

Neophil long lasting hydrophilic PVDF ultrafiltration in GIGAMEM large modules: Benefits and case studies of Polymem large plants performances

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Hollow fiber membranes, with a high packing density and an easy assembly in bundles and modules, are one of the most cost competitive solutions for water membrane filtration, re-use of wastewater, or prefiltration to reverse osmosis. Over the years, the investment and maintenance costs of such membrane systems have dramatically decreased and are now cost competitive with the conventional media filters. This was possible thanks to both module design evolution and associated process improvements. However, since the size of standard modules are today relatively small (from 4 to 12 inches), huge number of modules and huge number of associated connections, pipes and modules supports are necessary for the construction of large plants. It is a drawback for cost reduction which has reached a plateau. A way to start again costs saving, is to pass to larger pressurized module diameter. In this paper, a new and unique very large pressurized hollow fiber membranes module, developed recently by Polymem, is presented. The module, named Gigamem® UF240, with 600 mm diameter (24 inches) and 1.5 m height (60 inches), develops at least 540 m² of membrane filtration area. The module is

set directly on the ground, eliminating the need of module supports. Furthermore, since the inlet of raw water and the outlet of treated water are both located at the top of the module, only two headers located at the top, are needed. Hollow fibers are gathered in individual bundles which facilitates the maintenance of the membranes: removal of fiber elements, fiber integrity check and membrane replacement. During membrane replacement, only the fiber elements will be replaced thus saving the cost of module vessels replacement. These design improvements allow significant reductions in both capital investment and operating costs. Furthermore Gigamem® module is equipped with Neophil™ membrane. This membrane, jointly developed by Polymem and Arkema, is based on a Kynar® PVDF backbone in which a new amphiphilic bloc-copolymer is anchored durably. Compared to other PVDF membranes where hydrophilicity is given by hydrophilic polymer doping, the Neophil™ hydrophilicity is optimized and maintained during all the lifetime of the membrane plants. Cleaning frequency requirements stay identical since the beginning and permeability trends remain very predictable. In the paper, Neophil™ and Gigamem association benefits are presented in detail. Plants building, footprint reduction and investment costs are discussed and compared with previous membrane module generation. Finally, pilot trails and large plants performances are presented in oil and gas, pre-treatment to seawater desalination, water and wastewater treatments fields.

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