MICRO IRRIGATION SYSTEMS : DRIP IRRIGATION AND SPRINKLER IRRIGATION SYSTEM

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IRRIGATION

Artificial application of water to the crops

- Border Irrigation
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- Furrow Irrigation
- Sprinkler Irrigation
- Drip Irrigation

- Quality of Irrigation Water
- Soil Type
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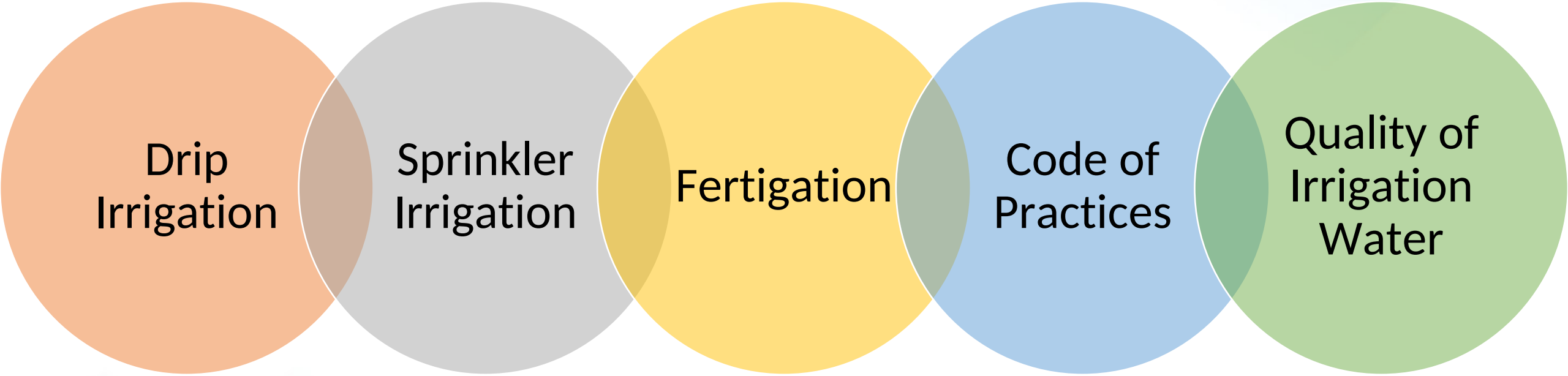
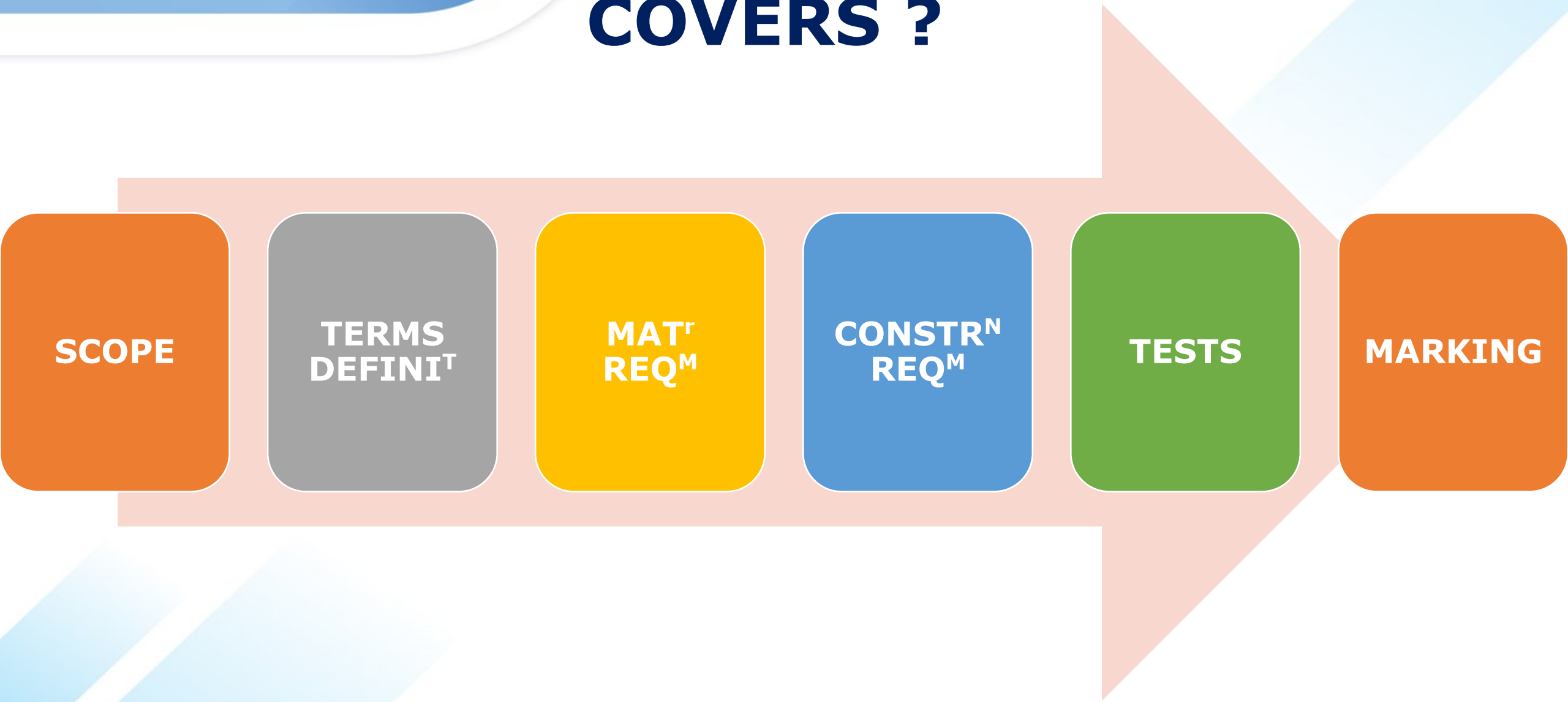
STANDARDS IN IRRIGATION



WHAT STANDARD COVERS ?



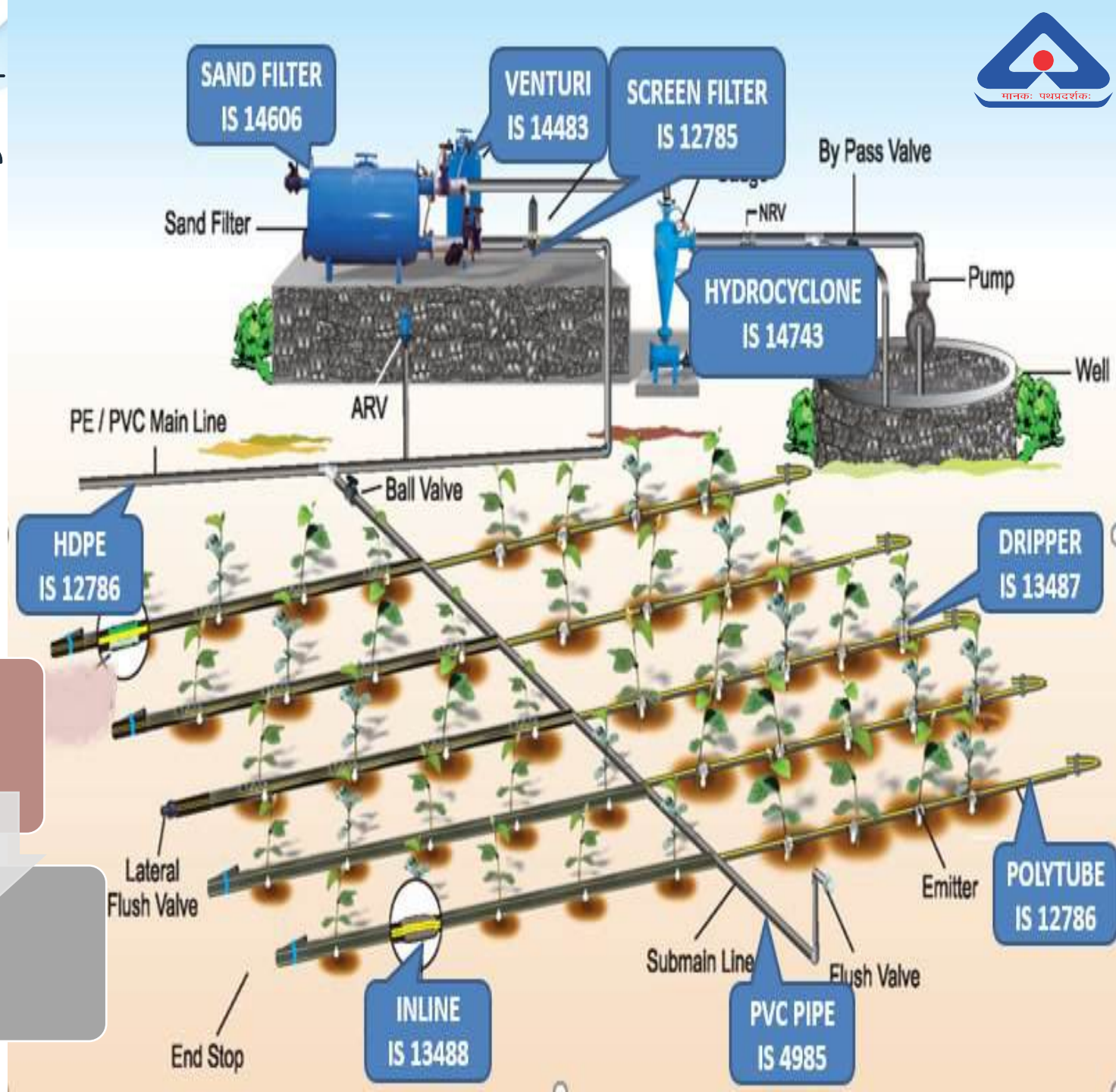
DRIP IRRIGATION SYSTEM

Pipes : IS 12786, IS 13488, IS 14482

Emitter : IS 13487

Filters : IS 12785, IS 14743, IS 14606

Prevention and Treatment : IS 14791



Pipes

IS 12786 for Irrigation Laterals

- Polyethylene pipes of outside diameter from 12 mm up to 32 mm
- Class 1 (0.2 MPa), Class 2 (0.25 MPa), Class 3 (0.4MPa)Pipes
- Material Requirement

IS 13488 for Emitting Pipe Systems

- Material Requirement
- Categories of Pipes (Regulating or Non-Regulating)
- Various Tests

IS 12786 : 2024 IRRIGATION EQUIPMENT — POLYETHYLENE PIPES FOR IRRIGATION LATERALS — SPECIFICATION (*first revision*)

This standard lays down requirements for polyethylene pipes of outside diameter from 12 mm up to 32 mm to be used for irrigation laterals that is branch supply lines on which sprayers or drippers or emitters are mounted directly or by means of a fitting or formed in the pipe during production.

Class of Pipe	Working Pressure	Colour
Class 1	0.20 MPa	Red
Class 2	0.25 MPa	Yellow
Class 3	0.40 MPa	Green

Normal working conditions of pipes shall be operation of maximum 800 working hours per year at the pressure rating of the pipe and at a water temperature up to 35 °C. If these working conditions are exceeded the next higher class of pipe, that is, pipe with greater wall thickness shall be chosen. With these working conditions the life expectancy of the pipe is 10 years.

IS 12786 : 2024 IRRIGATION EQUIPMENT — POLYETHYLENE PIPES FOR IRRIGATION LATERALS — SPECIFICATION (*first revision*)

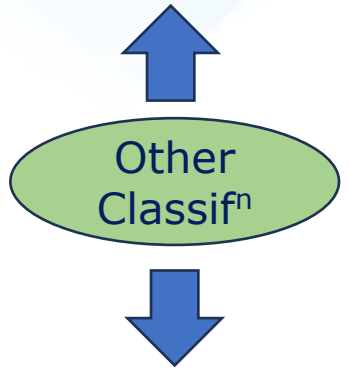
SPECIFICATION	SIGNIFICANCE
Material	To ensure right quality material with right amount of ingredients to achieve resistance against UV and to withstand environmental conditions.
Dimensions	All the manufacturer follows common dimensions. Makes it easy for the user to select proper tubing according to his requirements.
Hydraulic Characteristic	Pressure withstanding capacity of the tubing for ambient and elevated temperature.
Reversion Test	Checks effect of air temperature on laying length of the lateral.
Tensile Test	Tube shall withstand pulling force while laying and retrieval
Environmental Stress Crack Resistance	Ensure that tube shall not crack due to environmental stresses

IS 13488 : 2008 IRRIGATION EQUIPMENT — EMITTING PIPE SYSTEMS — SPECIFICATION (*first revision*)

This standard specifies the mechanical and functional requirements of the emitting pipes and their fittings, test methods and the data to be supplied by the manufacturer to facilitate correct installation and operation in the field.

Class of Pipe	Working Pressure
Class 1	0.100 MPa
Class 2	0.125 MPa
Class 3	0.250 MPa
Class 3	0.400 MPa

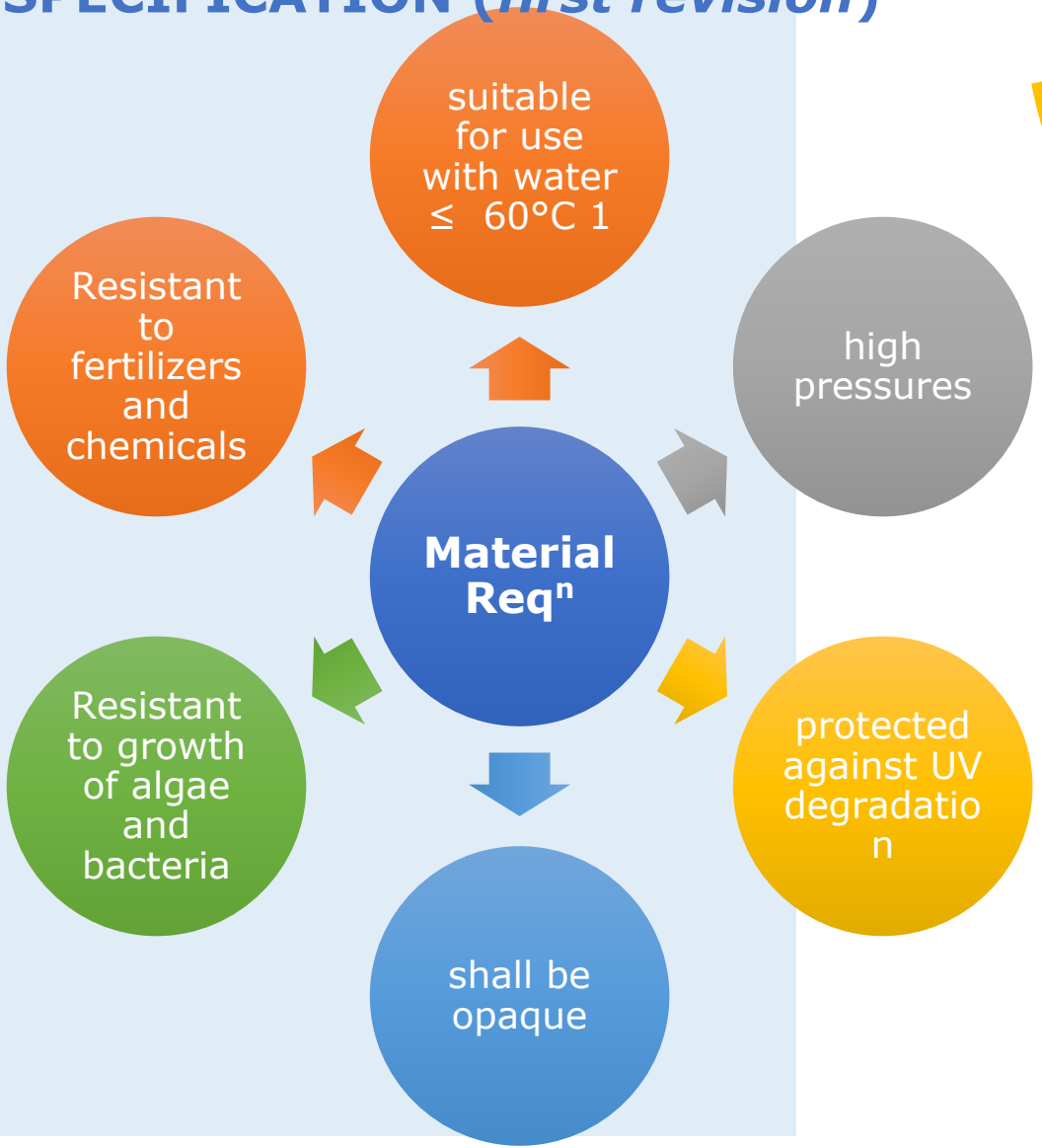
Unregulated Emitting Pipes
Regulated Emitting Pipes



Uniformity Category A
Uniformity Category B

NOTE - This standard applies to emitting and trickling pipes, hoses and tubings intended for irrigation. in which the emitting units form an integral part. This standard also applies to the fittings used for connecting these pipes, hoses and tubings. This standard does not apply to continuously porous pipe (porous along its entire length and circumference).

IS 13488 : 2008 IRRIGATION EQUIPMENT — EMITTING PIPE SYSTEMS — SPECIFICATION (*first revision*)



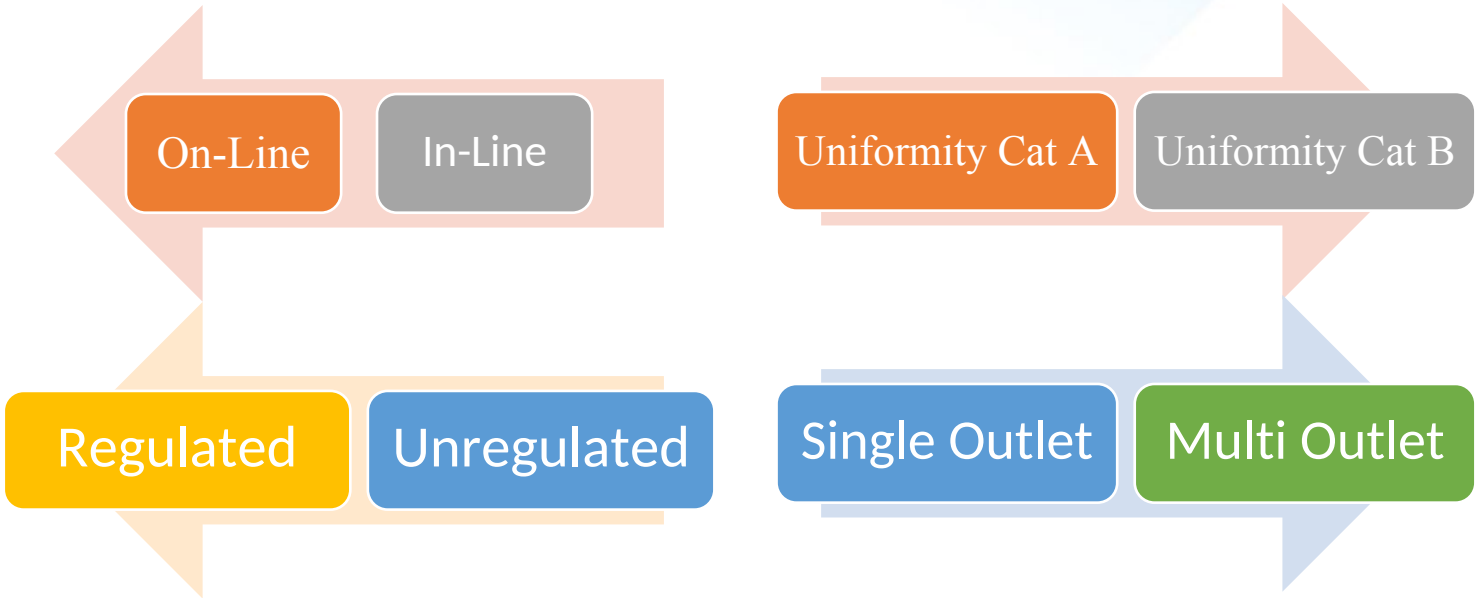
IS 13488 : 2008 IRRIGATION EQUIPMENT — EMITTING PIPE SYSTEMS — SPECIFICATION (*first revision*)

Specification	Significance
Uniformity of Flow Rate	Ensures that nearly uniform water shall be delivered to crops.
Emission Rate as a function of inlet pressure	Tells us how flow rate will vary for pressure fluctuations
Hydrostatic Pressure	Sudden change in pressure or operation of the dripline at higher pressure.
Resistance to tension at elevated temperature	Even if temperature increases, there shall not be deviation in flow rate by more than 5%
Resistance to Pull Out	Tube shall not be pulled out of fittings for nominal pulling force.
Environmental Stress Crack Resistance	Ensure that tube shall not crack due to environmental stresses
Emitter Unit Exponent	This is an indicator for performance of the emitter.

IS 13487 : 2025 IRRIGATION EQUIPMENT — EMITIERS — SPECIFICATION (*first revision*)

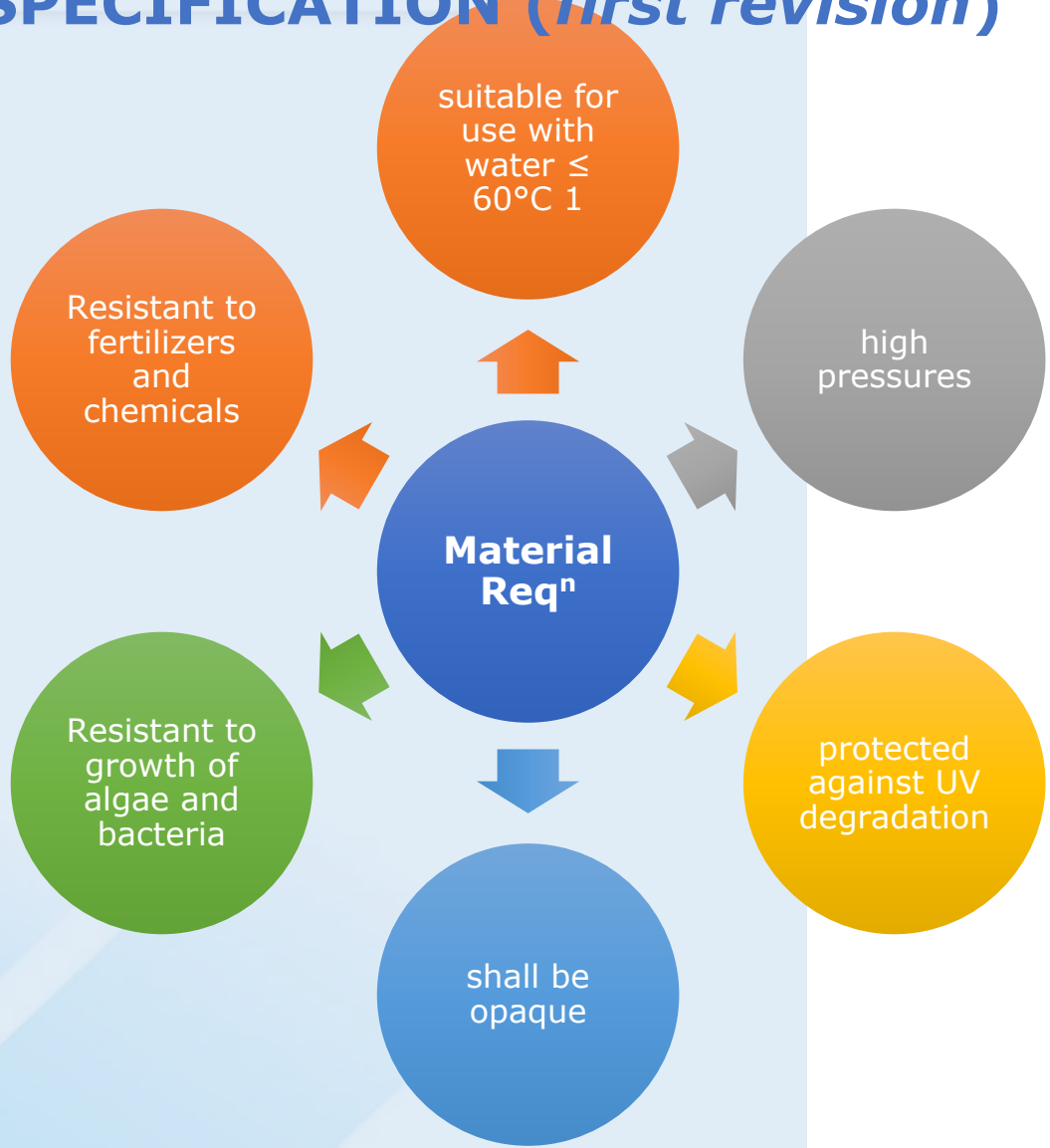
This standard specifies mechanical and functional requirements of irrigation emitters, test methods and the data to be supplied by the manufacturer to permit correct installation and operation in the field.

TYPES



NOTE - It applies to emitters, with or without pressure regulation, intended for irrigation; it does not apply to emitters which form an integral part of the pipe during manufacture as well as microtubes.

IS 13487 : 2025 IRRIGATION EQUIPMENT — EMITIERS — SPECIFICATION (*first revision*)



IS 13487 : 2025 IRRIGATION EQUIPMENT — EMITIERS — SPECIFICATION (*first revision*)

MECHANICAL TESTS AND REQUIREMENTS

- **Construction and Workmanship** – visual inspection for manufacturing defects
- **Flow Paths In Emitter** – dimension measurement
- **Resistance to Hydrostatic Pressure** – performance of emitter against high pressure
- **Emitter Pull-out Test**

FUNCTIONAL TESTS AND REQUIREMENTS

- Uniformly of Emission Rate
- Emission Rate as a Function of Inlet Pressure
- Determination of Emitter Exponent

SPRINKLER IRRIGATION SYSTEM

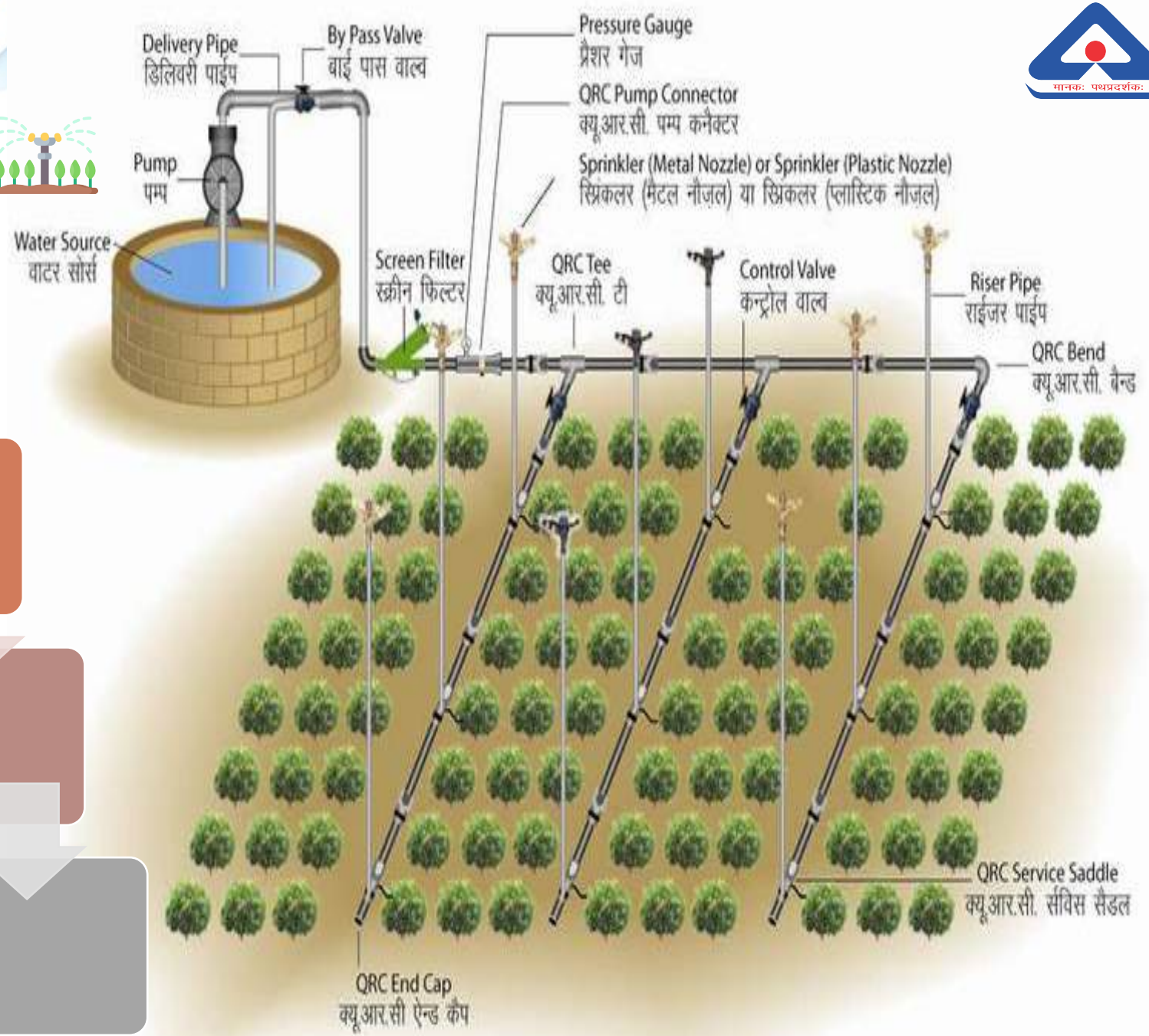
Pipes : IS 17425

Sprinklers : IS 12232 (Part 1 & 2), IS 14605

Chemical Injection System : IS 14483 (Part 1,2 & 3)

Design and Installation of SIS :

IS 14792

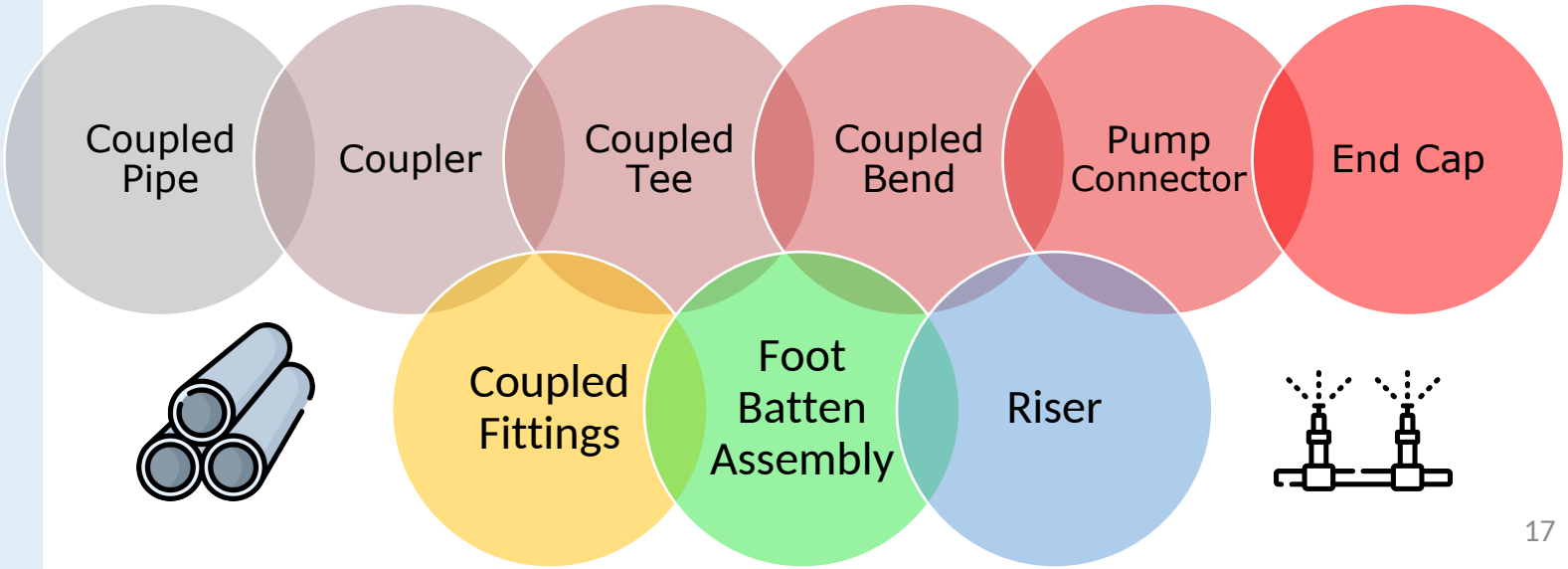


IS 17425 : 2020 IRRIGATION EQUIPMENT - QUICK COUPLED POLYETHYLENE PIPES AND FITTINGS FOR SPRINKLER IRRIGATION SYSTEMS - SPECIFICATION

IS 17425 lays down the general requirements for raw materials, manufacturing, method of tests and testing of **quick coupled** and **plain polyethylene pipes** and **fittings** of outside diameters 40 mm to 200 mm used for portable sprinkler and drip irrigation systems as mains, sub mains or laterals.

Classification of Pipes

Class of Pipe	Maximum Permissible Working Pressure at 30 °C
Class 1	0.25 MPa
Class 2	0.32 MPa
Class 3	0.40 MPa
Class 4	0.60 MPa



IS 17425 : 2020 IRRIGATION EQUIPMENT - QUICK COUPLED POLYETHYLENE PIPES AND FITTINGS FOR SPRINKLER IRRIGATION SYSTEMS - SPECIFICATION

Quick Coupled Pipes and Fittings

SPECIFICATION	SIGNIFICANCE
Leakage Test	Fittings coupled to the pipe are tested for leakage with water as medium with pressure from 0.0 MPa to maximum working pressure.
Hydraulic Proof Test	Same assembly as above tested at higher pressures checking the Pressure withstanding capacity.
Weldability Test	Hydraulic performance test (7.1.2) performed, to establish the joint between the couplers and pipe.

Plain PE Pipes

SPECIFICATION	SIGNIFICANCE
Visual Appearance and Workmanship (7.1.1)	pipes shall be smooth, clean and free from grooving, pit marks and melt fractures.
Hydraulic Performance Characteristics (7.1.2)	Pressure withstanding capacity of the pipe for ambient and elevated temperature.
Reversion Test (7.1.3)	Checks effect of air temperature on laying length of the lateral.
Tensile Test	Tube shall withstand pulling force while laying and retrieval
Fusion Compatibility Test	Testing the pipes joined with butt fusion, friction welding, socket fusion or using electro fusion fitting.
Environmental Stress Crack Resistance	Ensure that tube shall not crack due to environmental stresses

IS 12232 Part 1 and Part 2 : ROTATING SPRINKLER

IS 12232 (Part 1) specifies the design and operational requirements of rotating sprinklers, sprinkler nozzles and their test methods.

On the other hand **IS 12232 (Part 2)** specifies the conditions and methods used for testing of uniformity of distribution of rotating sprinklers which is important parameter for sprinkler irrigation system to achieve uniform/even application over the covered land area.

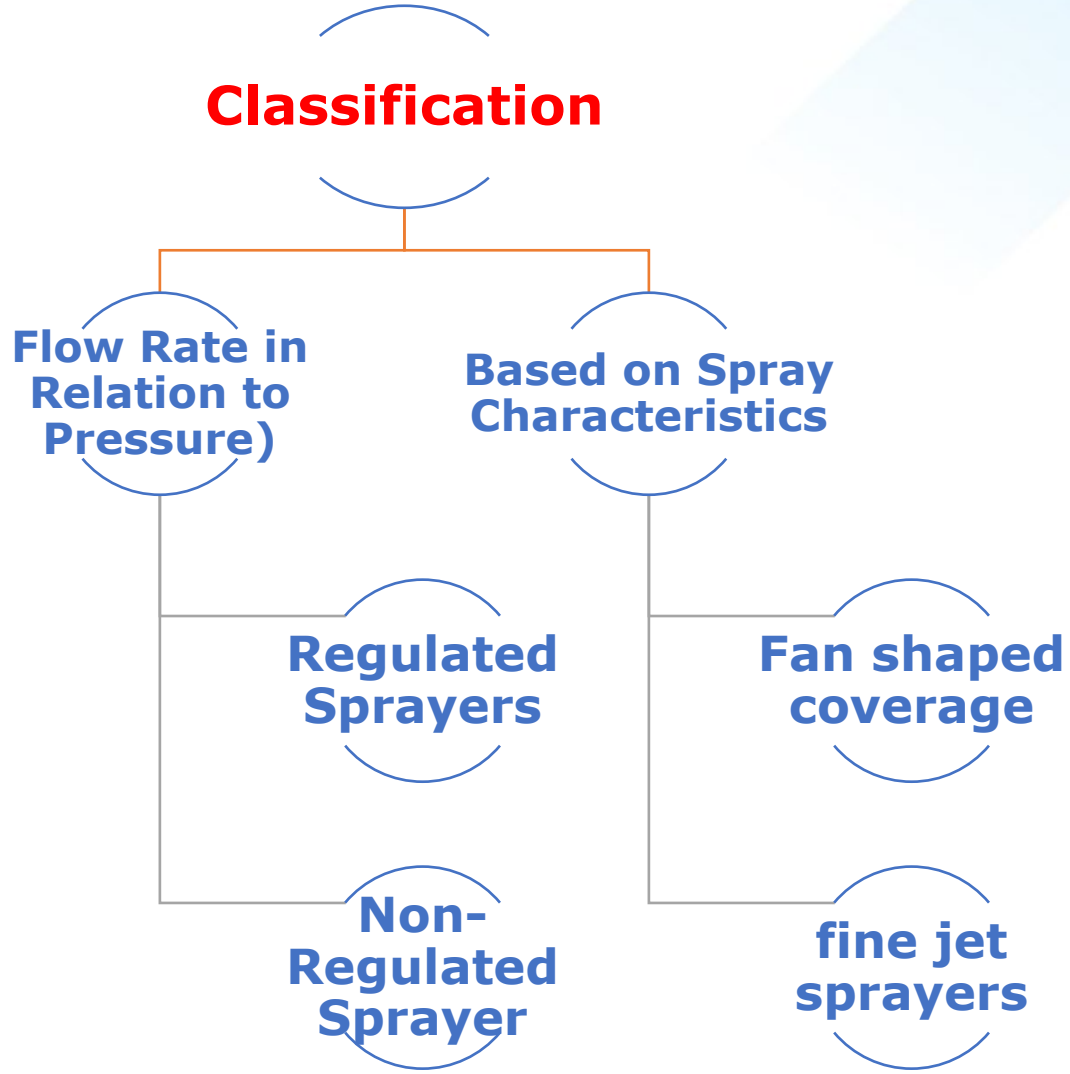
IS 12232 Part 1 and Part 2 : ROTATING SPRINKLER

Specification	Significance
Resistance to threaded connection	Sprinkler shall withstand tightening torque
Hydrostatic Pressure	Performance against increase in pressure.
Uniformity of Flow Rate	Ensures that nearly uniform water shall be delivered to crops.
Water Distribution Curve	Ensures uniformity of water distribution
Durability Test	This test ensures performance against life of the sprinkler.

IS 14605 : 1998 IRRIGATION EQUIPMENT — MICRO SPRAYERS — SPECIFICATION

Micro sprayers are type of sprinklers used to deliver water to the crops as a fine spray or mist, ensuring efficient coverage with minimal water wastage.

IS 14605 specifies the general requirements and test methods for micro sprayers. It applies to sprayers intended for assembly in pipeline networks for irrigation and for operation with irrigation water.

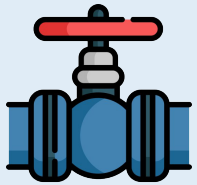


IS 14605 : 1998 IRRIGATION EQUIPMENT — MICRO SPRAYERS — SPECIFICATION

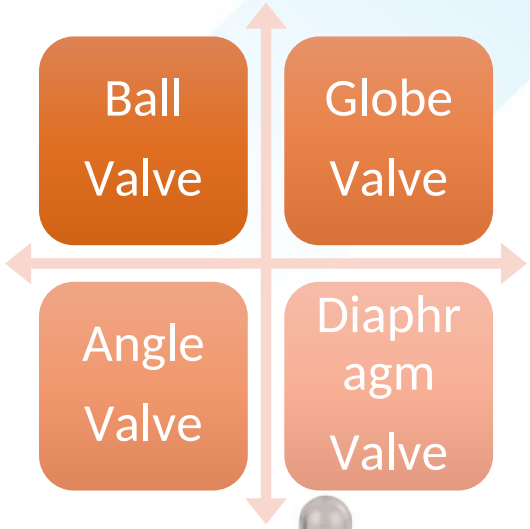
Specification	Significance
Hydrostatic Pressure	Performance against increase in pressure.
Uniformity of Flow Rate	Ensures that nearly uniform water shall be delivered to crops.
Water Distribution Curve	Ensures uniformity of water distribution

IS 18286 : 2023 Agricultural Irrigation Equipment — Manually Operated Serviceable Plastics Valves — Specification

IS 18286 specifies the general requirements and test methods for manually operated serviceable plastics valves intended for operation in agricultural irrigation systems. It is applicable to manually operated plastics valves of diameter nominal (DN) **8 (1/4")** to diameter nominal **110 (4")** including **angle**, **globe**, **diaphragm** and **ball valves**.



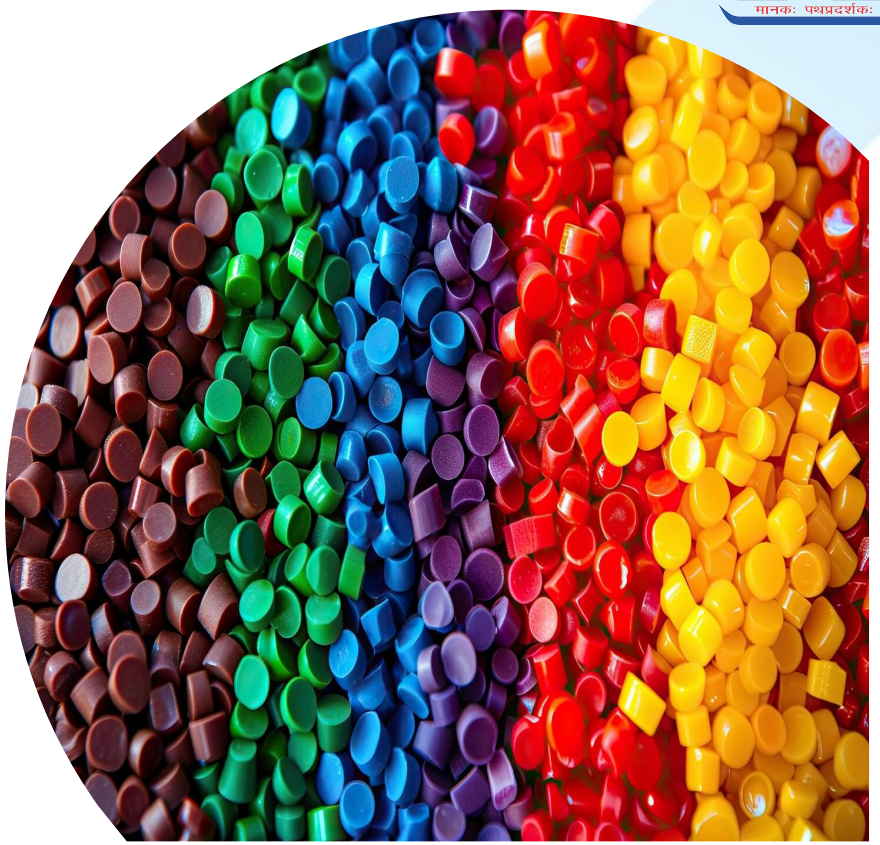
The valves are intended for installation in irrigation piping networks, using water at temperatures from **5 °C to 60 °C**. Nominal pressures of the valves are as designated by the manufacturer.



IS 18286 : 2023 Agricultural Irrigation Equipment — Manually Operated Serviceable Plastics Valves — Specification

PVC (Polyvinyl chloride)	PE (Polyethylene)
POM (Poly Oxy Methylene)	Poly Amide
PP (Polypropylene)	EPDM (Ethylene propylene diene monomer)
ABS (Acrylonitrile Butadiene Styrene)	NBR (Nitrile rubber)

All valve components those comes in contact with water shall not support the growth of algae and bacteria, nor be of metal which will corrode. Plastic parts of the valve that are exposed to sunlight shall be opaque and protected against UV degradation.



IS 18286 : 2023 Agricultural Irrigation Equipment — Manually Operated Serviceable Plastics Valves — Specification

Colour

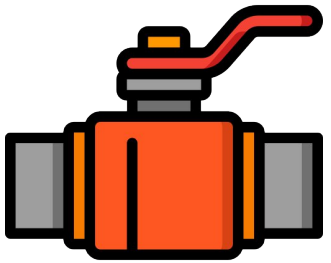
Colour of Polyvinyl chloride (PVC), Polyethylene (PE), Polypropylene (PP) the compound should be either **Grey or Black** or as agreed between manufacturer and customer.

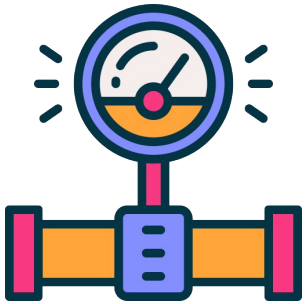
MECHANICAL AND FUNCTIONAL TESTS

- Resistance to Increased Torque
- Resistance of Valve and Valve Material to Internal Hydrostatic Pressure
- Seat and Stem Sealing Test
- Valve Performance at Increased Hydraulic Pressure
- Endurance Testing

CONNECTIONS TO PIPELINE SHALL BE IN ACCORDANCE WITH FOLLOWING TABLE:

Material	Reference IS Standard
Polypropylene (PP)	IS 15801
Polyethylene (PE)	IS 4984/IS 17425
Unplasticized polyvinyl chloride (PVC-U)	IS 4985/IS 7834 (Part 1)





FILTERS

FILTERS

- IS 12785 Strainer Filters
- IS 14743 Hydrocyclone Filters
- IS 14606 Media Filter

Filters are an essential component of micro-irrigation systems, designed to ensure clean and clog-free operation by removing debris, sediments, and other impurities from water before it enters the irrigation network.

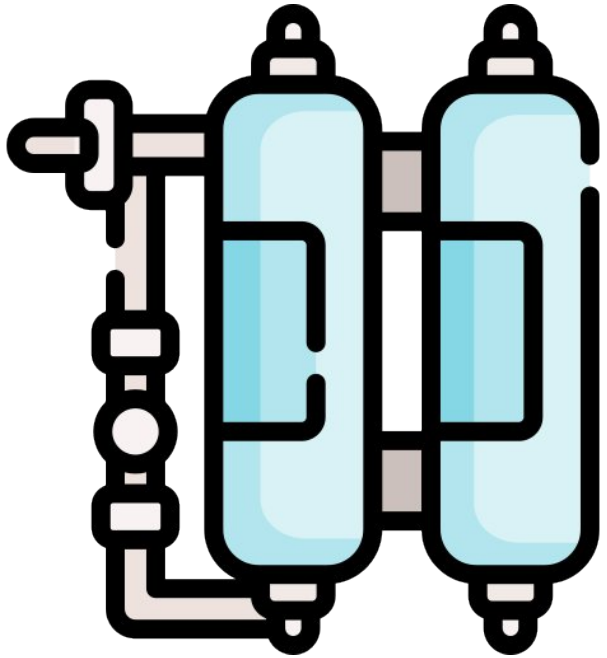
IS 12785 : 1994 STRAINER-TYPE FILTERS – SPECIFICATION

Strainer type Filters use a fine mesh, screen, disc or combination of these to trap debris/impurities contained in the irrigation water to prevent clogging in micro-irrigation systems.

IS 12785 specifies the general construction requirements and test methods for strainer type filters (hereinafter called filters) intended for operation in agricultural irrigation systems.

TYPES

- Screen Filter
- Disc Filter



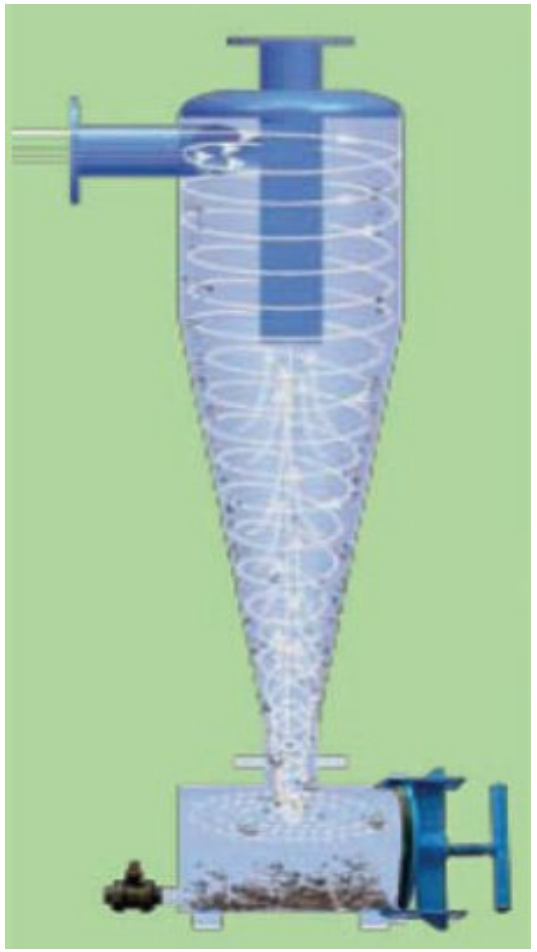
IS 12785 : 1994 STRAINER-TYPE FILTERS — SPECIFICATION

Specification	Significance
Resistance of Strainer to Internal Hydrostatic Pressure	Filter screen shall withstand pressure
Resistance to Internal Hydrostatic Pressure at High Temperature	Shall withstand even if water temperature is high
Resistance of Filter Element to Buckling or Tearing	Filter element shall not rupture even if filter is completely clogged
Tightness of Filter Element	Water shall not bypass the filter element
Clean Pressure Drop	Filters own pressure drop shall be considered for design of drip system

IS 14743 : 2024 HYDROCYCLONE FILTERS – SPECIFICATION (*first revision*)

Hydrocyclone filter is an essential component of micro irrigation system used to separate sand from the river or tube-well water. It works on the principle of centrifugal force. it is also called centrifugal filter/sand separator.

It is filtration device consisting of a cyclonic vessel having an arrangement to create spiral vortex flow, an inlet, a centrally rising up outlet and an underflow chamber for sand collection tank connected at the lower end, essentially having an opening for removal of accumulated entrapped particles.



IS 14743 : 2024 HYDROCYCLONE FILTERS – SPECIFICATION (*first revision*)

IS 14743 specifies the general constructional requirements and test methods of the hydrocyclone filters, intended for operation in agricultural irrigation systems.

The standard does not deal with filtration ability, efficiency and capacity nor it deals with the hydrocyclone filters that integrate automatic or continued flushing of accumulated sand.

TECHNICAL REQUIREMENTS

- Material
  - Metallic body or parts shall be coated with **durable abrasion resistant coating** having a coating thickness more than 70µm or hot dip galvanized to **resist corrosion** and under scouring
  - Plastic body or parts of the filter that are exposed to ultraviolet (UV) radiation shall include additives to improve their resistance to UV radiation
- Construction
- Cyclonic Vessel
- Connections

IS 14743 : 2024 HYDROCYCLONE FILTERS – SPECIFICATION (*first revision*)

TESTS

- Resistance to Internal Hydrostatic Pressure
- Resistance to Internal Hydrostatic Pressure at Elevated Temperatures
- Pressure Drop vs Flow
  - Test Period
  - Loading Rate
  - Flows
  - Testing Sequence
  - Results
  - Observations
- Cyclic Pressure Test

IS 14606 : 2022 IRRIGATION EQUIPMENT — GRANULATED MEDIA FILTERS — SPECIFICATION

Media Filters also called as sand filters uses a bed of sand or granular media to trap particles/impurities, making them ideal for water sources with high organic loads, such as ponds or reservoirs.

IS 14606 specifies This standard specifies the construction requirements and test methods for "granulated media filters",, intended for operation in agricultural irrigation systems. It includes manual cleaning media filters and automatic self-cleaning media filter "batteries" (2 units or more working in parallel).

This standard deals with manual and automatic backflow media filters and applies to:

a) manually cleaning filters.
b) complete automatic filters at a single unit level.
c) a filtration battery which is a complete filter system that includes:
- Inlet — Unfiltered supply water;
- Outlet — Filtered water carried to the irrigation network; and
- Back flush outlet — This is for the water and filtrate, flushed out during the backflow procedure.

d) Command power source — Usually hydraulic-filtered water for automatic operation (can also be pneumatic or electric).

This standard deals with the operation and performance of a media filter including related valves, backwash mechanism, under-drains, manifolds and all related accessories necessary for the operation of the filter.

This standard deals only with pressurized filters operating in a range of filtration velocities declared by the manufacturer. The standard does not deal with filtration ability, efficiency and capacity (quality of filtered water, time of operation before media filter becomes entirely clogged, etc).

IS 14606 : 2022 IRRIGATION EQUIPMENT — GRANULATED MEDIA FILTERS — SPECIFICATION

- CLASSIFICATION
  - Flow Direction
    - Top to bottom
    - Bottom to Top
  - Type and Number of Different Media Layers
    - Single Layer
    - Multi layer
  - Mechanical Structure and Shape
    - Other Pressure Sustaining Shapes
    - Oval/Ball/Spherical
    - Cylinder
  - Velocity of Filtration
    - low flow, 36-49 $m^3/h\text{-}m^2$
    - Medium flow, 50-85 $m^3/h\text{-}m^2$
    - Relatively High velocity, above 85 $m^3/h\text{-}m^2$

IS 14606 : 2022 IRRIGATION EQUIPMENT — GRANULATED MEDIA FILTERS — SPECIFICATION

MECHANICAL TEST

- Resistance of Filter to Internal Hydrostatic Pressure
- Requirements of Filter Housing (Metal and Plastic)
- Resistance of Filter to Internal Hydrostatic Pressure at High Temperature

RESISTANCE TO CYCLIC PRESSURE

BACK FLUSHING HYDRAULIC PARAMETERS AND TESTS

AUTOMATIC BACK FLUSHING AND CONTROLLER

- ❑ Backwash Initiation
- ❑ Flushing Control Mechanism Testing
  - Mechanism Activated by Pressure Differential Sensor
  - Mechanism Activated by Duration of Operation
  - Mechanism Activated by Volume of Filtered Water
  - Mechanism Activated by Some Other Physical Quantity
  - Test of Protective Device

Test for Flushing Mechanism Detecting Media Escape

FERTIGATION

Chemical Injection System

- IS 14483 (Part 1) Venturi Injector
- IS 14483 (Part 2) Water-driven Injector Pump
- IS 14483 (Part 3) Fertilizer Tank

Fertigation is the process of delivering fertilizers/chemicals or nutrients directly to crops through an irrigation system. It ensures precise nutrient application, enhancing plant growth and minimizing waste.

The application of fertilizer or/and other chemicals via irrigation water to crops/plants is based on the principle that a swiftly moving stream of water is able to carry with it the dissolved substances and fine dispersed suspended particles of fertilizer material.

Venturi injector, injector pump, fertilizer tank are such equipment used for this purpose

IS 14483 (Part 1) : 2024 FERTILIZER AND CHEMICAL INJECTION SYSTEM : PART 1 VENTURI INJECTOR (*first revision*)

Venturi Injector is an appliance used for fertigation or chemigation, chlorinating or injecting chemicals in the sprinkler and drip irrigation systems.

Venturi injector operates on the principle that, when a pressurized operating (motive) fluid enters the injector, it is constricted towards the injection chamber and changes into a high velocity jet stream. The increase in velocity inside the injection chamber results in decrease in pressure, thereby enabling an additive liquid material to be drawn through the suction port and entrained into the motive stream

IS 14483 (Part 1) prescribes the requirements of venturi injectors used for injecting fertilizer and chemicals in the sprinkler and drip irrigation systems.

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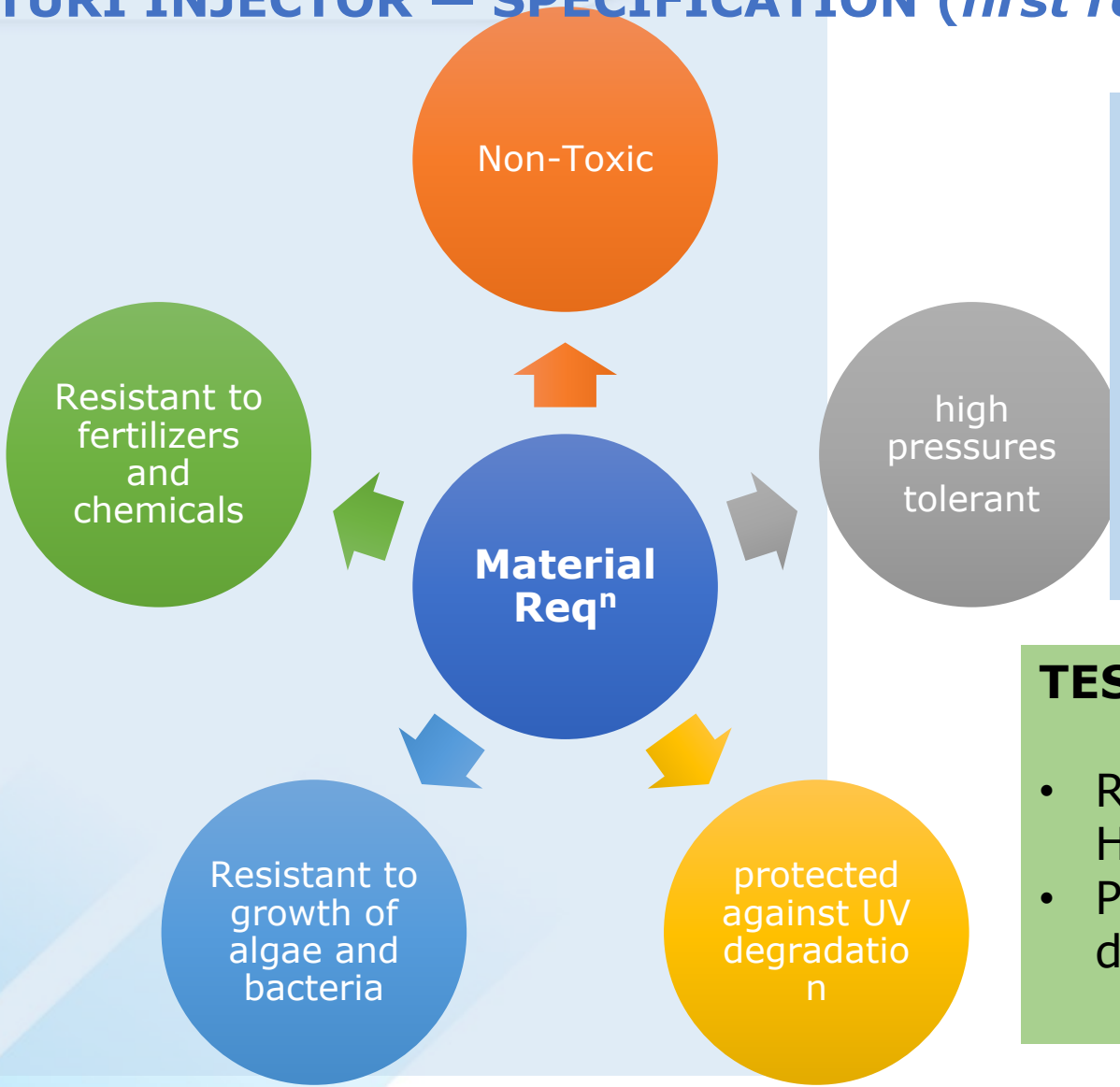
IS 14483 (Part 1) : 2024 FERTILIZER AND CHEMICAL INJECTION SYSTEM : PART 1 VENTURI INJECTOR — SPECIFICATION (*first revision*)



CONSTRUCTIONAL REQUIREMENTS

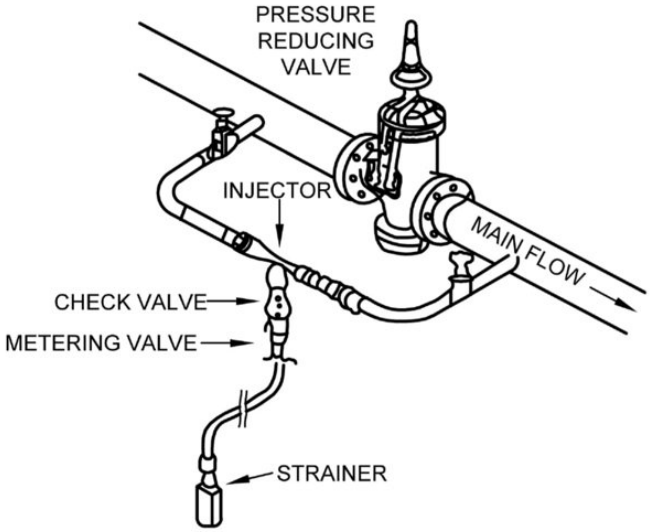
- Should be ddetachable for removal when not in use
- Suction port shall have suitable connection
- inbuilt check valve may be provided
- A metering device shall be provided
- pressure reducing device or flow control device to be provide

TESTS

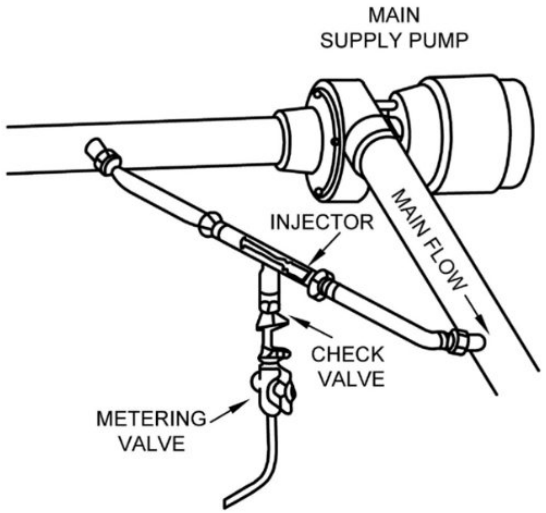
- Resistance of Venturi Injector to Internal Hydrostatic Pressure
- Performance Test as per manufacturer’s declaration

IS 14483 (Part 1) : 2024 FERTILIZER AND CHEMICAL INJECTION SYSTEM : PART 1 VENTURI INJECTOR (*first revision*)

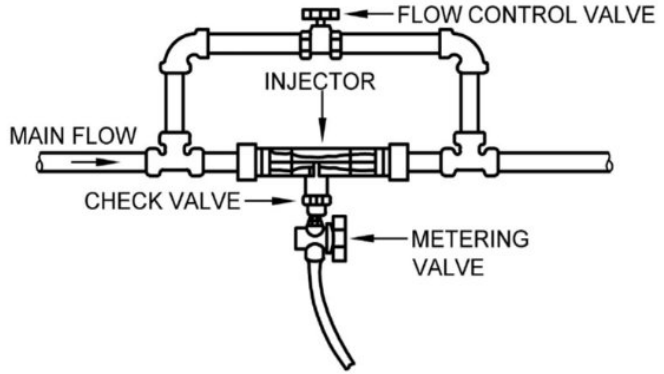
INSTALLATION OF THE VENTURI INJECTOR IN THE IRRIGATION SYSTEMS FOR PERFORMANCE TESTING



1. A REGULAR VALVE INSTALLED IN BETWEEN THE INLET AND OUTLET CONNECTIONS OF THE VENTURI INJECTOR CREATES DIFFERENTIAL PRESSURE AND FINALLY VACUUM NEAR THE SUCTION PORT.



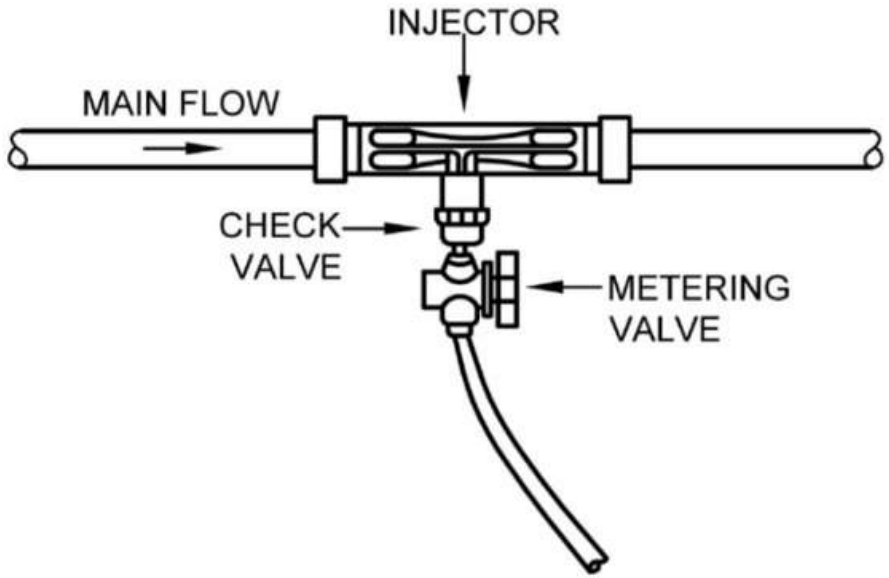
2. INLET OF THE VENTURI CONNECTED TO THE SUCTION PIPE OF A PUMP AND THE OUTLET CONNECTED TO THE DELIVERY PIPE OF THE PUMP. PRESSURE DIFFERENTIAL IS CREATED AUTOMATICALLY WHEN THE PUMP STARTS RUNNING.



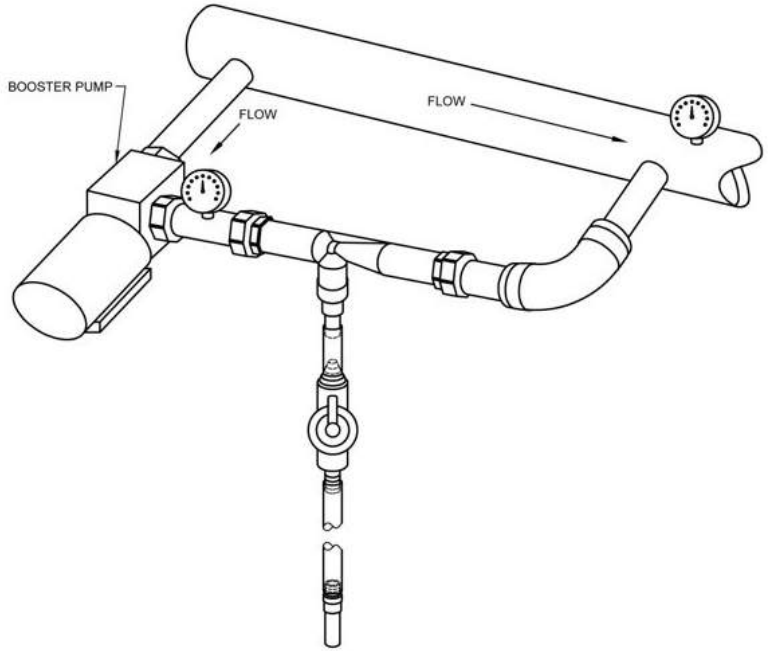
3. INJECTOR CAN BE INSTALLED DIECTLY IN THE MAIN LINE WITH A BY-PASS CONNECTION HAVING FLOW CONTROL VALVE. WHEN INJECTION IS NOT REQUIRED MAIN FLOW CAN BE DIVERTED THROUGH THE BY-PASS IN TO THE SYSTEM.

IS 14483 (Part 1) : 2024 FERTILIZER AND CHEMICAL INJECTION SYSTEM : PART 1 VENTURI INJECTOR (*first revision*)

INSTALLATION OF THE VENTURI INJECTOR IN THE IRRIGATION SYSTEMS FOR PERFORMANCE TESTING



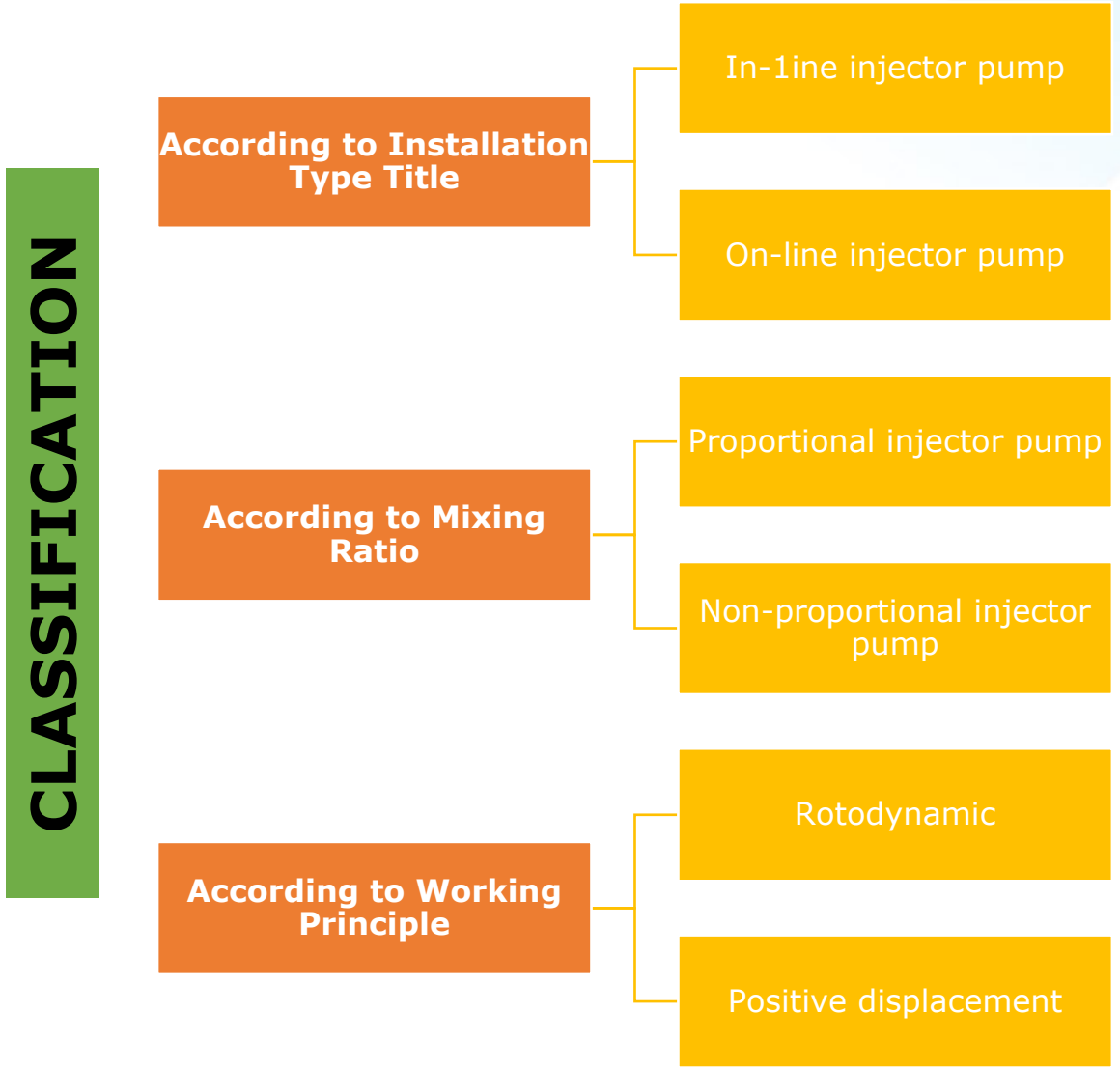
4. INSTALLED IN THE MAIN FLOW LINE TOTAL FLOW OF THE SYSTEM GOES THROUGH THE INJECTOR.



5. VENTURI INJECTOR WITH BOOSTER PUMP

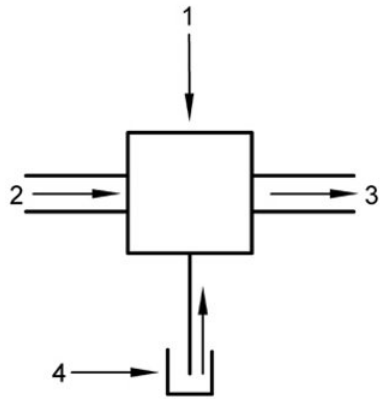
IS 14483 (Part 2) : 2025 FERTILIZER AND CHEMICAL INJECTION SYSTEM
PART 2 WATER-DRIVEN CHEMICAL INJECTOR PUMP — SPECIFICATION (*first revision*)

IS 14483 (Part 2) This standard specifies the construction and operational requirements and methods for water driven chemical injector pumps. These injector pumps are intended to operate at water temperatures of up to 50°C and with the types and concentrations of chemicals routinely applied in irrigation.

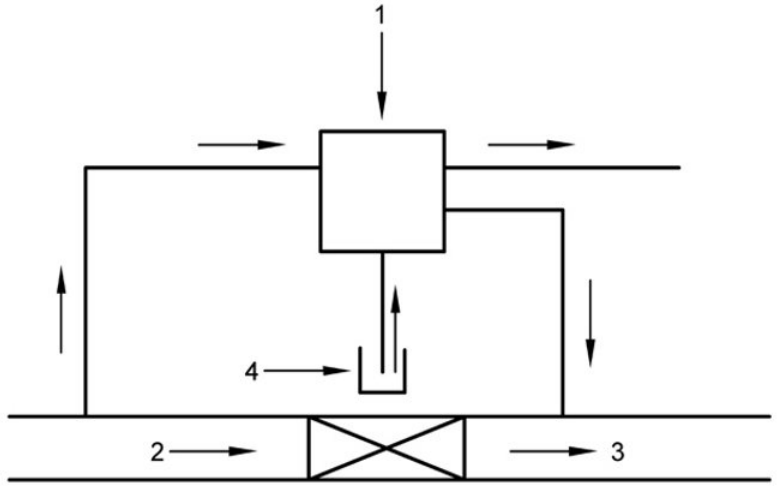


IS 14483 (Part 2) : 2025 FERTILIZER AND CHEMICAL INJECTION SYSTEM PART 2 WATER-DRIVEN CHEMICAL INJECTOR PUMP (*first revision*)

INSTALLATION OF INJECTOR PUMP IN THE IRRIGATION SYSTEMS FOR PERFORMANCE TESTING

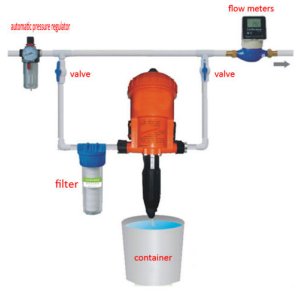


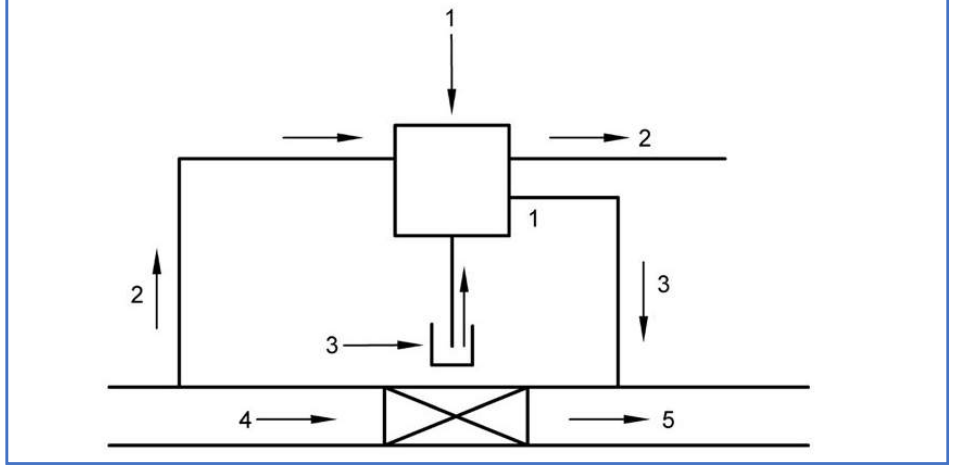
a) IN LINE FULL FLOW



b) IN LINE BYPASS

where
1 Injector pump
2 Irrigation flow
3 Irrigation water with injected chemicals
4 Chemicals





ON-LINE

where
1 Injector pump
2 Drive water
3 Chemicals
4 Irrigation flow
5 Irrigation water with injected chemicals

IS 14483 (Part 3) : 2018 FERTILIZER AND CHEMICAL INJECTION SYSTEM
PART 3 FERTILIZER TANL — SPECIFICATION

Fertilizer Tank is a component of fertigation systems used to mix and inject liquid or soluble fertilizers into irrigation water.

IS 14483 (Part 3) sspecifies the mechanical and functional requirements for fertilizer tanks used in irrigation systems, test methods and the data to be supplied by the manufacturer to permit correct installation and operation in the field.

This standard applies to fertilizer tanks working on the principle of differential pressure used in irrigation. systems. This standard also applies to the fittings used for connecting fertilizer tanks with the irrigation systems.

IS 14483 (Part 3) : 2018 FERTILIZER AND CHEMICAL INJECTION SYSTEM PART 3 FERTILIZER TANL — SPECIF N

REQUIREMENTS

- Resistance of Fertilizer Tanks to Hydrostatic Pressure at Ambient Temperature
- Resistance to Hydrostatic Pressure at Elevated Temperature
- Injection Rate Calibration

Classification

- *Quantitative model*
- *Proportionate model with rubber/plastic bladder*

IS 14483 (Part 3) : 2018 FERTILIZER AND CHEMICAL INJECTION SYSTEM PART 3 FERTILIZER TANL — SPECIFICATION

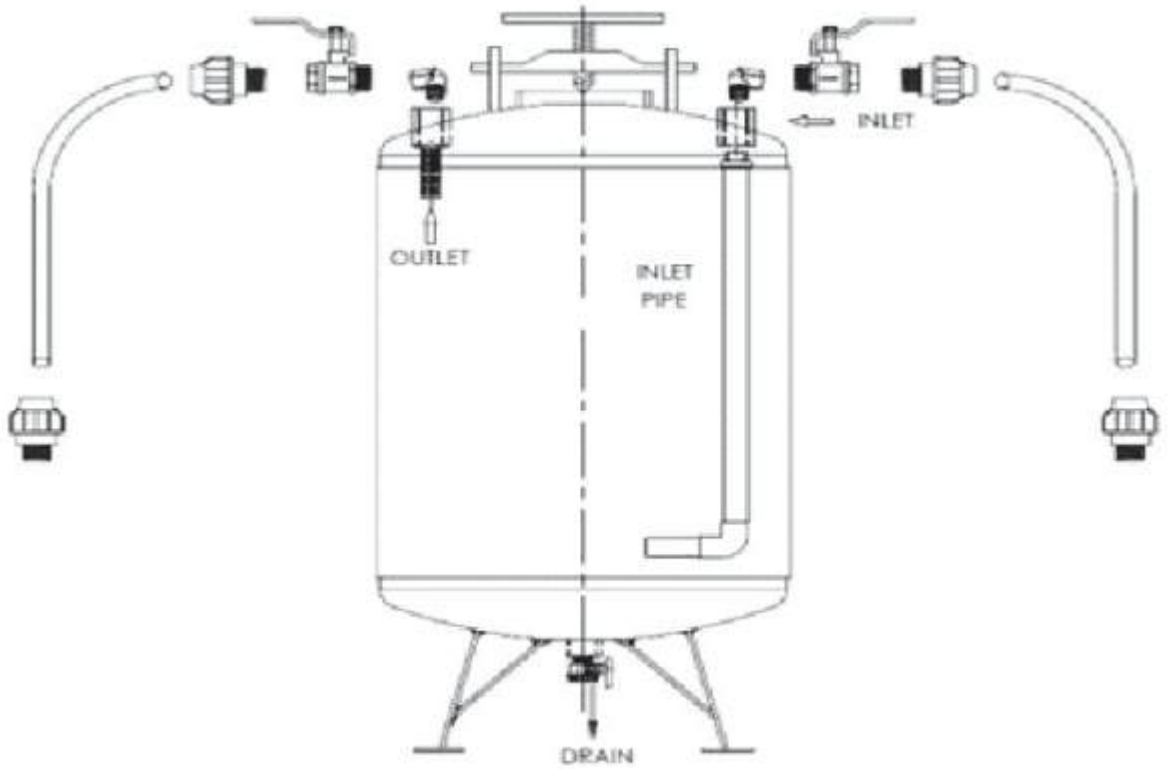


FIG. 1 QUANTITATIVE MODEL

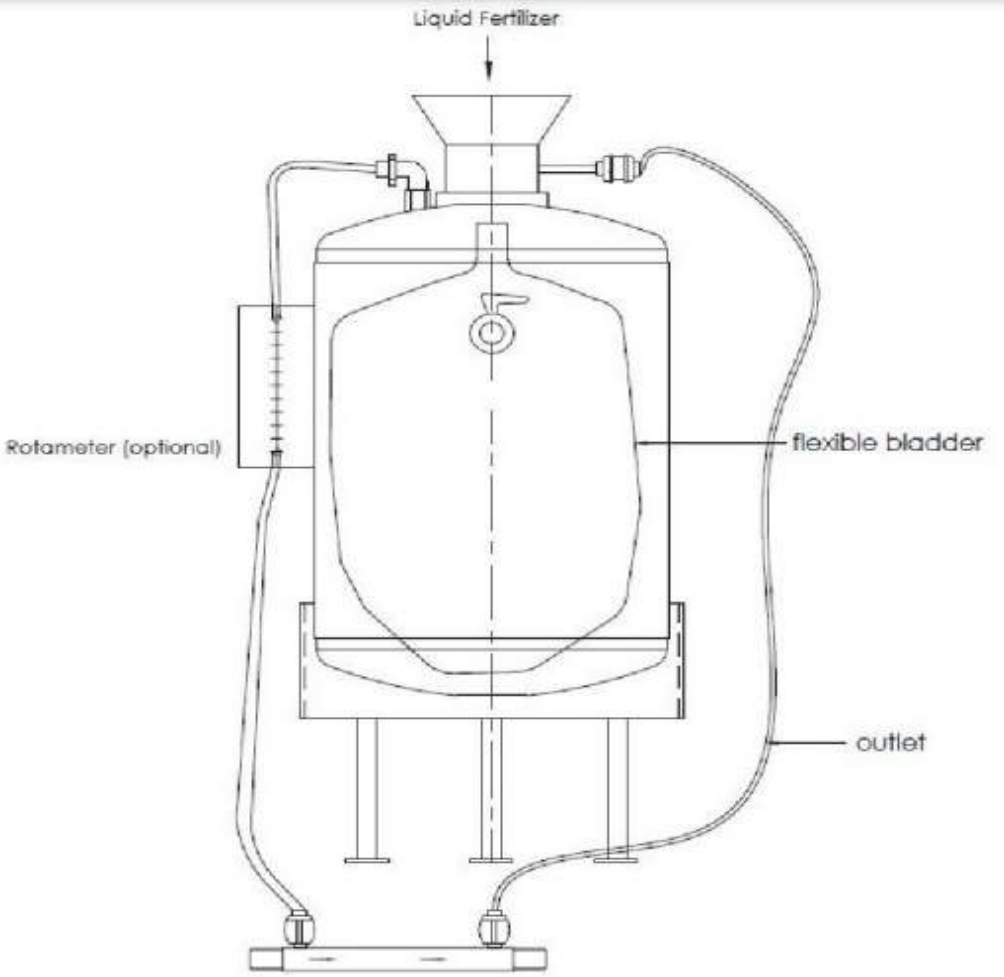
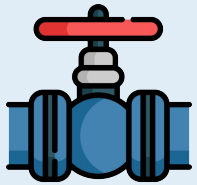


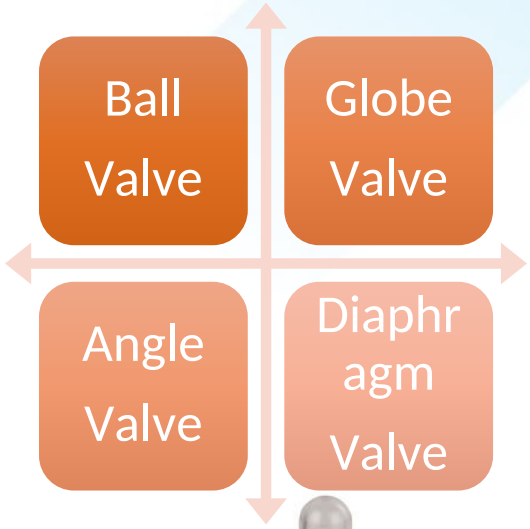
FIG. 2 PROPORTIONATE MODEL

IS 18286 : 2023 Agricultural Irrigation Equipment — Manually Operated Serviceable Plastics Valves — Specification

IS 18286 specifies the general requirements and test methods for manually operated serviceable plastics valves intended for operation in agricultural irrigation systems. It is applicable to manually operated plastics valves of diameter nominal (DN) **8 (1/4")** to diameter nominal **110 (4")** including **angle**, **globe**, **diaphragm** and **ball valves**.



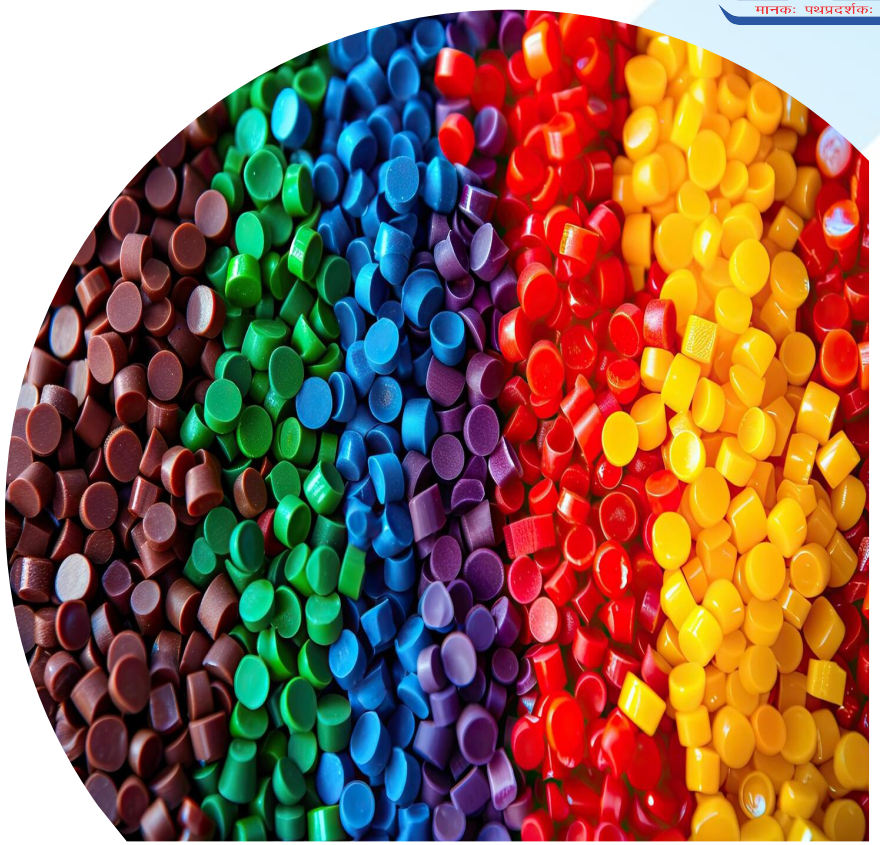
The valves are intended for installation in irrigation piping networks, using water at temperatures from **5 °C to 60 °C**. Nominal pressures of the valves are as designated by the manufacturer.



IS 18286 : 2023 Agricultural Irrigation Equipment — Manually Operated Serviceable Plastics Valves — Specification

PVC (Polyvinyl chloride)	PE (Polyethylene)
POM (Poly Oxy Methylene)	Poly Amide
PP (Polypropylene)	EPDM (Ethylene propylene diene monomer)
ABS (Acrylonitrile Butadiene Styrene)	NBR (Nitrile rubber)

All valve components those comes in contact with water shall not support the growth of algae and bacteria, nor be of metal which will corrode. Plastic parts of the valve that are exposed to sunlight shall be opaque and protected against UV degradation.



IS 18286 : 2023 Agricultural Irrigation Equipment — Manually Operated Serviceable Plastics Valves — Specification

Colour

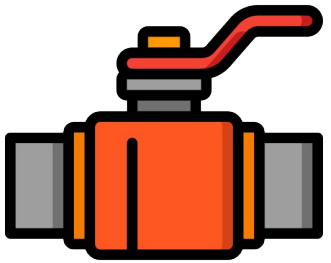
Colour of Polyvinyl chloride (PVC), Polyethylene (PE), Polypropylene (PP) the compound should be either **Grey or Black** or as agreed between manufacturer and customer.

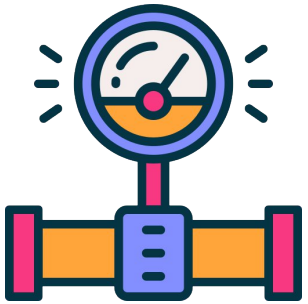
MECHANICAL AND FUNCTIONAL TESTS

- Resistance to Increased Torque
- Resistance of Valve and Valve Material to Internal Hydrostatic Pressure
- Seat and Stem Sealing Test
- Valve Performance at Increased Hydraulic Pressure
- Endurance Testing

CONNECTIONS TO PIPELINE SHALL BE IN ACCORDANCE WITH FOLLOWING TABLE:

Material	Reference IS Standard
Polypropylene (PP)	IS 15801
Polyethylene (PE)	IS 4984/IS 17425
Unplasticized polyvinyl chloride (PVC-U)	IS 4985/IS 7834 (Part 1)





IS 14791 : 2024 PREVENTION AND TREATMENT OF BLOCKAGE PROBLEM IN DRIP IRRIGATION SYSTEM — CODE OF PRACTICE (*first revision*)

This standard specifies the guidelines for prevention and treatment of blockage problems in drip irrigation system.

- Quality of Water to be supplied.
- Chemical Injection System Installed with DIS.
- Different Blockage Problems associated with DIS.
- Method of Assessment of blockage problems.
- Prevention and treatment of blockage problem.
- Safety Requirements

IS 14791 : 2024 PREVENTION AND TREATMENT OF BLOCKAGE PROBLEM IN DRIP IRRIGATION SYSTEM — CODE OF PRACTICE (*first revision*)

Quality of Water	Sample of water supplied to DIS is tested for different parameters such as Suspended Solids, pH, EC, Ca, Mg, Fe, Presence of oil etc. Table 1 of IS 14791 provided the safe limits for presence of above-mentioned parameters in water.
Chemical Injection System Installed with DIS.	Chemical Inject Systems (venturi injector, injector pumps, differential pressure tanks) are used in conjunction with DIS for supplying fertilizers into the field. These equipment's should be well test before installing.
Different Blockage Problems associated with DIS.	• Solid Contaminants • Dissolved Contaminants - Biological or Chemical Clogging Problem • Emitter Suck-back • Physical Blockage of Dripline/Lateral • Failure of Main Filtration System • Poor Maintenance of the System • Quality of Water

IS 14791 : 2024 PREVENTION AND TREATMENT OF BLOCKAGE PROBLEM IN DRIP IRRIGATION SYSTEM — CODE OF PRACTICE (*first revision*)

Method of Assessment of blockage problems	Driplines on Ground Surface : When driplines are laid on the surface, the degree of blockage can be checked by means of visual inspection and measuring the amount and uniformity of discharge through the emitters or orifices and comparing it with the specified discharge. Dripline Buried Under Ground ;

Prevention and treatment of blockage problem.	• Physical Treatment :
	  • Use of silting reservoir
	  • use of Filters such as Hydrocyclone, screen filters, media filters, disc filters
	  • Flushing of irrigation pipelines
	• Chemical Treatment :
	  • Bacterial precipitation of Iron, Sulphur,
	  • Aeration and settling, pH Control
	  • Chlorination of water, Acid Treatment
	• Algae Control
	• Emitter Clogging by Roots : trifluorine/ pendimethalin / copper can be used for prevention

Safety Requirements	The resistance of drip irrigation components to the chemical used should be taken into consideration. All chemicals-should be handled cautiously and should be stored in a secured place for the reasons of safety and hazardous nature of the products. Irrigation water should not be used for consumption by human beings and animals. Do not inhale acid fumes or chlorine gas.

IS 14792 : 2000 IRRIGATION EQUIPMENT — DESIGN, INSTALLATION AND OPERATION OF SPRINKLER IRRIGATION SYSTEMS — CODE OF PRACTICE

HYDROLOGICAL DESIGN

- Depth of Water Application
- Effective Crop Root Depths
- Net Depth of Application
- Leaching Requirement
- Gross Depth of Application
- Estimation of Soil Moisture Loss by Evaporation and Transpiration

Table 4 Potential Evapotranspiration (PET)

(*Clause* 3.5)

Sl. No.	Climate	mm of Water Used per Day
(1)	(2)	(3)
i)	Cool humid	2.5-3.8
ii)	Cool dry	3.8-5.1
iii)	Warm humid	3.8-5.1
iv)	Warm dry	5.1-6.3
v)	Hot humid	5.1-7.6

IS 14792 : 2000 IRRIGATION EQUIPMENT — DESIGN, INSTALLATION AND OPERATION OF SPRINKLER IRRIGATION SYSTEMS — CODE OF PRACTICE

APPLICATION RATE

- 0.8° slope — level to undulating
- 1 — 9°-12.5° slope — undulating to low
- 2 — over 12.5° slope — low to steep h
- 3

Table 6 Estimated Maximum Water Application Rates for Design (*Clause* 5.2)

Sl. No.	Soil Groups Based on Texture and Profile	Slopes[1] 0-8°	Slopes[2] 9° to 12.5°	Slopes[3] over 12.5°
i)	Sands and light sandy loams uniform in texture to 1.82 m pumice	31.8	25.4	20.3
ii)	Sandy loams to 0.61 m overlaying a heavier subsoil	20.3	16.5	12.7
iii)	Medium loams to sandy clays over a heavier subsoil	16.5	12.7	10.2
iv)	Clay loams over a clay subsoil	12.7	10.2	7.6
v)	Silt loams and silt clay	10.2	7.6	5.1
vi)	Clays	6.4	5.1	3.8
vii)	Peat	16.5	-	-

see IS 14792 for more details

IS 14792 : 2000 IRRIGATION EQUIPMENT — DESIGN, INSTALLATION AND OPERATION OF SPRINKLER IRRIGATION SYSTEMS — CODE OF PRACTICE

UNIFORMITY OF WATER APPLICATION

- Pressure variation in sprayline
- Spacing of sprinklers
- Water application rate
- Sprayline spacing

Lateral spacing (**6.2.4.1**)

Sl. No.	Wind Velocity (km/h)	Lateral Spacing (% of wetting diameter)
(1)	(2)	(3)
i)	No wind	65
ii)	< 8	60
iii)	8 to 16	50
iv)	> 16	30

Sprinkler spacing (**6.2.4.2**)

Sl. No.	Pattern	Wind Velocity (km/h	Sprinkler Spacing (% of wetting diameter)
(1)	(2)	(3)	(4)
i)	Square or Rectangular	No wind	65
ii)		< 7	60
iii)		7 to 13	50
iv)		> 13	30

IS 14792 : 2000 IRRIGATION EQUIPMENT — DESIGN, INSTALLATION AND OPERATION OF SPRINKLER IRRIGATION SYSTEMS — CODE OF PRACTICE

INSTALLATION

i. Buried Mains - Particular attention is drawn to the necessity for concrete anchor blocks of sufficent size being provided at any significant change in direction or grade, change in diameter, major branch connection or terminal, and adjacent to any values or fittings that may give rise to hydraulic loading along the line.

ii. Pumps and Prime Mover - Internal combustion engines shall be provided with protective devices. Devices shall be supplied that stop the engine if

a) engine temperature exceeds the safety point for the prime move and

b) oil pressure falls below the minimum specified; or pressure because of loss of suction or reduction in delivery pressure.

IS 14792 : 2000 IRRIGATION EQUIPMENT — DESIGN, INSTALLATION AND OPERATION OF SPRINKLER IRRIGATION SYSTEMS — CODE OF PRACTICE

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OPERATION

The purchaser shall be supplied with written operational data, performance, and layout details of the system and its components including:

a) sprinkler make, model, performance, and nozzle diameter;
b) design layout of sprayline;
c) design pump duty; and
d) correct range of operating pressures for the system.

The supplier or his agent shall demonstrate the important aspects regarding the operation, care, and maintenance of the unit including methods of shifting and setting up the portable components of the system.

Wiring and starting equipment for electrically operated planta shall comply with Electrical Code 1985. Electric motors shall be provided with overload, low-voltage, and inter phase variation protection.

Pumps, power units and transmission shall be effectively guarded.

IS 14792 : 2000 IRRIGATION EQUIPMENT — DESIGN, INSTALLATION AND OPERATION OF SPRINKLER IRRIGATION SYSTEMS — CODE OF PRACTICE

RESPONSIBILITIES OF MANUFACTURER/DEALER

- *Investigation*
- *Design and information to purchaser before sale*
- *Installation*

RESPONSIBILITIES OF PURCHASER

- *i. Request for Service*
- *ii. Purchase for Equipment*

List of India Standards on MIS

Thank You…