From the Board

Control Filter Rates Without Rate Controllers


Shirish Kardile

Traditionally, rapid sand (rapid gravity) filters in India have employed float-operated rate-of-flow controllers. The flow controllers consist of a rate-sensing device, rate-setting device, control mechanism, and control valve. The effluent control valve is automatically adjusted to maintain the desired preset level in the filter bed, thus ensuring constant flow.

Such a system is expensive to purchase and maintain. For example, a float-and-fulcrum system is highly maintenance prone; the float in the bed often becomes nonoperational, requiring manual intervention to regulate the water level. If the system's filter outlet weir is below the media, accidental dewatering also occurs. Such failures lead to uncontrolled flow rates and hence affect treated water quality. In India, wherever such mechanisms are installed, they become defunct within a few months of a plant's commissioning.

Now rate-of-flow controllers are being replaced with more popular and reliable constant-rate filters with influent splitting systems. A weir is constructed in a box at the inlet of each bed to ensure the flow of incoming water is distributed equally over all the beds. The filter outlet's weir crest is 0.15–0.20 m above the top of the media to avoid negative head-loss buildup and accidental dewatering. No control is required over the filter outlet valve, as it's a simple on-off valve.

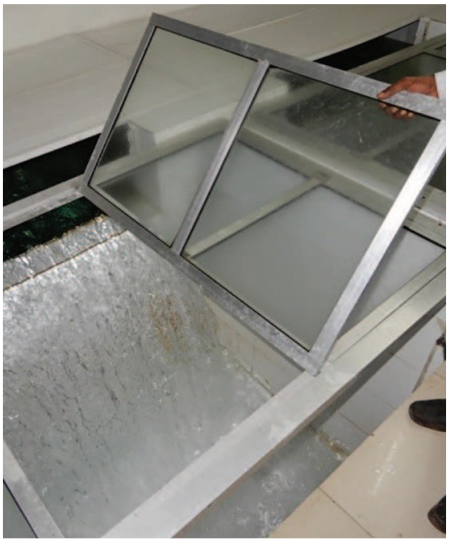
During the filtration cycle (service cycle) the water's initial operating level is low (height of outlet weir crest + initial head loss). As the media starts clogging, the water head above the media starts increasing gradually. Normally, the water level in the bed reaches up to the crest of the influent splitting weir, the service cycle is completed, and the filter is taken out of service for a backwash. The level difference in the crest of the filter outlet weir and the influent splitting weir is normally 2–2.25 m, which is the maximum allowable head loss.

This is the simplest and most operator-friendly system. The head loss is visible in terms of the bed's water level, and no maintenance-prone gauges are required to observe head loss. A simple "scale" painted on the filter bed's wall shows the developing head loss. Sometimes, if filter automation is desired, an electronic or ultrasonic flow indicator is provided.

When a filter is taken out of service for a backwash, the additional water gets equally divided over the rest of the beds. The uniform and incremental flow gradually increases the rate of filtration in the beds until the backwash is completed. Because there's no hydraulic "shock loading," the treated water quality remains unaffected.

The only disadvantage of such a system is that an extra filter box depth of 1–1.5 m is required to accommodate reasonable head loss up to 2 –2.25 m. Extra concrete costs are compensated over a short time, compared with the capital and maintenance costs associated with rate-of-flow controllers. Constant-rate filters are becoming more popular in the Indian water filtration market because of their simplicity and reliability.

—Shirish Kardile,
AWWAIndia Past Board Chair



Throughout India, defunct rate-of-flow controllers (left) are being replaced by constant-rate filters with influent splitting systems (middle), with the filter outlet's weir crest above the top of the media (right).

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