



FACTSHEET

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DRUM FILTERS

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Introduction

A drum filter uses a rotating screened drum to filter solids out of washwater. It is best suited to removing coarse solids early in a treatment system. Drum filters produce two different streams, the clarified water that can be further treated if necessary to be discharged or reused and the waste stream of concentrated solids.

Description

Drum filters can be installed as a gravity-fed system or fed with a pump. The path through the system begins when water enters the inlet and flows through the screen (Figure 1 and 2); different screen sizes can be used depending on the size of solids in the water. The treated water which exits through an outlet may be treated further for either discharge or reused for a primary wash. As the screen becomes clogged with the solids, the water level rises within the drum. At a specified level a motor rotates the drum so that the

clogged portion is over a collection tray. A spray bar outside the drum sprays recycled water, collected from under the drum, through the screen and removes the solids which fall into the collection tray (Figure 3). The waste flows into a collection basin through the waste outlet. This system creates a concentrated waste stream which can be further treated or disposed. There is a water fraction in addition to the solids in the waste as it is used to remove the solids from the screen. The percentage of solids in the waste stream is dependent on the initial concentration.

The spray cycle is operated by a programmable logic controller (PLC) that will rotate the drum the water once the level sensor has been tripped. This is useful for inconsistent flows as it operates on an as-needed basis. Changing the duration of the spraying will impact the water to solids ratio in the waste stream.

There are several factors to consider when selecting and sizing a drum filter. The screen size is dependent on the size and

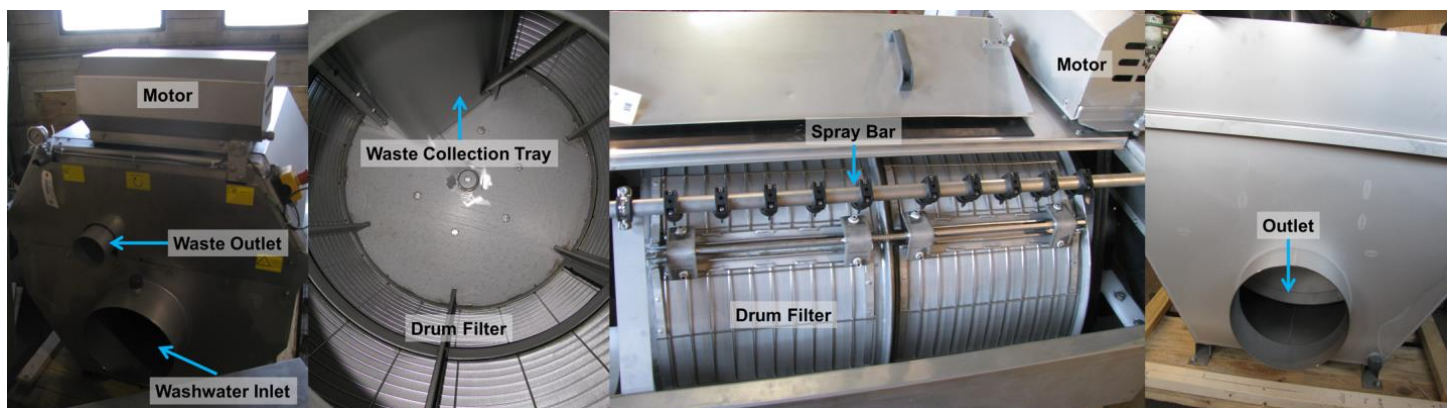


Figure 1: Components of a drum filter (HMGA Water Project)

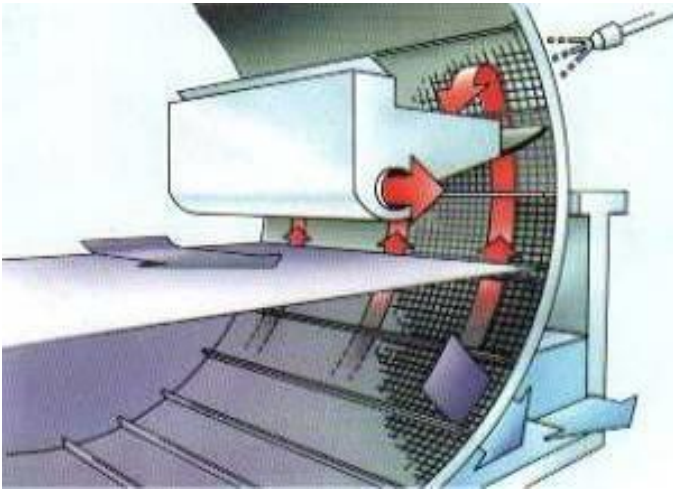


Figure 2: Path of washwater (purple arrows), solids and waste (red arrows), and treated water (blue arrows) through a drum filter (Belshaw, 2010)

characteristics of particles to be filtered. The dimensions of the drum are a function of the solid loading rate, which is based on the concentration of solids and washwater flow rate (Figure 4). A heavier solid load decreases the maximum flow rate that the filter can treat. A lower flow with a large solid load may require the same size filter as a high flow with very low solids.

System Placement

Drum filters remove solids like soil particles and are meant to be placed early in the washwater treatment system prior to finer solid removal or polishing steps. It can be applied in recirculation systems as well; for example, it can be positioned to treat washwater from later stages that can be reused as an initial wash.

Considerations

A drum filter is an indoor treatment system that can be integrated into an existing system with minimal modifications. It can handle inconsistent flows as it operates only when necessary.

The waste stream produced by the treatment must be disposed of on a regular basis. The waste could be composted or

dewatered to make it further concentrated and more easily handled due to decreased volume. The decision on which option to proceed with is dependent on the quantity which is a function of the flow rate of washwater and the solid load, as well as the efficiency of the system. When considering a drum filter, a plan to manage the treated water and waste should be formulated prior to making a final decision.

The purchase and installation of equipment is a capital cost, but does require some electricity on an on-going basis to power the drum rotation. Waste disposal will be an additional cost if it requires additional



Figure 3: Solids trapped by the screen, displaying the water level, left behind after being drained (top) and the spray bar removing solids from the screen (bottom) (HMGA Water Project)



Size (L x W x H)	61" x 53" x 47" 1.55 m x 1.35 m x 1.19 m	25" x 22" x 24" 0.64 m x 0.56 m x 0.61 m
Flow @ 10 mg/L TSS	1000 US gallons/min 3785 litres/min	105 US gallons/min 397 litres/min

Figure 4: Comparison of two drum filters, front (left picture) and back (right picture) of units, dimensions (not including stands), and the recommended flow rate at a specific total suspended solid (TSS) load (Pictures from HMGA Water Project)

treatment, storage, or removal by hauling off-site. The lifespan of a drum filter is ten years or more.

Performance

The duration of the spray cycle significantly impacts the concentration of solids in the waste stream. Over the course of a test completed by the HMGA Water Project, the change of total suspended solids in the waste stream before and after the drum filter went from 46 to 71% through manipulating the spray cycle (Figure 5).

The screen sizes available for drum filters are not suitable for fine solids. Thus, additional treatment for smaller particles will be necessary in some situations.

Drum filters are not recommended for washwater with solid loads above 25 mg/L. However, the HMGA Water Project demonstrated the larger unit shown in Figure 4 with washwater averaging a total suspended solid load of 6710 mg/L during the test. The unit lowered the suspended solids to an average of 2375 mg/L. At these solid loads the system is not as efficient as it could be due to necessary rapid rotating.

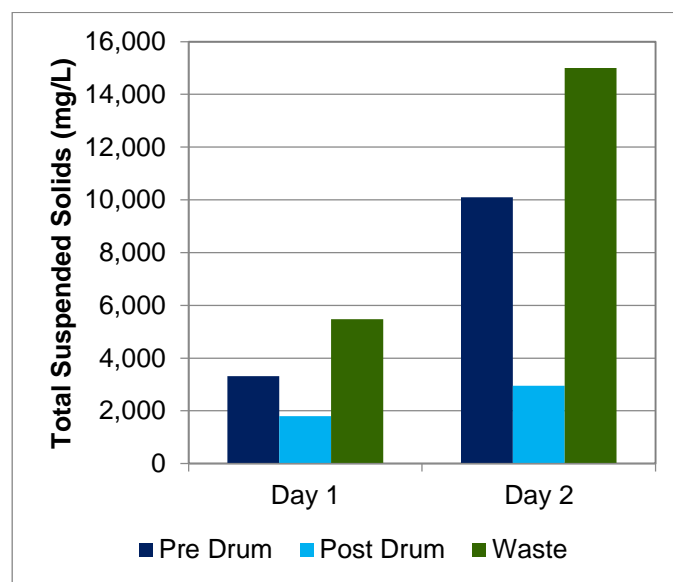


Figure 5: Total suspended solids in pre drum, post drum, and waste samples prior to optimization on day 1 and after on day 2 (HMGA Water Project)

Cost

The cost of a drum filter is directly related to the water flow and solid load as those are the two factors that determine the required size. Pumps may be necessary where

gravity systems are not feasible. Costs associated with the waste stream depend on how it will be disposed.

Conclusion

When a drum filter is properly sized and optimized, it is an efficient on-demand system that will remove coarse solids from washwater.

References

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