an activated sludge process. In this case, water is treated in process tanks upstream of the membrane tank to produce mixed liquor, which flows to the membrane tank. Permeate is withdrawn through the membrane units leaving activated sludge in the membrane tank. The activated sludge is withdrawn from the membrane tank and divided into waste activated sludge (WAS) and return activated sludge (RAS). The RAS is returned to the process tanks and becomes part of the activated sludge. The influent (raw wastewater) flow rate (Q) is roughly balanced by the total of the permeate flow rate and the WAS flow rate. The RAS flow rate is typically in the range of 2Q to 5Q.

SUMMARY

[0005] This summary is intended to introduce the reader to the invention and the detailed description to follow but not to limit or define the claimed invention.

[0005a] According to a first aspect of the present invention, there is provided a method of operating an immersed membrane system comprising the steps of,

providing a membrane tank having a plurality of immersed membrane units;

feeding influent to the membrane tank;

dividing the influent into multiple portions by flowing the influent into one or more ducts, wherein each of the one or more ducts comprises at least one baffle that extends about horizontally: (i) below at least part of the membrane unit; and (ii) above the bottom of the duct; and

directing one of the portions of influent to the bottom of each one of the plurality of immersed membrane units.

[0005b] According to a second aspect of the present invention, there is provided a membrane filtration system comprising,

a membrane tank;

a plurality of immersed membrane units spaced apart within the membrane tank; and,

one or more ducts extending from an inlet to the membrane tank to a plurality of openings corresponding to the plurality of immersed membrane units, wherein each of the one or more ducts comprises at least one baffle that extends about horizontally: (i)_below at least part of the membrane unit above the baffle; and (ii) above the bottom of the duct.

CLAIMS:

I/we claim:

1. A method of operating an immersed membrane system comprising the steps of,

providing a membrane tank having a plurality of immersed membrane units;

feeding influent to the membrane tank;

dividing the influent into multiple portions by flowing the influent into one or more ducts, wherein each of the one or more ducts comprises at least one baffle that extends about horizontally: (i) below at least part of the membrane unit; and (ii) above the bottom of the duct; and

directing one of the portions of influent to the bottom of each one of the plurality of immersed membrane units.

2. The method of claim 1 wherein the immersed membrane system is part of a membrane bioreactor operated with a return activated sludge flow rate at least 1Q or at least 2Q.

3. The method of claim 1 or 2 further comprising directing the portions of influent upwards through the plurality of membrane units.

4. The method of any of claims 1 to 3 wherein the membrane tank is elongated and/or the membrane units are spaced along the length of the membrane tank.

5. The method of any of claims 1 to 4 wherein at least 90% of the influent fed to the membrane tank flows directly to the bottoms of the immersed membrane units.

6. The method of any of claims 1 to 5 wherein the flow rate of each of the multiple portions is within 10% of an average flow rate of the multiple portions.

7. The method of any of claims 1 to 6 wherein each of the multiple portions leaves the duct through a separate opening.

8. The method of claim 7 comprising flowing the influent into the one or more ducts through one or more duct openings facing into the influent flow.

9. The method of claim 8 wherein the one or more duct openings facing into the influent flow has an area that is about 50% or less than the area of the corresponding separate opening of the one or more ducts.

10. The method of any of claims 1 to 9 wherein the influent flows through the membrane units substantially in a single pass.

11. The method of any of claims 1 to 10 wherein the upwards velocity in the membrane units is 0.025 m/s or more.

12. A membrane filtration system comprising,

a membrane tank;

a plurality of immersed membrane units spaced apart within the membrane tank; and,

one or more ducts extending from an inlet to the membrane tank to a plurality of openings corresponding to the plurality of immersed membrane units, wherein each of the one or more ducts comprises at least one baffle that extends about horizontally: (i) below at least part of the membrane unit above the baffle; and (ii) above the bottom of the duct.

13. The system of claim 12 wherein each of the plurality of membrane units has one or more cassettes of flat sheet or flat plate ceramic membrane elements within a membrane case creating a vertically oriented flow path through the cassette.

14. The system of claim 12 or 13 wherein the plurality of membrane units are at least twice as long as they are wide.

15. The system of any one of claims 12 to 14 wherein the at least one baffle is displaced vertically below the top of the duct.

16. The system of any one of claims 12 to 15 wherein each of the at least one baffle forms an influent opening facing the inlet.

17. The system of claim 16 wherein the influent opening has an area that is about 50% or less than the area of the corresponding opening.

18. The system of any of claims 12 to 17 wherein the openings have non-equal sizes.

19. The system of any of claims 12 to 18 wherein the size of the openings is less than 50% of the footprint of the membrane units.