



On-site Effluent Treatment National Testing Programme (OSET NTP)

PERFORMANCE CERTIFICATE Reflections Textile 5000 OSET NTP Trial 13, 2017/2018

System Tested

The Reflection Textile 5000 treatment plant, comprising a recirculating textile filter packed bed reactor (RTF), participated in Trial 13 of the On-site Effluent Treatment National Testing Programme (OSET NTP). This commenced on 23 October 2017 and ran over ten months (44 weeks) during which the treated effluent discharge was monitored generally every six days. The Reflection Textile 5000 treatment plant tested had a normal operational capacity of 2,000L/day and maximum capacity of 2,400L/day. The plant comprised two 5,100L concrete tanks, Tank 1 being a primary chamber with a Zoeller 170-0078 effluent filter and Tank 2 having 3 chambers, recirculation chamber (1950L) with a reflection 250DP 200L/h recirculation pump operating 60min/day, textile filter chamber (2250L) with 2.6m² needle punched non woven polyester media and effluent pump chamber (900L) with a Reflection 400IR Vortex 400W pump.

The emergency storage which includes the effluent pump station and media submergence is 2,000L.

The service requirement is annual

Test Flow Rate

The Reflection Textile 5000 treatment plant was tested at 1,000L/day (equivalent to servicing a 3-bedroom 5 to 6 person household) over an 10 month (40 week) period November 2017 to August 2018 including a 1 month (4 week) high load effects test involving 5 days at 2,000L/day then 1,000L/day over the following 3 weeks. Note that the manufacturer's advised design capacity for this plant is 2,000L/day.

Testing and Evaluation Procedures

A two-month (8 week) media development and settling-in period was initially proposed, but this was extended to 12 weeks due to an unscheduled geothermal waste influent flow on 23 November, followed by extreme weather events in Rotorua, resulting in widespread flooding and high infiltration into the sewerage system, along with an electrical storm impacting on the testing facility control system in early December. Ten samples were taken during this period (Weeks 4 to 12). Neither the geothermal influent nor the weather events had any significant impact upon the Reflection plant performance, which showed only a minor and short-duration increase in both BOD₅ and TSS.

The performance evaluation testing programme followed involving a three-month pre-benchmarking period (20 samples over Weeks 13 to 28), and a three-month benchmarking period (19 samples over Weeks 29 to 40). Within each block, a five-day consecutive sample period occurred (Weeks 25 and 34). A one-month high load assessment period followed in Weeks 42 to 44 (three samples).

The 39 samples taken through the pre-benchmarking and benchmarking periods were used to assess treatment performance against the **Secondary Effluent Quality** requirements for biochemical oxygen demand (BOD₅) and total suspended solids (TSS) defined by AS/NZS 1547:2012 as set out in AS/NZS 1546.3:2008

A total of 19 treated effluent samples of organic matter (BOD₅), total suspended solids (TSS), total nitrogen (TN), ammonia nitrogen (NH₄-N), total phosphorus (TP) and faecal coliforms (FC) at generally six day intervals during weeks 28 through 40 were tested and the results benchmarked and rated on their median values.

General Performance

The Reflection Textile 5000 treatment plant performed well throughout the study, with no equipment failures or attendance required throughout the trial period.

In terms of effluent quality, the plant performed well overall, with low and stable BOD₅ and TSS results, each having median results of 2.0mg/L throughout the analysis period. The plant achieved a high level of



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nitrification throughout, but with poor denitrification, resulting in low levels of NH₄-N, and high levels of TOXN and TN. The median Total Nitrogen level was 40mg/L. The high flow test was handled well with no change in BOD₅, TSS, or TN levels, although it should be noted the high flow of 2,000L/day was the same as the plant's nominated operational capacity. Bacteria removal was only moderate.

The plant's power usage at 0.61kWh/day, was low for a package secondary treatment plant.

AS/NZS 1547:2012 Secondary Effluent Quality Requirements

These requirements are that 90% of all test samples must achieve a BOD₅ of $\leq 20 \text{ g/m}^3$ and TSS of $\leq 30 \text{ g/m}^3$ with no one result for BOD₅ being $>30 \text{ g/m}^3$ and no one result for TSS being $>45 \text{ g/m}^3$.

The plant had low BOD and TSS results throughout except for one high TSS result of 53mg/L on 5 June which SWANS-MAG considered could be deleted from the AS/NZS 1547 evaluation analysis as an unexplained outlier.

The Reflection Textile 5000 plant therefore had **100% of BOD₅ results** and **100% of TSS results** within the **Secondary Effluent Quality** requirements for both the 90 percentile and maximum limits above. **The Reflection Textile 5000 plant thus achieved AS/NZS 1547 secondary effluent quality performance requirements** when operated at 1,000L/day, which is 50% of the manufacturer's advised normal flow design capacity.

Benchmark Ratings

The Reflection Textile 5000 system achieved the following effluent quality ratings:

Indicator Parameters	Median	Std Dev	Rating	Rating System				
				A+	A	B	C	D
BOD ₅ (mg/L)	2	0.4	A+	<5	<10	<20	<30	≥30
TSS (mg/L)	1	11.7	A+	<5	<10	<20	<30	≥30
Total Nitrogen (mg/L)	39	3.1	D	<5	<15	<25	<30	≥30
NH ₄ - Nitrogen (mg/L)	3.0	1.3	A	<1	<5	<10	<20	≥20
Total Phosphorus (mg/L)	4.0	0.5	B	<1	<2	<5	<7	≥7
Faecal Coliforms (cfu/100mL)	47,500	30,500	C	<10	<200	<10,000	<100,000	≥100,000
Energy (kWh/d) (mean)	0.61	0.12	A	0	<1	<2	<5	≥5

This Certificate of Performance only applies to the Reflection Textile 5000 treatment plant as described in the 'System Tested' above when operated at 1,000 L/day, which is 50% of manufacturer's advised normal flow design capacity. The certificate is valid for 5 years from the date below. For the full OSET NTP report on the performance of the Reflection Textile 5000 treatment plant contact Nigel Paull, Phone: 09 411 7337 , Mobile: 021 909 026 or Email: nigel@rwts.co.nz

Authorised By:

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