

**The importance of proper swimming pool or spa filtration can not be overstated. The reasons for filtration are obvious — clear water not only looks beautiful, but it is also necessary for health and safety reasons. Much of the material suspended in the water, derived from plant and animal sources, provides food for bacteria and algae. It is these materials that must be removed if a pool or spa is to be maintained in a safe and sanitary condition.**

**The three most popular types of filtration currently in use in residential pools and spas are high-rate sand, cartridge and diatomaceous earth (D.E.). Each method of filtration is explained below.**

### High-Rate Sand

The oldest and most popular method of filtration is sand. Sand filters share two things in common: 1) When in the filtration mode, water always flows from top to bottom; 2) They all have some sort of lateral or underdrain with slots to hold back sand while allowing clean, filtered water to pass through.

High-rate sand filters use a special filter sand, normally .45 to .55 mm (also known as pool-grade #20 silica sand), because it has sharp edges that serve to separate particles, allowing filtration to take place. They operate on the basis of “depth” filtration; dirt is driven through the sand bed and trapped in the minute spaces between the particles of sand. Initially, a clean sand bed will remove larger particles, and then, as the bed starts to load up, it will remove finer particles.

Cleaning of the media, or sand bed, is accomplished through reversing the flow through the filter, to the “waste” line. This is known as backwashing.

### Cartridge

Cartridge filtration has been available for a relatively long time, but only recently has it begun to enjoy rapid growth and acceptance.

When water passes through a cartridge filter, dirt is screened out at the surface of the cartridge element. When clean, the element will trap larger particles, with finer particles being filtered out as the pores of the element become clogged by the larger debris.

The cartridge element can be removed and cleaned by pressure washing inside and out with a garden hose.



High-Rate Sand Filter



Cartridge Filter



Vertical Grid Diatomaceous Earth (D.E.) Filter

### Diatomaceous Earth (D.E.)

Many pool professionals consider D.E. filtration to be the finest, because it is capable of removing smaller particles than either sand or cartridge.

Diatomaceous earth is a porous powder with microscopic openings, that, when magnified, look like tiny sponges. Clear water can pass through these openings, but particles, as small as five microns, are trapped the first pass through the media.

All D.E. filters have internal elements that become coated with D.E. It is this “filter cake” that strains dirt, dust, algae and some forms of bacteria from the water.

Similar to sand filters, when a D.E. filter becomes dirty, it is cleaned either by backwashing the clogged D.E. to the “waste” line or regenerating and draining. To restore filtration, a fresh “charge” of D.E. is added to the filter.

### Water Chemistry

Whatever method of filtration is selected, it is important to remember that filtration alone does not keep water looking its best. Proper water chemistry must also be maintained for safe, clean water. Most pool owner complaints are directly related to water chemistry or improper sizing of filters and pumps rather than equipment failures.

### Technical Data – Filtration

Filtration Method	Suggested Filtration Rate		Approximate Filtration Range (Microns)
	Residential (GPM/ft. <sup>2</sup> )	Commercial (GPM/ft. <sup>2</sup> )	
High-Rate Sand	20	15	20 to 40
Cartridge	1	.375	10 to 20
Diatomaceous Earth	2	2	5

Sources: (1) NSPI. Basic Pool & Spa Technology (2/88 Edition; Section 1.4: Filters)

(2) Hayward Pool Products Technical Bulletin TMF-12.

For proper filter sizing techniques, please see “Filter Sizing” section 4B on page 23.