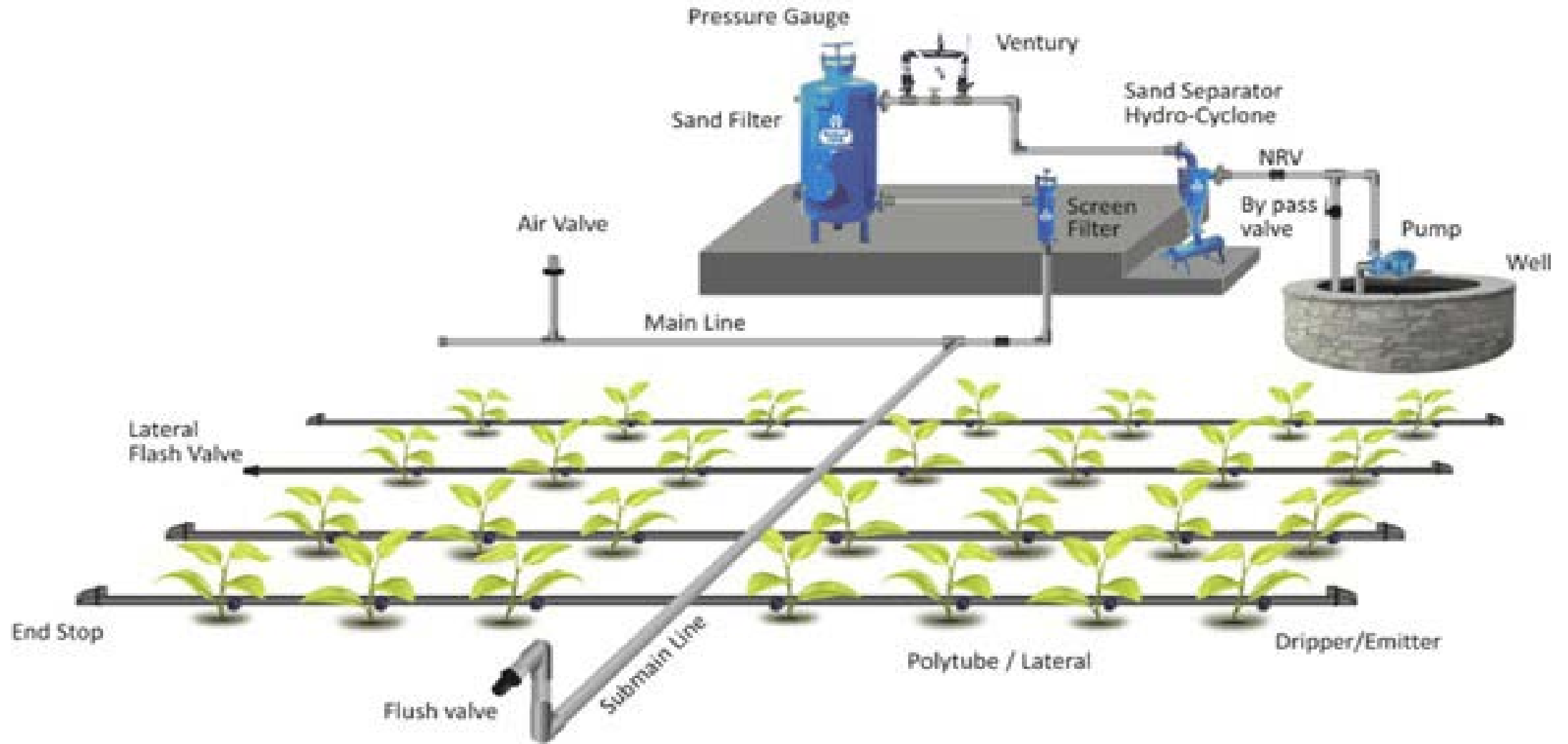# Sprinkler and Micro irrigation Systems

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Prepared by: Er. Duda Balas

IDE-2.4.8

DEPARTMENT OF IRRIGATION AND DRAINAGE ENGINEERING
COLLEGE OF AGRICULTURAL ENGINEERING AND TECHNOLOGY
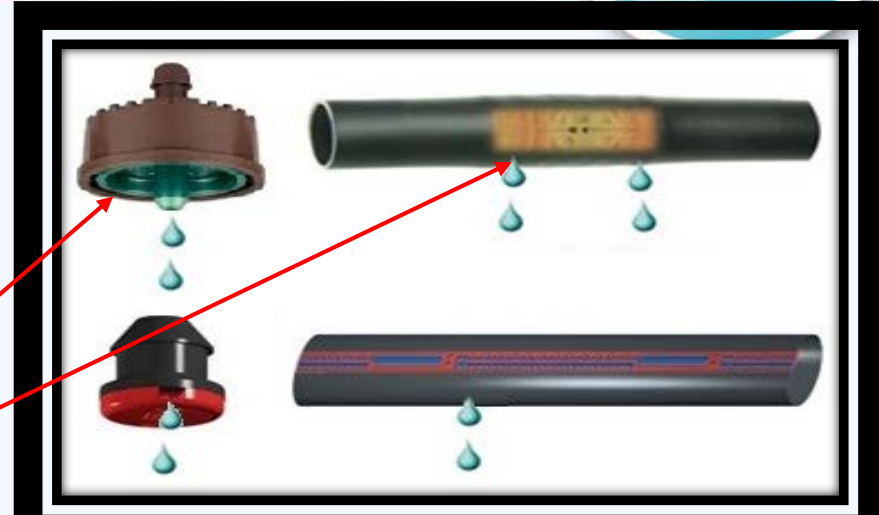ANAND AGRICULTURAL UNIVERSITY
GODHRA - 389001

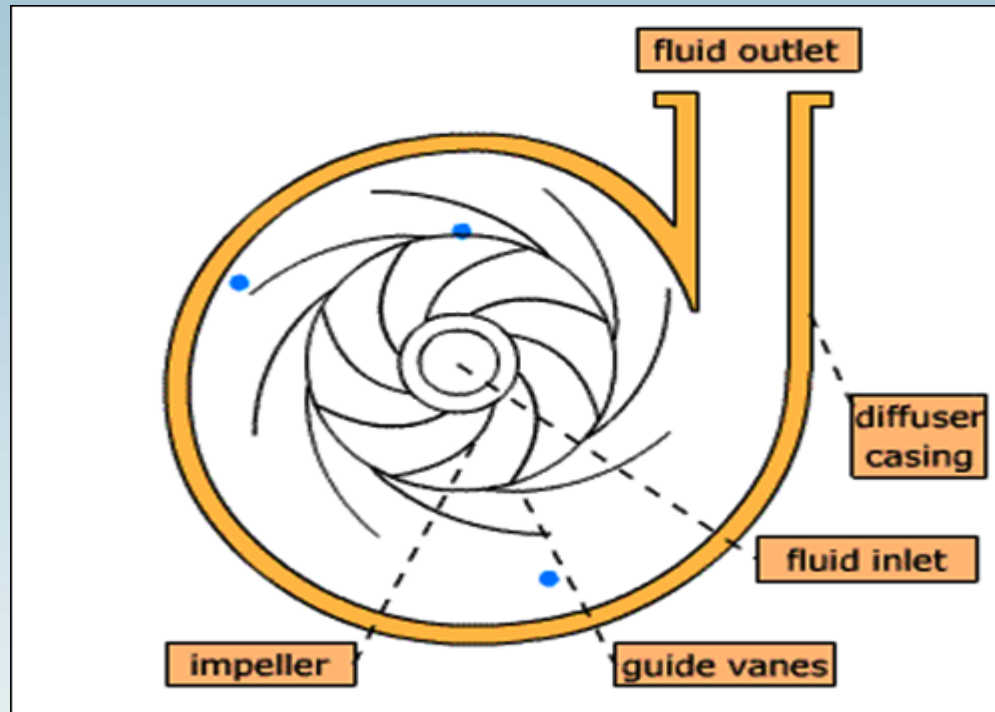# Drip Irrigation Systems' Layout

What is Drip Irrigation

- A drip irrigation is the drop by drop application of water by mechanical device called ***emitter or dripper*** to the soil up to root zone for better crop production is called drip irrigation.
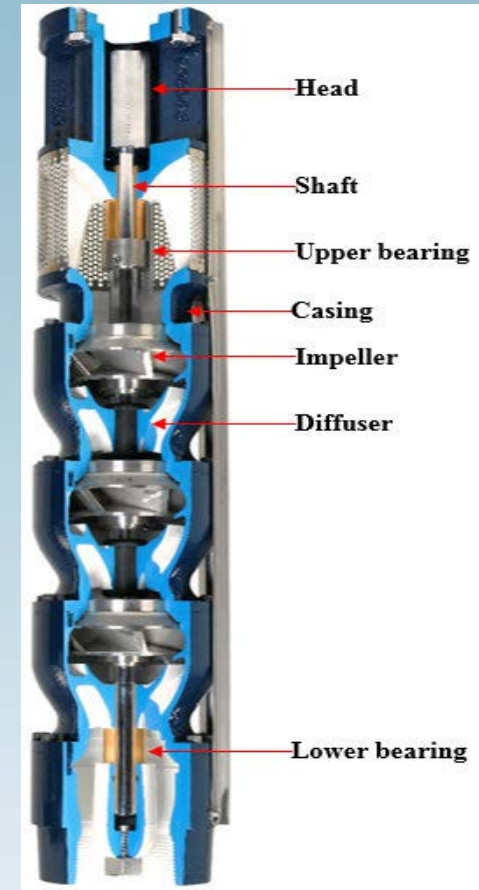
Pump

It is a mechanical device which is used to suck and raised the water by pressure
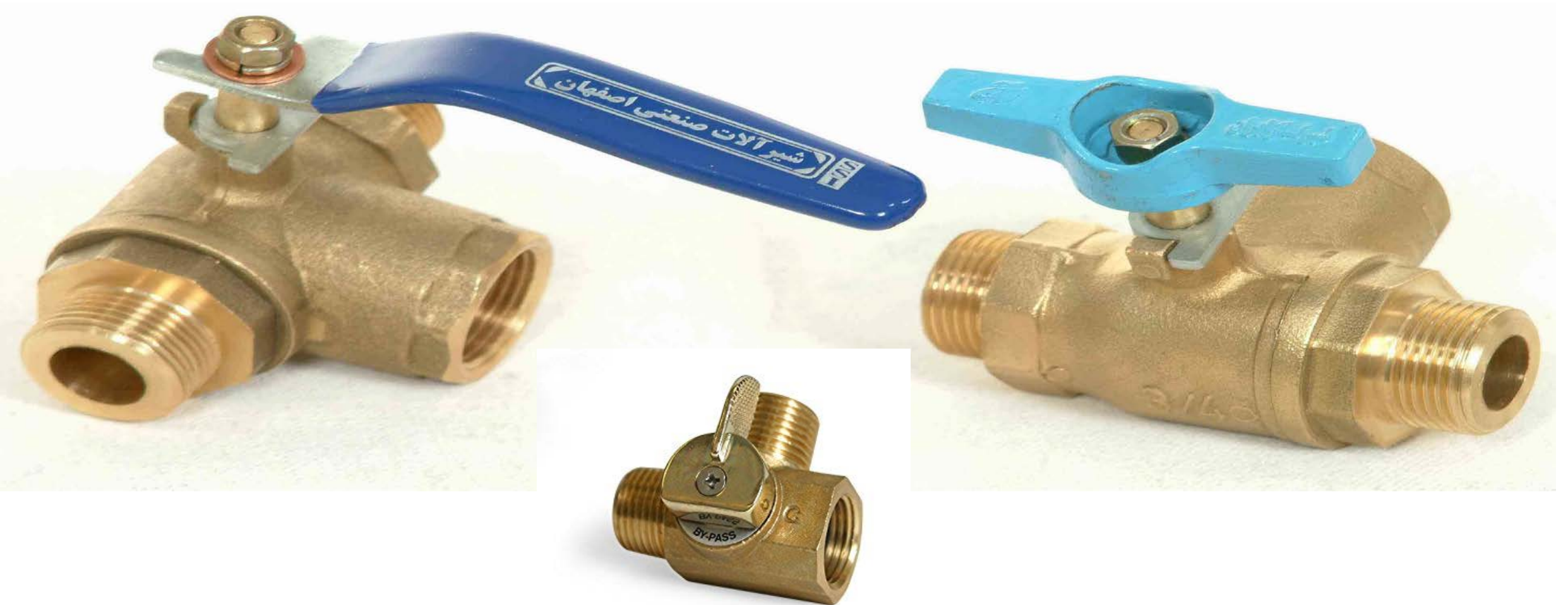

Centrifugal pump

Submersible pump

By pass valves

It is used to divert the excess flow of water to prevent the system from breakage

Non return valve

It is used to prevent the reverse or backward flow of water from pipe

Forward flow

Body   Guide
Spring
Disc

Open Position
Forward Flow

Close Position
Reverse Flow
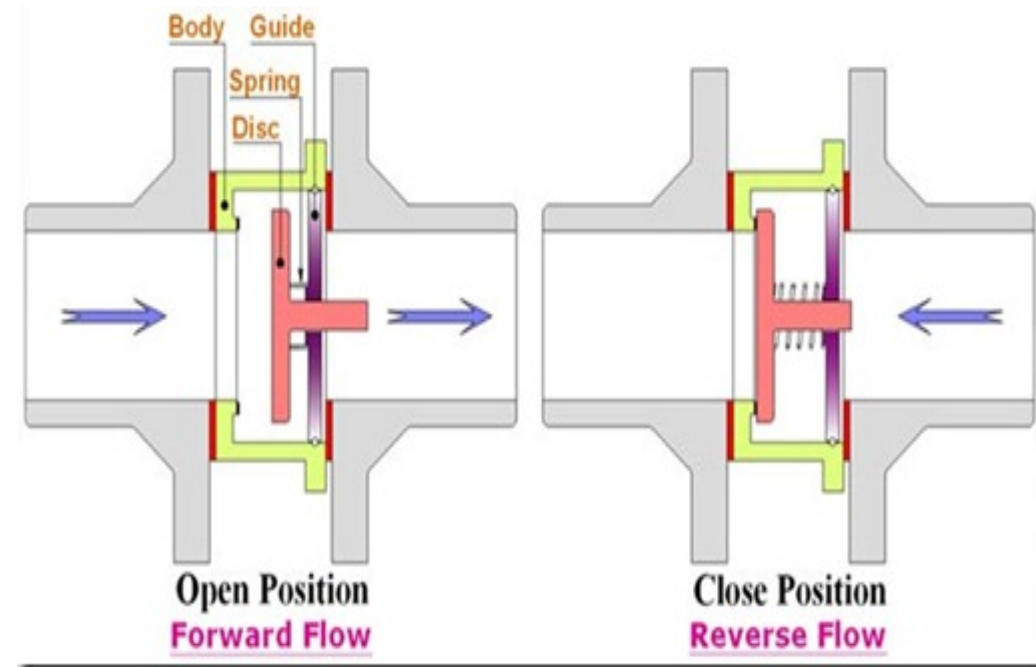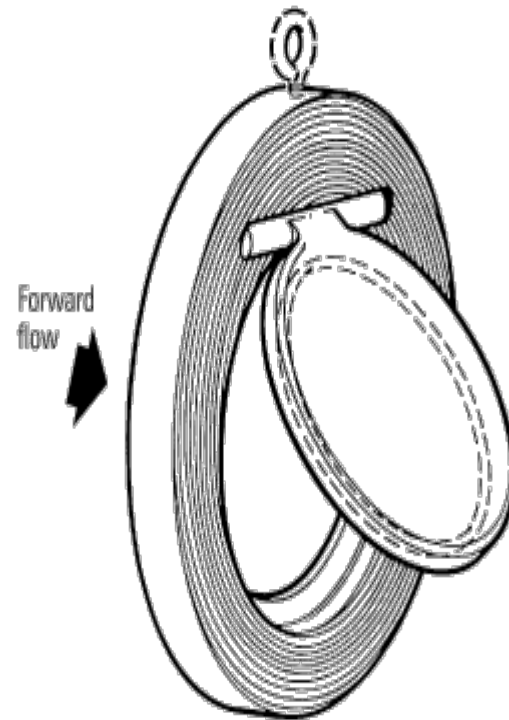
Hydro cyclone/Sand separator filter
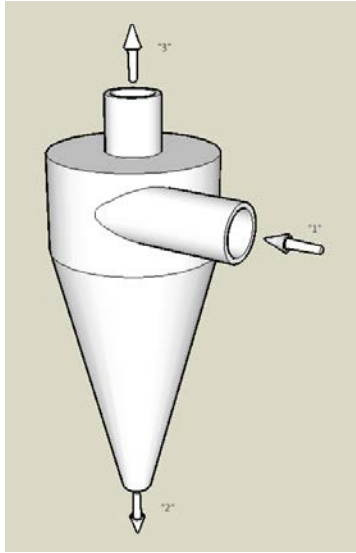
It is used to separate the coarser particles which are heavier than the water e.g. sand and gravel

It's works on the principle of centrifugal force

It is adopted when water source is tube well

It is the primary filter
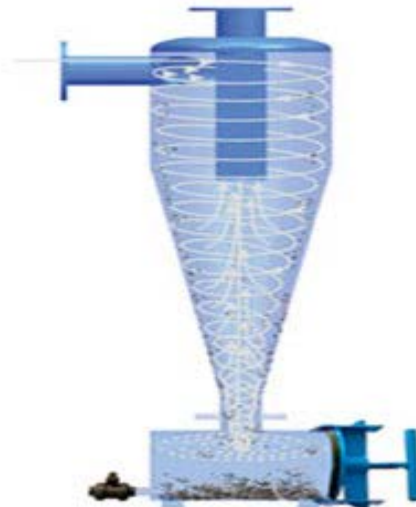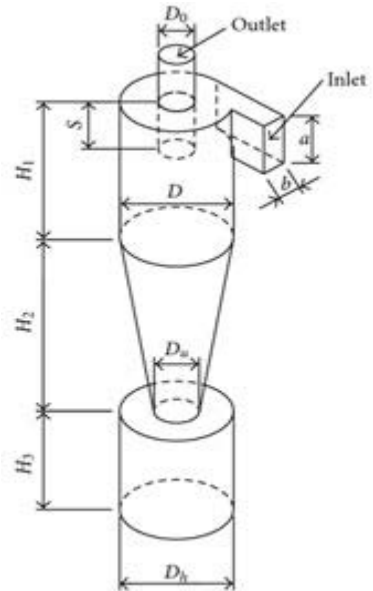
Sand filter/Gravel filter

It is used to separate the impurities present in the water e.g. algae
It is adopted when water source is open in environment e.g. open well, reservoir or sump
It is the secondary filter
It has two types vertical and horizontal
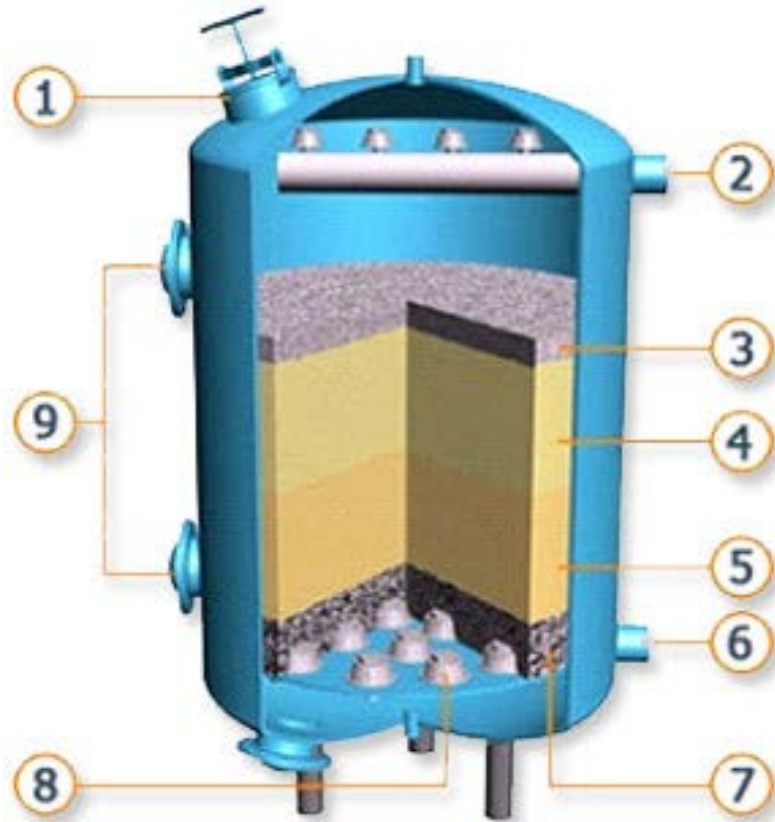
Venturi

It is used to apply the accurate fertilizer doze to the plant
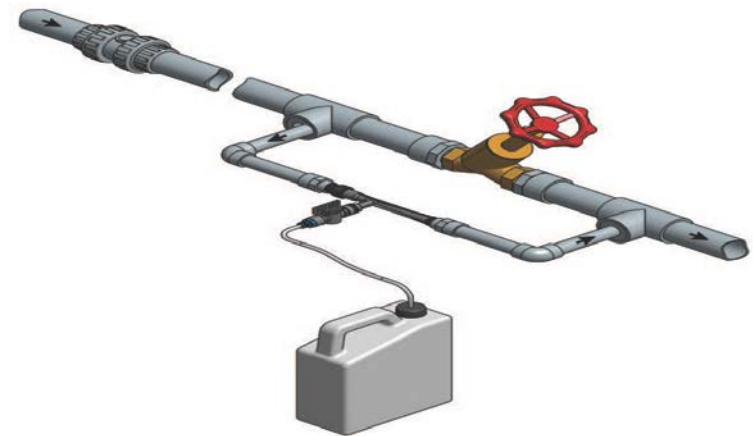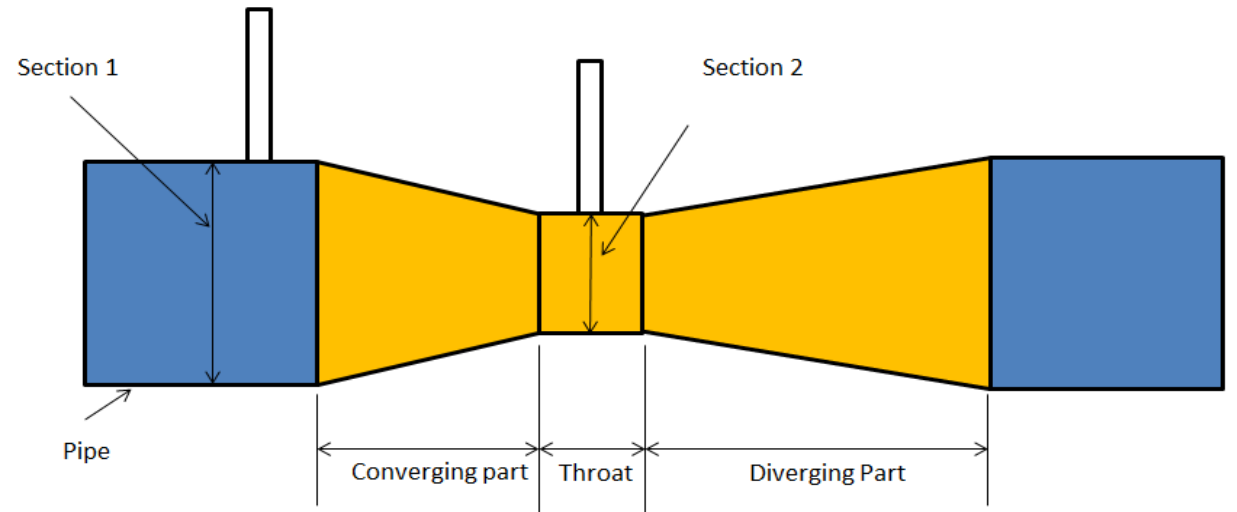
Compulsory filter

It is used to separate the finer particles and impurities present in the water
It is compulsory to adopt in the drip irrigation that's why it is called compulsory filter
It has two types screen and disc

Screen filter
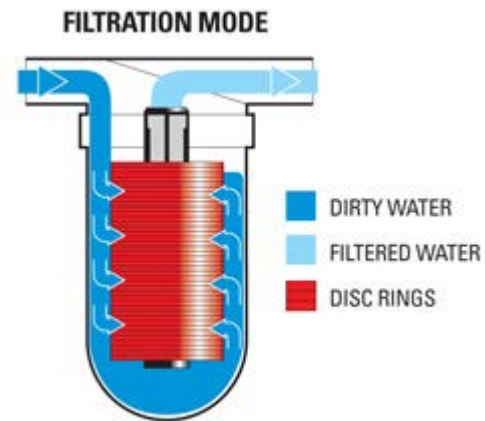
Disc filter

Pipes

Pipes are used to convey the water from water source to the field
It has two types HDPE and PVC

HDPE

PVC

Inline Drip Pipe

➢ Drippers are fitted inside the lateral pipe by manufacturer company
➢ It is used for close growing crop e.g. wheat, maize etc.
➢ Distance between drippers is less than 1 m
➢ It has two types cylindrical and flat

Cylindrical dripper

Flat dripper

Online Drip Pipe

➢ Drippers are fitted on the lateral pipe
➢ It is used for widely spaced crop e.g. mango trees, coconut trees etc. (Horticultural crops)
➢ Distance between drippers is more than 1 m

Accessories

➢ End stop is used to close the end of lateral

8 shape high qulaity pipe ends cap

size: Φ12– Φ25

End stop/cap

➢ ARV is used to remove the air from the system
➢ Fitted on mainline

Air Release Valve(ARV)

➢ Flush valve is used to clean or flush the entire system or to remove the impurities from the system

Flush valves

⬤	Water source
▮	Filtration unit
——	Main line
——→	Sub main
——→ ←——	Lateral
✛	Ball valve
←—	Flush valve

Crop direction (W-E)

1

2

1

3

4

5

6

Friction loss

Table 1: Friction Losses and Velocity in Pipes - RPVC Class II (4kg/cm2) C = 150,

Pressure Loss (m) per 100 mtr of pipe

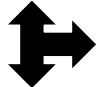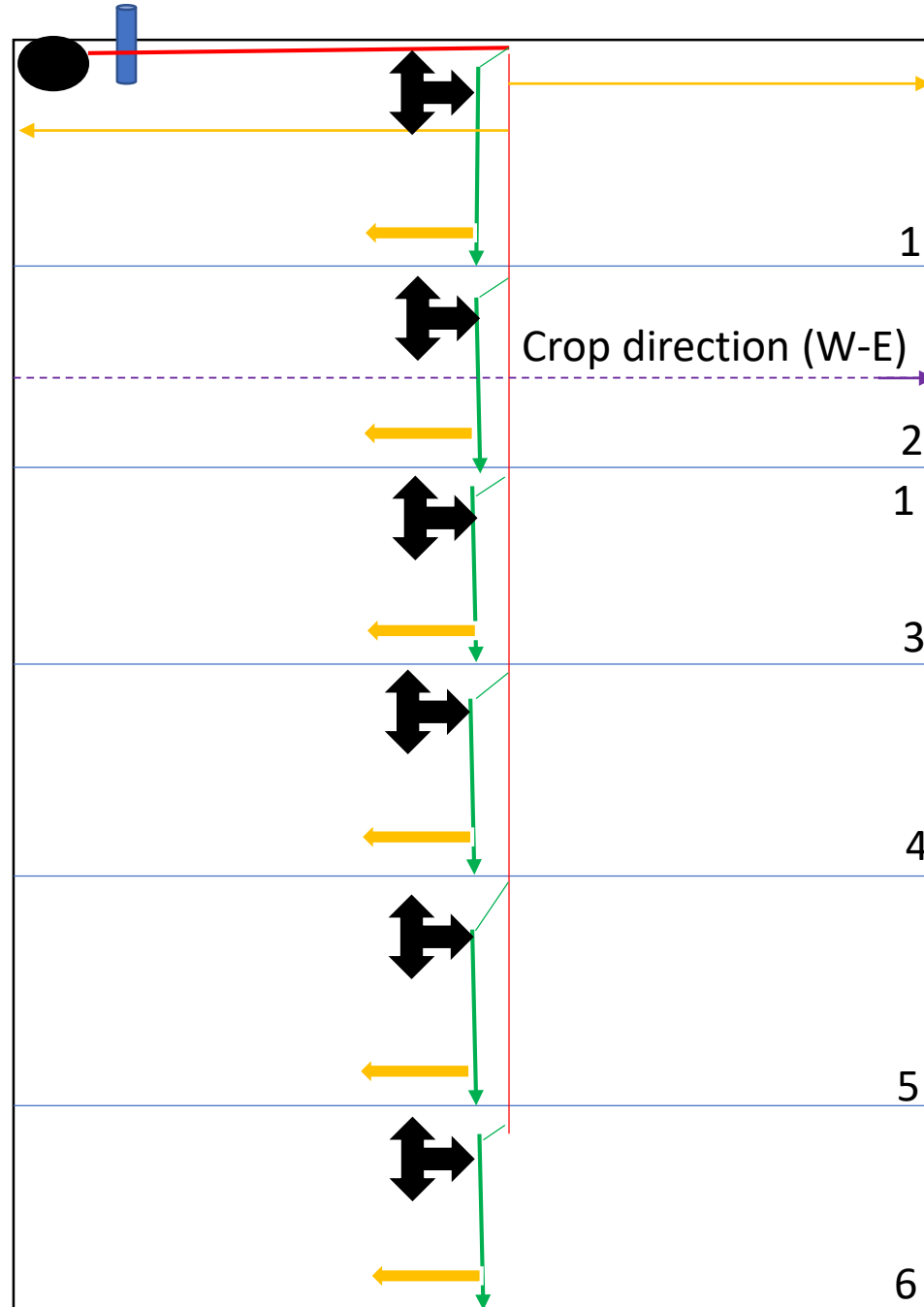| Nom.size	40mm			50mm			63mm			75mm			Nom.size
Pr.Class	6kg/cm2			6kg/cm2			4kg/cm2			4kg/cm2			Pr.Class
Q	Friction		V	Friction		V	Friction		V	Friction		V	Q
Valve Flow	Loss		Velocity	Loss		Velocity	Loss		Velocity	Loss		Velocity	Flow
m3/hr	m		m/sec	m		m/sec	m		m/sec	m		m/sec	m3/hr
	ML	SM		ML	SM		ML	SM		ML	SM		
2	1.13	0.43	0.57										2
3	2.41	0.92	0.86										3
4	4.1	1.56	1.15	1.08	0.41	0.66							4
5	6.19	2.35	1.44	1.63	0.62	0.83							5
6	8.69	3.30	1.72	2.28	0.87	1.00	0.66	0.25	0.6				6
7				3.04	1.16	1.16	0.88	0.33	0.7	0.37	0.14	0.49	7
8				3.88	1.47	1.33	1.12	0.43	0.8	0.48	0.18	0.56	8
9				4.83	1.84	1.49	1.4	0.53	0.9	0.59	0.22	0.63	9
10				5.87	2.23	1.66	1.69	0.64	1.00	0.73	0.28	0.70	10
11							2.02	0.77	1.10	0.87	0.33	0.77	11
12							2.38	0.90	1.20	1.01	0.38	0.84	12
13							2.76	1.05	1.30	1.18	0.45	0.91	13
14							3.17	1.20	1.40	1.35	0.51	0.98	14
15							3.6	1.37	1.49	1.53	0.58	1.05	15
16							4.06	1.54	1.59	1.73	0.66	1.12	16
17							4.53	1.72	1.69	1.94	0.74	1.19	17
18							5.04	1.92	1.79	2.15	0.82	1.26	18
19							5.58	2.12	1.89	2.38	0.90	1.33	19
20							6.13	2.33	1.99	2.62	1.00	1.40	20
21										2.86	1.09	1.47	21
22										3.11	1.18	1.54	22
23										3.39	1.29	1.62	23
24										3.66	1.39	1.69	24
25										3.95	1.50	1.76	25
26										4.25	1.62	1.83	26
27										4.56	1.73	1.9	27
28										4.87	1.85	1.97	28
29										5.2	1.98	2.04	29
30										5.53	2.1014	2.11	30

Table 2: Friction Losses and Velocity in Pipes - RPVC Class II (4kg/cm2) C = 150,

Pressure Loss (m) per 100 mtr of pipe

Nom.size	90mm			110mm			140mm			Nom.size
Pr.Class	4kg/cm2			4kg/cm2			4kg/cm2			Pr.Class
Q	Friction		V	Friction		V	Friction		V	Q
Valve Flow	Loss		Velocity	Loss		Velocity	Loss		Velocity	Flow
m3/hr	m		m/sec	m		m/sec	m		m/sec	m3/hr
	ML	SM		ML	SM		ML	SM		
18	0.88	0.33	0.88							18
19	0.97	0.37	0.92							19
20	1.07	0.41	0.97							20
21	1.17	0.44	1.02							21
22	1.28	0.49	1.07							22
23	1.29	0.49	1.12							23
24	1.5	0.57	1.17							24
25	1.62	0.62	1.22	0.61	0.23	0.81				25
26	1.74	0.66	1.26	0.65	0.25	0.84				26
27	1.86	0.71	1.31	0.69	0.26	0.88				27
28	1.99	0.76	1.36	0.74	0.28	0.91				28
29	2.12	0.81	1.41	0.79	0.30	0.94				29
30	2.27	0.86	1.46	0.85	0.32	0.97	0.26	0.10	0.6	30
31	2.41	0.92	1.51	0.89	0.34	1	0.27	0.10	0.62	31
32	2.55	0.97	1.56	0.95	0.36	1.04	0.3	0.11	0.64	32
33	2.71	1.03	1.61	1	0.38	1.07	0.31	0.12	0.66	33
34	2.86	1.09	1.65	1.07	0.41	1.1	0.33	0.13	0.68	34
35	3.01	1.14	1.7	1.12	0.43	1.13	0.35	0.13	0.7	35
36	3.18	1.21	1.75	1.18	0.45	1.17	0.36	0.14	0.72	36
37	3.34	1.27	1.8	1.24	0.47	1.2	0.39	0.15	0.74	37
38	3.51	1.33	1.85	1.31	0.50	1.23	0.41	0.16	0.76	38
39	3.69	1.40	1.9	1.38	0.52	1.26	0.42	0.16	0.78	39
40	3.86	1.47	1.95	1.44	0.55	1.3	0.44	0.17	0.8	40
41	4.04	1.54	1.99	1.51	0.57	1.33	0.46	0.17	0.82	41
42	4.22	1.60	2.04	1.57	0.60	1.36	0.48	0.18	0.84	42
43	4.41	1.68	2.09	1.64	0.62	1.39	0.51	0.19	0.86	43
44	4.61	1.75	2.14	1.72	0.65	1.43	0.53	0.20	0.88	44
45	4.8	1.82	2.19	1.78	0.68	1.46	0.55	0.21	0.9	45
46	5.01	1.90	2.24	1.86	0.71	1.49	0.57	0.22	0.92	46
47	5.2	1.98	2.29	1.94	0.74	1.52	0.59	0.22	0.94	47
48	5.41	2.06	2.34	2.01	0.76	1.56	0.63	0.24	0.96	48
49	5.62	2.14	2.38	2.09	0.79	1.59	0.65	0.25	0.98	49
50	5.83	2.22	2.43	2.17	0.82	1.62	0.67	0.25	1	50
51				2.26	0.86	1.65	0.69	0.26	1.02	51
52				2.33	0.89	1.69	0.73	0.28	1.04	52
53				2.42	0.92	1.72	0.75	0.29	1.06	53
54				2.51	0.95	1.75	0.77	0.29	1.08	54
55				2.59	0.98	1.78	0.8	0.30	1.1	55
56				2.67	1.01	1.82	0.82	0.31	1.12	56
57				2.77	1.05	1.85	0.86	0.33	1.14	57
58				2.86	1.09	1.88	0.88	0.33	1.16	58
59				2.95	1.12	1.91	0.91	0.35	1.18	59
60				3.05	1.16	1.95	0.94	0.36	1.2	60
61							0.97	0.37	1.22	61
62							1.00	0.38	1.24	62
63							1.03	0.39	1.26	63
64							1.06	0.40	1.28	64
65							1.09	0.41	1.3	65
66							1.12	0.43	1.32	66
67							1.16	0.44	1.34	67
68							1.19	0.45	1.36	68
69							1.22	0.46	1.38	69
70							1.25	0.48	1.4	70
71							1.29	0.49	1.42	71
72							1.32	0.50	1.44	72
73							1.35	0.51	1.46	73
74							1.39	0.53	1.48	74
75							1.42	0.54	1.5	75
76							1.45	0.55	1.52	76
77							1.50	0.57	1.54	77
78							1.53	0.58	1.56	78
79							1.56	0.59	1.58	79
80							1.61	0.61	1.6	80
81							1.64	0.62	1.62	81
82							1.67	0.63	1.64	82
83							1.72	0.65	1.66	83