
August 31, 2011

Mr. Bob Bauer
Walter E. Deuchler Associates, Inc.
230 Woodland Avenue
Aurora, IL 60506

Re: Evaluation of New and Used SSI 12-Inch PTFE Coated Membrane Disc
Diffusers from Fox Metro WRF – Job No. 111-07020-04

Dear Bob,

On June 21st of this year Redmon Engineering Company received two 12-inch diameter Stamford Scientific International PTFE coated membrane disc diffusers for test. One diffuser was an unused Membrane from the first installation project (circa November 2007) and the second membrane had been removed from Aeration Plant 3 at Fox Metro following about two years of service (placed in service October 2009). The unused diffuser was labeled B35-11-1 and the used diffuser was labeled B35-11-2.

The two attached tables and the figure present the results. The two tests I conducted were pressure drop across the diffuser membrane when operating under water (known as dynamic wet pressure – DWP) as a function of airflow and clean water oxygen transfer efficiency at 2.0 cubic feet of air per minute when operating at a 10.0 feet diffuser submergence. I also conducted a series of physical tests including weight in air, weight in water, specific gravity, Shore A durometer hardness, membrane thickness, and membrane diameter. The attached appendix describes the testing methods employed.

Table 1 summarizes the operating data obtained for the two diffusers tested. Figure 1 is a plot of the dynamic wet pressure of the two diffusers over a range of airflow from 1.0 cubic feet of air per minute (cfm) to 4.0 cfm. This data indicates that the used diffuser has an operating pressure that is approximately 1.8 inches water column greater than the new diffuser at 1.0 cfm and about 5.3 inches water column

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greater at 4.0 cfm. Both diffusers had been soaked in tap water for several days before testing. The used diffuser was wiped off with a soft towel and re-tested. The cleaning resulted in a very slight reduction in the DWP values. Table 1 also presents the oxygen transfer efficiency results for the two diffusers. The data indicate that the new membrane disc diffuser had an oxygen transfer efficiency of 19.05% while the used diffuser had an efficiency of 19.75%, obtained under the same conditions. The ratio of efficiency (old to new) is 1.037 indicating a gain of efficiency of approximately 4%. With PTFE coated diffusers, it sometimes takes a couple of weeks for the coated surface to become as hydrophilic as a used diffuser.

Table 2 presents a summary of the physical properties of both diffusers. The data indicate that the used diffuser is about 3.5% heavier than the new diffuser. The specific gravity of the used diffuser is about 0.18% higher than the new diffuser, indicating very little change as a result of service. The durometer data indicates the used diffuser has a Shore A durometer hardness that is 3.1% greater than the new diffuser. Finally the used diffuser is 5.56% thicker and the permanent set data indicates the used diffuser has shrunk by about 0.38%. These are very small changes considering diffuser B35-11-2 has been in service for almost two years.

In summary, the used diffuser is performing almost like that of a new diffuser, except that the operating pressure (dynamic wet pressure) has increased between about 2 and 5 inches water column over the range of airflows tested.

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If you have any questions or comments on the above data, do not hesitate to contact me.

Best regards,

REDMON ENGINEERING COMPANY

David T. Redmon, PE