

## Frequently asked questions

### PERFORMANCE

**Q. What does the Jellyfish filter system do?**

It removes fine sediment and pollutants that attach to fine sediment, such as particulate-bound phosphorus, metals, and organics. The Jellyfish filter, at flow rates up to 50 gpm per cartridge, is designed to remove greater than 86% Sil-Co-Sil 106, which is a fine PSD (median particle size of 23 microns) frequently specified in testing protocols such as those prescribed by Washington State Department of Ecology (TAPE) and New Jersey Department of Environmental Protection (TARP).

**Q. What else does the Jellyfish filter system treat?**

The Jellyfish also removes floatable pollutants such as oil and trash, which are segregated from the filtration zone. It also removes coarse sediment and adsorbed pollutants. The system integrates pretreatment and filtration in a single compact structure, typically without the need for a separate upstream pretreatment device.

**Q. How much of the total phosphorus and heavy metal load can the system remove?**

The Jellyfish system is projected to remove at least 50% total phosphorus, based on widely published independent research data that shows particulate-bound phosphorus is typically the dominant contributor to the total phosphorus load. Significant levels of heavy metals that attach to fine sediment will also be removed.

The Jellyfish system design is amenable to modifications that allow incorporation of specific adsorptive media, such as Sorbtive™, for use as a polisher in removing dissolved phosphorus and dissolved metals.

**Q. Can the Jellyfish filter system be used as part of a treatment train?**

In some installations, it may be desirable to incorporate the Jellyfish into a treatment train, using a Stormceptor® as a pre-treatment and spills capture device upstream of the Jellyfish system to extend the service life and maintenance interval of the Jellyfish filter cartridges. The Stormceptor system's scour prevention (internal bypass) feature can also be custom-configured to divert excessive flows around the Jellyfish system. In this manner, the Stormceptor serves a dual purpose as pre-treatment and as a diversion structure for flows that exceed the Jellyfish filter system's operating capacity.

## CONFIGURATIONS

### **Q. What configurations are available?**

The standard Jellyfish filter systems are cylindrical precast concrete or fiberglass reinforced plastic (RFP) manhole structures with inside diameter of 4, 6, 8, 10, or 12 feet. The system can also be configured as a rectangular vault structure for small applications such as catch basins or large applications where a rectangular vault may have advantages compared to a manhole structure.

For very large drainage areas, multiple structures can be configured in a series arrangement.

### **Q. How are bypass flows handled?**

An external bypass diverts flows in excess of the maximum operating rate around the Jellyfish system. In installations where the Jellyfish is incorporated into a treatment train using a Stormceptor® as an upstream pre-treatment device, the Stormceptor system's scour prevention (internal bypass) feature can be custom-configured to divert excessive flows around the Jellyfish system.

The Jellyfish is designed with the flexibility to be used as a bend structure in the storm sewer piping system. This permits a wide range of angles between influent and effluent pipes, which can be a distinct advantage in retrofit and redevelopment situations.

## SYSTEM SIZING

### **Q. How is the Jellyfish filter system sized?**

There are two primary criteria for sizing the system – the water quality treatment flow rate and the annual sediment mass loading. The system is sized with the minimum number of cartridges and appropriate vessel configuration that address both criteria.

The water quality treatment flow rate is determined using methods approved by the local jurisdiction. The approved methods vary considerably. In some cases, methodologies such as the Rational Method or TR-55 are used; in others, it may be common to use continuous simulation modeling.

In some jurisdictions, a water quality volume (% volume capture) is specified for treatment rather than a water quality flow rate. In these cases, it is typical to treat the flow rate corresponding to the specified volume capture percentile on the hydrograph.

In other jurisdictions, detention of a specified volume of runoff is required, followed by treatment. A Jellyfish system employed downstream of a detention structure is typically sized to treat the water release rate specified for the detention structure.

The consulting engineer is encouraged to contact the local Imbrium Systems Stormwater Specialist for assistance with system sizing.

**Q. What are the standard tentacle lengths in a Jellyfish filter cartridge? Does the tentacle length affect the depth of the vessel?**

The Jellyfish filtration tentacles come in three lengths - 18, 36, and 54 inches. A cartridge contains tentacles of one fixed length. The tentacle length directly affects the depth of the unit. For the typical manhole structure that uses 54-inch tentacles the total depth will be approximately 13 feet. This accounts for the tentacle length below the cartridge deck plus 2 feet of sump, and for working head space above the cartridge deck needed for maintenance servicing.

## FLOW CAPACITY

**Q. What is the flow capacity of a Jellyfish filter cartridge?**

The flow capacity of a cartridge will vary depending on the cartridge diameter, tentacle count, tentacle length, and the available driving head.

In a given system, a draindown cartridge will typically have 50% of the flow capacity of a standard (back-washable) cartridge.

**Q. How is the flow controlled?**

The diversion manhole of the external bypass is configured with a weir to control the maximum flow rate that can flow to the Jellyfish system. In addition, flow control orifices are used on the standard and draindown cartridges.

## MAINTENANCE

**Q. What is involved in a typical maintenance servicing?**

A maintenance servicing typically has two primary stages. After removing the manhole covers, a vacuum hose is lowered from the surface through the 30-inch maintenance access pipe and used to evacuate the accumulated trash, oil, and sediment. The next stage involves replacement of the exhausted filter cartridges with fresh cartridges. This step requires access to the cartridge deck by climbing down the ladder mounted in the sidewall of the vessel. Maintenance personnel trained in confined space entry procedures are required to change out cartridges.

Evacuated pollutants are disposed of according to local guidelines. Spent cartridges will typically be disposed of as solid waste.

**Q. What is the expected maintenance interval?**

The Jellyfish filter system is typically designed for a minimum 12-month maintenance interval. Quarterly inspections are recommended in the first year of service to gauge system performance. Semi-annual inspections are recommended subsequently, and the maintenance interval for vector service and cartridge replacement adjusted based on actual site experience.

## COMPARISON WITH CONVENTIONAL GRANULAR MEDIA-BASED FILTRATION SYSTEMS

**Q. How can the Jellyfish filter system achieve such a small footprint?**

Each Jellyfish filter cartridge is loaded with filtration tentacles, which together provide much higher available surface area per unit of treatment flow compared to conventional granular media filter cartridges. This increased surface area allows each cartridge to be much smaller in diameter than granular media filter cartridges of similar flow capacity. For example, a Jellyfish cartridge with a flow capacity of 50 gpm is 12 inches in diameter compared to 19 inches in diameter for a conventional cartridge that is rated from 7.5 – 15 gpm. In order to provide enough cartridges for 50 gpm of treatment capacity, the conventional system occupies more than 8 times as much plan view surface area for cartridge placement compared to the single Jellyfish cartridge. As a result, a much smaller installation footprint is required to accommodate the far fewer number of small-diameter Jellyfish cartridges.

**Q. How can the Jellyfish filter cartridge achieve such a high flow rate?**

The unique membrane filtration tentacles of a Jellyfish cartridge feature both superior hydraulic conductivity and vastly increased surface area compared to conventional granular media cartridges. For example, a conventional 19-inch diameter granular media cartridge rated at 7.5 to 15 gpm has filtration surface area of 7.5 ft<sup>2</sup>. In comparison, a 12-inch diameter Jellyfish cartridge rated at 50 gpm has filtration surface area of 76 ft<sup>2</sup> – more than 10 times the surface area!

**Q. How does the weight of the Jellyfish cartridge compare to conventional granular media cartridges?**

The Jellyfish cartridges are extremely lightweight compared to conventional granular media filter cartridges. The weight of 12-inch diameter cartridge with 54 inch tentacles is about 20 pounds dry and less than 50 pounds wet. This compares favorably to conventional cartridges which typically weigh from 125 to 400 lbs when wet. With the Jellyfish system, manual replacement of cartridges is easy - there is no need for heavy equipment to do the lifting and transporting during maintenance activities.

## JELLYFISH SYSTEM FEATURES

**Q. What self-cleaning mechanism does the Jellyfish system employ?**

The Jellyfish system employs 3 self-cleaning mechanisms to remove accumulated sediment from the tentacles and extend the cartridge service life – gravity, tentacle motion and collision, and passive backwashing. Unlike conventional granular media filter systems that use float valves and anti-siphon valves, the Jellyfish system uses no mechanical apparatus that can stick and malfunction.

For more information, please contact an Imbrium Systems representative at:  
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