1 Filtration systems

1.1 General

1.1.1 The design of the filtration system should take into account the worst case scenario due to seasonal changes in water quality.

1.1.2 Where ground water is used, biofilm is often formed and developed in laterals and emitters.

Filtration, a physical water treatment, removes suspended material from the water entering the system to avoid its deposition in pipes and emitters. The filtration system is a primary, multistep means that facilitates the separation and disposal of suspended materials.

1.1.3 The degree of filtration (mesh/micron) should be defined by the system requirements and should be sized according to the emitter manufacturer's specifications.

1.1.4 As filtration alone cannot provide a complete solution for the factors affecting the performance of emitters applying ground water, chemical and physical treatments should be used.

1.1.5 Depending on the circumstances, as many as three or more filtration locations, with a different filtration degree, should be installed along the system.

1.1.6 A filtration system should be designed to consider the reservoir, the intake water quality and distance between the reservoir and the irrigated field.

1.1.7 Filtration should be carried through the following stages:

a) pre-filtration unit — in the reservoir outlet;

b) primary filtration unit — with filtration requirements per emitter manufacture recommendations;

c) check filter — following the primary filtration, which should not be finer than the primary filtration.

1.1.8 Pre-filter and primary filters in the multistep filtration should be self-cleaning filters.

If a signal is not received after a certain time period has passed, the flushing process should start.

1.1.9 In automatic filter batteries, a flushing controller should detect excessively frequent self-cleaning or flushing cycles shorter than time pre-set. Excessive flushing cycles or short run cycles should indicate adverse change in TWW quality such as increased dirt load requiring the operator's immediate attention.

1.2 Filtration battery manifold structure

1.2.1 Due to TWW quality variation, a filtration battery manifold should include extra fittings that should be ready for a fast connection of supplementary filter units, in case they are needed.

1.2.2 To balance the load on the battery's filters, the battery should be installed in a way that allows for each filtration unit to have the same hydraulic loss.

1.3 Filtration technology — Filtration media

A filtration media should be used for TWW.

The type of filtration media (e.g. screen, disc, gravel) should be selected according to its resistance to corrosive water and the chemicals utilized

1.4 Flow/filter area ratio

Depending on the TWW quality at the reservoir, harsh TWW conditions should be considered. Filtration systems should be designed allowing 50 %–70 % of the nominal flow rate of filtration in order to overcome high backwash frequencies.

1.5 Filtration stations location in accordance with flow direction

1.5.1 A self-cleaning strainer filtration unit with a 250 and coarser micron pore size for the removal of coarse dirt should be installed at the outlet of a low quality TWW source or at pump suction inlet,

1.5.2 The main filtration TWW passage should comply with dripper/micro-sprinkler requirements. The battery or the filter should have an automatic flushing mechanism.

The main filtration should be in proximity to the irrigated plots.

The filtration system should consist of a battery of filters in order to prevent irrigation interruption.

The check filter should be a manually flushed disc and screen filter of 130 micron, to enable examination of the materials accumulated on the filtration mediator.

1.5.3 When the battery is located near the operational reservoir, backflush TWW should be returned to the reservoir, at a location distant from the pumping point. Wind regime in site should be considered.

1.5.4 When a battery is located at an area where flushing TWW cannot be discharged, a special pipe installation should be considered, to return flushing TWW back to the reservoir.

Such a piping system should include hydraulic considerations in the design.

Resistance along the return stream should be minimized, to optimize the backflush efficiency.

An alternative way to return backflush TWW from the filter to the reservoir can be employed by filling up a water tank which is occasionally emptied into the reservoir, at a location which is distanced from the pumping point.

1.5.5 For a distant or isolated irrigation plot inlet, to prevent flushing TWW nuisances, backflush TWW should be captured and removed in a way that does not contaminate the soil and underground water resources.

1.6 Filtration grade

The size of filtration required (e.g. media discs or screen) should correspond with the requirements of the emitters as prescribed by the manufacturer. In filtration, water passages ratio should be 1:10 in drip irrigation, and 1:7 in micro-irrigation.

1.7 Manual filter cleaning

If flushing cannot remove all particles, to avoid accumulation of scale or sticky substances on the body of the filter, the filtration mediator should be cleaned periodically and thoroughly.

The periodical cleaning of the disc filter should be executed by dismantling the filter interior out of the filter housing and immersing it in chemicals, i.e. acid and hydrogen peroxide.

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