

An Introduction to The “Hamburg-Matten” Filter and Poret Filter Foam

– Simple, Cheap, Flexible and High Performance DIY Filter Systems

by Paul Garrett

While I was browsing overseas aquarium web sites and forums last year, I came across a couple of terms I was not familiar with - “Hamburg-Matten filters” and “Poret”. It turns out that the Hamburg-Matten is a type of filter in common use in Europe for the past twenty years and that Poret is the brand name of the “special” foam used to make the best of them.

From what I could work out, the Hamburg-Matten filter could be as simple as a block of Poret (or similar) filter foam set up so that the aquarium water was continuously passing through it. The “secret” (if there is one) is to maximise the surface area of the foam acting as both a mechanical and biological filter and to ensure that the flow-rate was optimised for the growth of the “good” bacteria that do biological filtration (converting ammonia to nitrites and nitrites to nitrates).

Poret foam is a semi-rigid open-cell polyether foam (it is very similar to the foam supplied with Eheim canister filters) and comes in several grades from coarse (at 10 pores per inch) to very fine (45 pores per inch). It is most commonly sold in blocks that are 5cm thick but 3cm and 7.5cm thickness are available in some densities. The foam is very high quality and can last many years without the cells degrading or collapsing as happens with some cheaper (and even some more expensive!) alternatives.

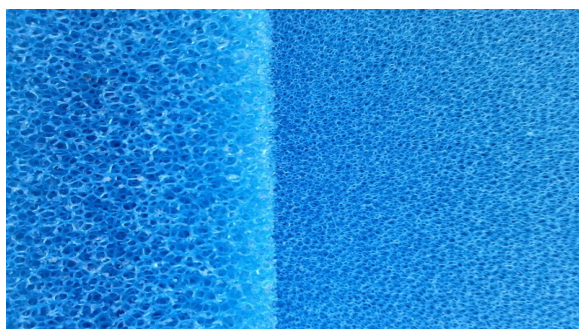
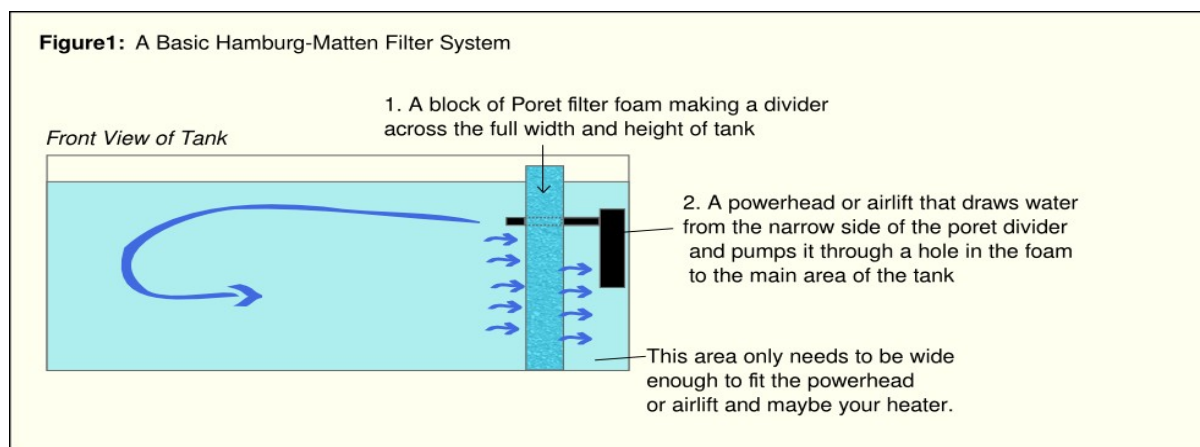


Photo 1: The open cell structure of Poret filter foam provides a massive surface area for bacteria and allows the free flow of water. This picture shows 20 Pores Per Inch (PPI) medium density foam (left) and 30 PPI high density (right).

In its simplest form, A Hamburg-Matten filter system looks like Figure 1.



It really is very simple, both in theory and practice. The powerhead or airlift moves water to the main area of the tank and it flows back through the foam to the narrow reservoir. The only “trick” seems to be ensuring that the flow rate is neither too low nor too high to get the optimum biological filtration through bacterial nitrification. You can do a lot of maths and science to figure out the “right” flow rate (there are papers on the internet about it, of course) but there is also an easy “rule of thumb” you can use for “normally proportioned” tanks - make sure the flow through the filter mat (the flow rate of the powerhead or airlift) is between 3 and 5 times the tank volume per hour.

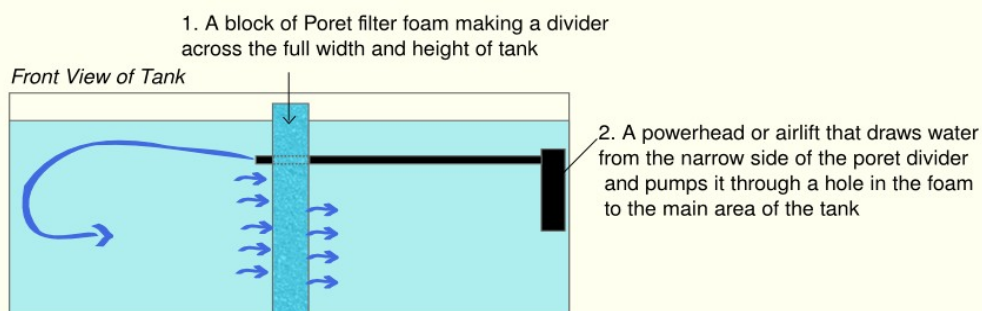
That means, for example, that for a 60cm x 30cm x 30cm aquarium (a standard 2 foot tank) the flow rate should be between around 150 and 250 litres per hour. There are many small, cheap powerheads in that range. On the same basis, a 90cm x 45cm x 45cm tank (180 litres) would need a powerhead moving between 540 and 900 litres per hour. Do note that these flow rates are very low compared to what some of us have regarded as normal or adequate for a good biological filter. In some applications you might need to provide additional water movement or aeration on the “tank side” of the filter.

The foam itself can be easily cut or pierced with a sharp knife and it retains its dimensions and shape even when fully soaked. By cutting the block a couple of centimetres wider than the tank, it fits snugly and doesn't need any additional support.

In this basic form, a Hamburg-Matten filter is convenient and effective and a lot less trouble to install and maintain than almost anything else I know. The foam rarely, if ever, needs cleaning beyond an occasional vacuuming when doing a water change. If it does start to become blocked, you will know because the water level in the reservoir area will drop below that of the main area of the tank. If that happens, you just take the foam out and hit it against a wall a couple of times to loosen any trapped mulm! No rinsing required.

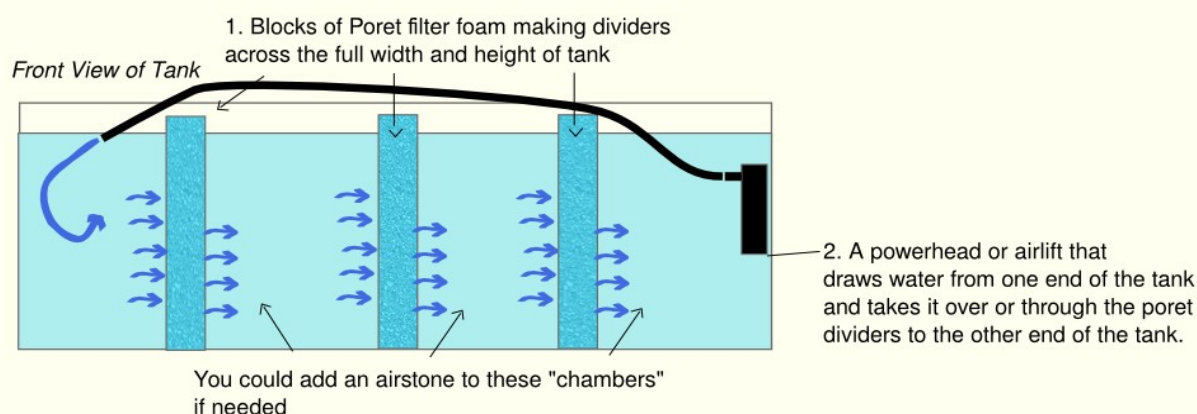
It isn't really suitable for display aquariums of course and for a "one-off" small DIY project obtaining the foam and fitting it is probably more trouble than installing a traditional sponge filter. And, just like any biological filter, a Hamburg-Matten filter must be properly "cycled" before using it with precious livestock.

Figure 2: A Hamburg-Matten Filter as a Tank divider



I think that where this system really comes into its own is in multi-tank and breeding set-ups where you can use the filter as a divider. Figures 2 and 3 show a couple of possible configurations.

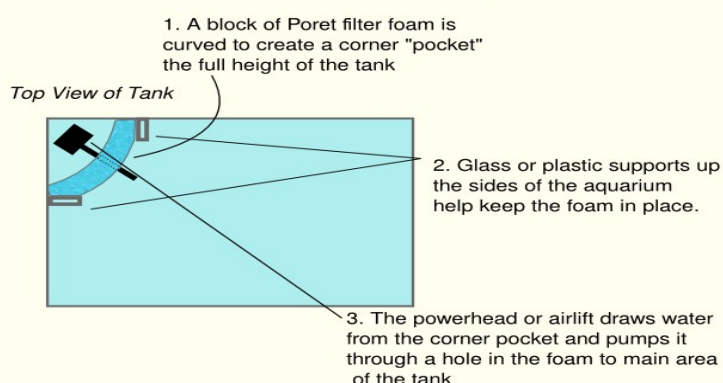
Figure 3: Using Multiple Hamburg-Matten Filters as Tank Dividers



These divided tanks have a lot of advantages. They are certainly a very flexible way to use your tank real estate for breeding fish and raising fry because the dividers can be easily moved to create different sized spaces while maintaining a single large volume of water. You can easily remove one or more dividers and keep them "alive" in a separate tank with adequate aeration.

One final variation on the standard filter (one that I haven't tried yet) is to create a corner filter rather than use the whole end of the tank. Figure 4 shows the basic idea.

Figure 4: Curving the Poret Foam to Make Hamburg-Matten Corner Filters



Poret is also apparently highly suitable for sump filters, including the wet-dry kind. It is also ideal material for home-made air-driven sponge filters.

Some Interesting Additional Snippets

- The two finer grades of Poret (30 and 45 pores per inch) are fry- and shrimp- safe. I have even had dwarf cichlid parents take a school of very small fry to the filter wall to graze on trapped food and infusoria.
- You can attach moss and plants such as Java Fern and Bolbitis directly onto a Poret filter pad using thread or fishing line. This creates some interesting possibilities for “moss wall” filters.
- There is some debate (on-line) about whether the Hamburg-Matten filter is also performing denitrification. The theory goes that only the first centimetre or so of the filter can have enough oxygen to support nitrifying bacteria and that denitrification by anaerobic bacteria occurs in the back half of the filter.
- People are also planting terrestrial plants (including vegetables and herbs!) into the top of their Poret filter pads to create an instant Aquaponics setup – see this thread at the AquariumLife forums – <http://www.aquariumlife.com.au/showthread.php/50180-Aquaponics-setup-in-our-hatchery>. Of course, having plants, either terrestrial or aquatic, using the nitrates produced by the filter is another good way to control their build-up in the tank.
- You can also use Poret as a combined substrate builder and filter in aquascapes, paludariums and terrariums by building up pads on the floor of the tank and covering them with substrate (or perhaps fibreglass?) – you just need to make sure you have adequate water flow through the pads.
- Any off-cuts can be used in traditional cannister, hang-on-back or internal aquarium filters.

Cost

I have not been able to find an Australian supplier of Poret foam so have bought mine online from a New Zealand based aquarium business (link at the end of this article). There are several different grades and thicknesses available and a couple of different standard sheet sizes. Your cost per tank will vary with these factors and how you choose to structure your order. On the basis of their current prices, you could, for example, get a one metre square sheet of 5cm thick high density foam for around \$125 Australian. Add \$15 freight (it weighs very little) and you would have sufficient Poret to equip 9 standard 2 foot tanks at less than \$16 per tank (plus the cost of airlifts or powerheads). The same sheet would make four dividers for a tank with a 45cm x 45 cm or 50cm x 50cm end dimensions. If you have particular needs for particular sized sheets, I'm sure you could talk to Greg Van Der Poel who owns the business. Remember that Poret is not a “consumable” like many other filter pads – it lasts indefinitely.



Photo 2: A precut 33cm x 33 cm x 5cm thick block of Poret 30 PPI foam ready to use as a filter or divider. The blue colour seems to be “traditional” and easiest to find but it does come in a variety of colours.

Conclusions

Hamburg-Matten filters made of Poret filter foam are a versatile, low maintenance way to provide excellent mechanical and biological filtration at a fraction of the cost of high-end filter systems. They seem to have proven their worth over a long period of time in Europe. For serious fish keepers, they could open up some really effective and efficient options for production systems without increasing the “foot print” of an existing setup. My own Hamburg-Matten systems (4 tanks) have been running for only a few months now but they certainly work well as both biological and mechanical filters and show no signs of needing any maintenance at all. Designing a rack of tanks around the

Hamburg-Matten system (by using long tanks and dividing them with blocks of Poret) could really drive down the cost of a big setup. The Poret foam itself has lots of other uses and is a very handy material to have around the fishroom – in one of Greg Van Der Poel's videos he calls it “Duct Tape for Fishtanks” which, if you know anything about DIY, is very high praise indeed!

Links

<http://www.janrigter.nl/mattenfilter/> A long but excellent article, somewhat technical, about Hamburg-Matten filters. This article contains the formulas for working out optimum flow rates -and the science behind them.

<http://www.swisstropicals.com/> A breeder and shop in the US who sells Poret and has many interesting applications for it – including several not covered in this article. Lots of information and photos of Poret in action in a sophisticated production fishroom.

<http://www.poret-aquarium-filter.co.nz/> This is Greg Van Der Poel's site. He is a New Zealand based breeder and runs an online shop for Poret – He has several pictures and videos of Poret being used in different applications, including his own African Cichlid breeding facility. This is probably the most cost-effective and accessible source of Poret for Australian aquarists (it is where I bought mine). Freight is cheap and Greg is a delight to deal with.