

Tough new family of Zytel® resins for USFilter CMF system housing

USFilter is meeting needs for a strong, long-lasting filter housing for its water microfiltration system with glass-reinforced Zytel® nylon resins based on PA612 polymer technology.

By James F.B. Patterson, DuPont Engineering Polymers, Australia

Worldwide water and wastewater treatment specialist, USFilter, has adopted Zytel® PA612 nylon resins tailored to deliver the structural strength and toughness required by filter housings for its Memcor® brand Continuous MicroFiltration (CMF) system.

The CMF system's new housing of Zytel® was developed at the company's Australian USF Memcor® plant in South Windsor (NSW) and launched in mid-2000.

The increased costs of conventional water filtration methods, combined with

the highly effective and cost-effective separation of new membrane micro-filtration methods, have brought the process to the forefront of water production and reuse technology in recent years. USFilter is a company with global sales, headquartered in Timonium, MD (USA). Based on microporous membrane technology, USFilter's Memcor® Continuous MicroFiltration (CMF) systems remove a wide range of contaminants from water, including suspended solids, particles, colloids, algae, bacteria, yeast, protozoa and cysts. Proven in more than 700 installations worldwide

since it was first introduced in the 1980s, Memcor® CMF systems are used by municipal water, wastewater and water reuse treatment utilities. Capable of 6-log (i.e. 99.9999 per cent) removal of giardia and cryptosporidium, Memcor® CMF's in-situ integrity testing system validates removal down to two tenths of a micron, separating out virtually all solids and harmful microorganisms.

USF Memcor® Managing Director John Crapper, who is based at the South Windsor (Australia) facility, said: "The most critical factor in our selection of Zytel® PA612 was its ability to remain strong and tough when exposed to water over long periods of time. If parts become weakened, they can potentially fail as a result of dynamic flexing under water pressure. Leaks and failures would clearly be unacceptable to our customers."

The Memcor® CMF system consists of banks of vertically suspended tubular filter modules containing thousands of hollow microporous fibres. Unfiltered water enters the module under pressure, surrounding the outside surfaces of the fibres. It passes through the fibres' porous walls, depositing suspended solids and microorganisms on the walls' outside surfaces. Filtered water flows through the inside of the hollow fibres and exits at each end of the module.

The length of the housing measures 175 cm. Its moulded parts include a centre tube with a diameter of 130 mm, large upper and lower headpieces, and end caps, spacers and outer sleeves.



USFilter's Continuous MicroFiltration (CMF) system removes a wide range of contaminants from water.



State of the art microfiltration components of Zytel® from USFilter, which were developed at the company's South Windsor (NSW) Australia facility with DuPont,

The CMF incorporates a patented self-cleaning gas backwash. Filtration is halted periodically and compressed air is injected into the hollow fibres. The air passes rapidly through the fibres' porous walls, dislodging accumulated solids from the outside surfaces. The solids are then flushed away using feed water rather than filtrate.

Because backwashing and other aspects of the filtration process generate strong pressure pulses, USFilter set a burst-strength requirement of 3,000 kiloPascal (kPa) for the module's headpieces, centre tube and other parts under pressure. To meet this requirement, DuPont scientists developed a tailor-made, toughened grade of Zytel® PA612 that contains 33 per cent glass-fibre reinforcement and uses a proprietary DuPont toughening technology.

DuPont specialists also met the formidable challenge of optimising the toughened resin to the moulding challenges posed by the filter module's headpieces. Crapper explained: "The headpiece is designed to a very intricate, heavy and hard-to-mould specification. DuPont worked with us to come up with a formulation of Zytel® that meets this particular challenge." Each headpiece weighs around 3 kg and has a wall thickness averaging 5.5 mm. The part is cube-shaped, with each dimension measuring 180 mm.

Aside from the filter housing, USF Memcor® moulds other parts of its CMF system – for example the filtrate cups and outer sleeves – in standard, 33 per cent glass-reinforced Zytel®.

DuPont worked closely with USFilter to obtain worldwide certification for use in drinking water systems of both grades of Zytel® used in the new system. Crapper confirmed: "DuPont submitted all the necessary applications and materials data to

more filtration units, each containing 90 filtration modules interlocked and fitted with piping, valves and controls. CMF systems are also increasingly used for municipal and industrial wastewater recovery. Industrial units, comprising a smaller number of filtration modules, are used for a variety of other applications including filtration of fruit beverages and wine.

USFilter is owned by Vivendi Water, the world's largest provider of commercial, industrial, municipal and residential water and wastewater treatment systems, products and services with operations in more than 100 countries.



USF Memcor® Continuous Microfiltration system (CMF) filter housing uses a centre tube and head pieces of injection moulded from a toughened PA612 grade of Zytel® with 33 per cent glass reinforcement. End caps, spacers and outer sleeves are moulded from a second toughened PA612 grade of Zytel®, also with 33 per cent glass reinforcement.

smooth the way for us in marketing our 2000-model, CMF micro-filtration system." The system using the Zytel® nylon resins is currently certified safe by leading water authorities such as NSF International (Drinking Water Systems, Standard 61) and the UK's Drinking Water Inspectorate (DWI).

A typical CMF system to produce municipal drinking water comprises one or

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