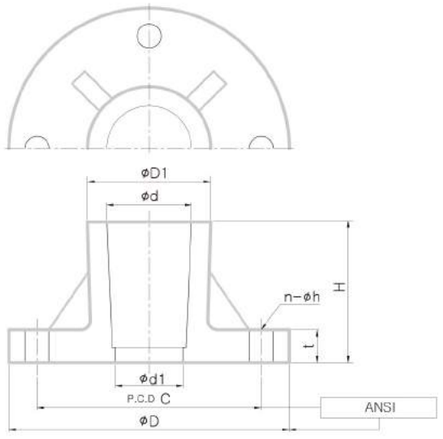


DIMENSION (FLANGE=JIS 10K)

unit : mm

NOMINAL SIZE	D1	d	d1	H	t	JIS 10K		
						D	C	n-h
15A	32	22.4	18	46	14	95	70	4-15
20A	35	26.4	22	46	14	100	75	4-15
25A	44	32.4	25	25	14	125	90	4-19
32A	50	38.5	30	29	14	135	100	4-19
40A	61	48.5	41	35	15	140	105	4-19
50A	74	60.5	52	39	19	175	140	4-19
65A	88	76.8	67	41	20	175	140	4-19
80A	102	89.8	79	49	21	185	150	8-19
100A	129	114.9	99	59	22	210	175	8-19

TS FLANGE (ANSI FLANGE TYPE)



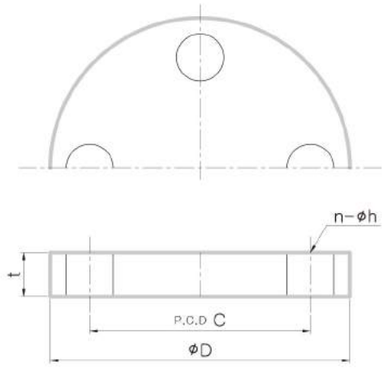
DIMENSION (FLANGE=ANSI)

unit : mm

NOMINAL SIZE	D1	d	d1	H	t	ANSI CLASS 150		
						D	C	n-h
15A	32	22.4	18	46	14	88.9	60.4	4-16
20A	35	26.4	22	46	14	98.6	69.9	4-16
25A	44	32.4	25	25	14	108.0	79.2	4-16
32A	50	38.5	30	29	14	117.3	88.9	4-16
40A	61	48.5	41	35	15	127.0	98.5	4-16
50A	74	60.5	52	39	19	152.4	120.6	4-19
65A	88	76.8	67	41	20	177.8	139.7	4-19
80A	102	89.8	79	49	21	190.5	152.4	4-19
100A	129	114.9	99	59	22	228.6	190.5	8-19

PVDF
Pipe and Fittings

BLIND FLANGE (JIS)

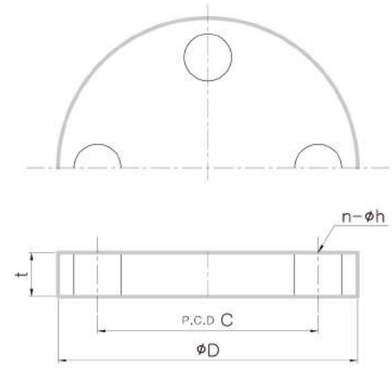


DIMENSION (JIS)

unit : mm

NOMINAL SIZE	JIS 10K			t
	D	C	n-h	
15A	95	70	4-15	14
20A	100	75	4-15	14
25A	125	90	4-19	14
32A	135	100	4-19	15
40A	140	105	4-19	16
50A	155	120	4-19	17
65A	175	140	4-19	20
80A	185	150	8-19	20
100A	210	175	8-19	21

BLIND FLANGE (ANSI)



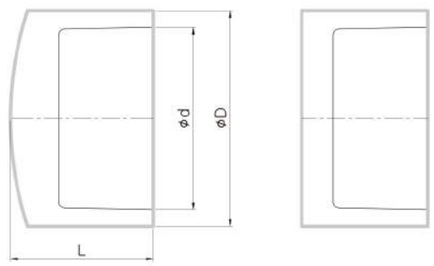
DIMENSION (ANSI)

unit : mm

NOMINAL SIZE		ANSI CLASS 150			t
mm	inch	D	C	n-h	
15A	½"	88.9	60.4	4-16	14
20A	¾"	98.6	69.9	4-16	14
25A	1"	108.0	79.2	4-16	14
32A	1-¼"	117.3	88.9	4-16	15
40A	1-½"	127.0	98.5	4-16	16
50A	2"	152.4	120.6	4-19	17
65A	2-½"	177.8	139.7	4-19	20
80A	3"	190.5	152.4	4-19	20
100A	4"	228.6	190.5	8-19	21

PVDF
Pipe and Fittings

CAP



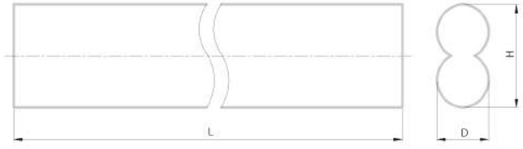
15A ~ 65A

80A ~ 100A

DIMENSION
unit : mm

NOMINAL SIZE	D	d	L
15A	30	22.4	31
20A	34	26.4	36
25A	40	32.4	39
32A	46	38.5	43
40A	58	48.5	48
50A	73	60.5	52
65A	87	76.8	61
80A	105	89.8	64
100A	132	114.9	77

WELDING ROD



DIMENSION
unit : mm

L	D	H
1,000	3	6