

Doulton Ultracarb and Sterasyl elements, both, slimline and imperial series ceramics

Cysts - Beaver Fever, Cryptosporidium Oocysts, Giardia Test Performance

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Procedure:

The 8 1/2" Ultracarb ceramic candle was inserted into the single filter unit housing as instructed. The unit was then connected to a 5 gallon pressure vessel. An initial pressure test was conducted by closing the terminal outlet, filling the pressure tank with 10 liters of dH₂O and pressurizing the system with 30 PSI of nitrogen gas. After checking for leaks, the 10 liters were allowed to flow through the filter. After depressurizing the system, the pressure vessel was filled with 10 liters of dH₂O and seeded with 10(8) formalized oocysts (10(7)/L). The water was stirred to ensure a homogenous distribution of oocysts. The system was again pressurized to 30 PSI and the water allowed to flow through the filter. Two liters were allowed to pass through the filter. Liter #2 was saved for processing. The outlet at the terminal end was shut off leaving the system under pressure. After 16 hours, liters 3-5 were passed through the filter saving liter #5 for processing. After leaving the system under pressure for 8 more hours, liters 6-10 were passed through with liter #9 collected.

Each one liter sample was filtered through a lum pore size Nucleopore polycarbonate membrane filter. The sample flask was washed with dH₂O + 0.1% Tween 80 (washing solution) to remove any residual material. The rinse was also filtered. Each filter was carefully removed and placed in a 50 ml conical tube (tube A). The filter was washed and vortexed 3 times. After each wash the contents were placed into another 50 ml conical tube (tube B). The volume in tube B (45-50 ml) was concentrated by centrifugation (3000 rpm in a Sorvall T-6000B centrifuge for 10 minutes). The liquid portion was aspirated down to 1 ml, then mixed to resuspend the pellet. This pellet is a 1:1000 concentration of the original liter and represents a theoretical oocyst count (assuming no oocysts were trapped by the filter) of 10(10) oocysts/ml. Samples of the suspension were then placed in a hemacytometer and counts were made in triplicate at 400X mag. giving a particle concentration in oocysts per ml. This figure was then multiplied by the final volume of the suspension to give the total number of oocysts recovered. This number was divided by the seeded concentration value times 100 to calculate the percentage of oocyst removal.

Water quality challenge conditions:

Tap water
NTU = 0.2
pH = 7.8
TDS = 630mg/L
TOC = 3.4mg/L

Table 1:	Removal of Cryptosporidium oocysts	
Sample	# Oocysts Recovered	Percentage Removal
1) Liter #2	none	100%
2) Liter #5	none	100%
3) Liter #9	none	100%

Discussion:

This filter unit performed very well and **far exceeded the EPA** recommended 3 log reduction (99.9% removal) of parasitic cysts.

The black and white particulate matter found in each sample was carbon and ceramic which had been washed from the filter. This occurred even after the candle had been flushed with 10 liters of water prior to the start of the testing phase. It would be recommended therefore that more water flushing (more than 19 liters) be done on new units to remove this loose particulate matter prior to use. There were no detectable external leaks.

Signed

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