

Introduction of Membrane Filtration to LSS for the Aquarium-Technologies to Ensure Advanced Water Quality and Water Reuse -

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Recently, the typical technical trend for the aquarium includes the adoption of large-size tank for exhibition and closed recirculation system for life support system (LSS), which is expected to be increasing more and more in the future. Together with these developments, it's supposed that the supply with more clear water for large-size exhibition tanks and the recovery and reuse of backwashing wastewater for LSS should be required. Based on these future requirements, the traditional sand filtration for recirculated LSS is not enough, and the introduction of membrane filtration as one of alternative technologies for LSS was discussed in this study.

For the large-size exhibition tank for fish culture with the volume of several thousand m³, the visual water turbidity could be observed even with the "extremely good water quality" defined by the common water analysis, which was caused mainly by the micro particles with the diameter less than 1μm according to our findings. Furthermore, the water turbidity was also related to the structure of exhibition tanks and the numerical relationship was also proposed in this study. In order to remove the micro particles resulted to the water turbidity, it was supposed to introduce membrane for the better filtration performance than traditional sand filter. The pilot-scale experiments were carried out and the performance of membrane filtration was confirmed. The introduction of membrane filtration to the reuse of backwashing wastewater has been adopted successfully in many fields, and the same application to the LSS in aquarium was also demonstrated successfully.

In this study, the introduction of membrane filtration to LSS in aquarium was demonstrated to meet the future requirements of both advanced water quality for large-size exhibition tanks and the wastewater recovery and reuse for LSS.