TEST REPORT

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Report Number: 2295-20491 **Project Number:** 34044

Report Issued: June 26, 2020

Report To: ASSE International

Tested For: KD Enterprises LLC
4348 Waialae Ave 315
Honolulu, HI 96816

Code/Standard: NSF/ANSI 50 - 2019

Product(s) Tested: The HDC Device

Test Date(s): June 5-June 23, 2020

Test Location: IAPMO 5001 East Philadelphia Ontario CA 91761

Conclusion: The device identified above COMPLIED with the standard for the reduction of chlorine use and hydrostatic pressure

The device identified above did not comply with acid reduction nor the reduction of combined chlorine

During the sample run there was a 41% reduction in chlorine use, 14% reduction in combined chlorine and 13% increase in acid use.

Report Status: **IN COMPLIANCE**

Reviewed By:

Sal Aridi - Director

TEST SPECIMENS
Two test specimens were sent by KD enterprise and received in good condition on April 29, 2020.

Standard Requirement:

For devices claiming a reduction in chlorine consumption, the mass of chlorine used during the test period shall be a minimum of 25% less than the mass of chlorine used during the baseline period.

For devices claiming a reduction in combined chlorine, the average combined chlorine in the test water measured during the test period shall be a minimum of 25% or 0.20 mg/L, whichever is greater, less than the average combined chlorine in the test water measured during the baseline period.

For devices claiming a reduction in acid consumption, the mass of HCl used during the test period shall be a minimum of 25% less than the mass of HCl used during the baseline period

For devices claiming head loss claim the actual head loss shall not exceed the claimed head loss by more than 5%

For devices claiming hydrostatic pressure test, the device shall show no evidence of rupture, leakage, burst, or permanent deformation when subject to a hydrostatic pressure 1.5 times the manufacturer's maximum operation pressure

Performance Validation Test Setup:

See Figure 8, a 10,000 gallon tank with the following dimensions was used. The tank was covered and air conditioned.

Height: 5'6"
Width 8'6"
Length 46'

A variable frequency pump was used to pull water from the tank at an elevation of 1' from the bottom and push water through an 18" sand filter that has a bed depth of 11". The water then went through a Coates water heater then through the device under test which was installed in a 2 inch sched 40 line parallel to a blank pipe and valved so that it can be isolated. The water then returns to the tank at an elevation of 1 ft below the water surface.
An inline turbidity meter and chlorine/ pH controller were installed to control the chlorine and acid feed pumps. A mixing pump was used to keep the water mixed.

After completion of the baseline run the test tank was drained rinsed refilled and rebalanced. The filter sand was replaced with fresh sand to a bed depth of 11 inches.

When the sand was fresh the filter was backwashed until clean at 38 gpm and rinsed for 30 seconds. When the filter was dirty it was backwashed until it was clean Turbidity < 10 then rinsed until clean.

Results:

The mass of chemicals used was measured during the baseline run as well as the sample run; the data is in Table 1.

Table 1- Mass of Chemicals Used in gm During Each of the 7 Day Runs

Chlorine 4%		Acid 2 N	
Baseline Run	Sample Run	Baseline Run	Sample Run
34935	20605	29120	33005

During the Sample run the chlorine usage was **41% less**.

During the Sample run the acid usage was **13% more**.

The average **reduction** in combined chlorines was 14%

Table 2- Operational Data

	Baseline Run	Sample Run
Average Total Chlorine ppm	1.94	2.08
Average Combined Chlorine ppm	0.15	0.13
Average Chlorine Use Per Day gm	4991	2944
Average Acid Use per Day gm	4160	4715
Total Synthetic Bather Load Used gm	6150	6230
Average Water Temperature ˚F	83.8	81.1
Average Air Temperature ˚F	80.3	77.2
Average Flow Rate gpm	26.7	27.6
Conditioned Makeup Water Added gal	2987	2400*
Number of Filter Backwashes	1	1

**The amount of water going to drain through the turbidity monitor and chlorine controller was slowed to reduce wasted water.*

Figures 2- 6 show the logs of the data captured during the running of tests; this data was sampled from the return line just upstream of the filter. A couple of spikes of chlorine were due to sensor fouling. During the first 2 days of the baseline run the chlorine and acid ran out in the early morning hours.

Hydrostatic Test:

Rated Pressure: 50 psi
Test Pressure: 75 psi
Test Duration: 5 min
Test Water Temp: 78.9˚ F

Test Result: **PASS**

Head Loss Test:

Table 3- Pressure Drop Across Sample

Flow gpm	26.2	34.4	50.4	63.4	72.0
Pressure in	0.4	0.9	1.5	2.2	2.6 (differential)
Pressure out	0	0	0.3	0.4	
Pressure Drop psi	0.4	0.9	1.2	1.8	2.6

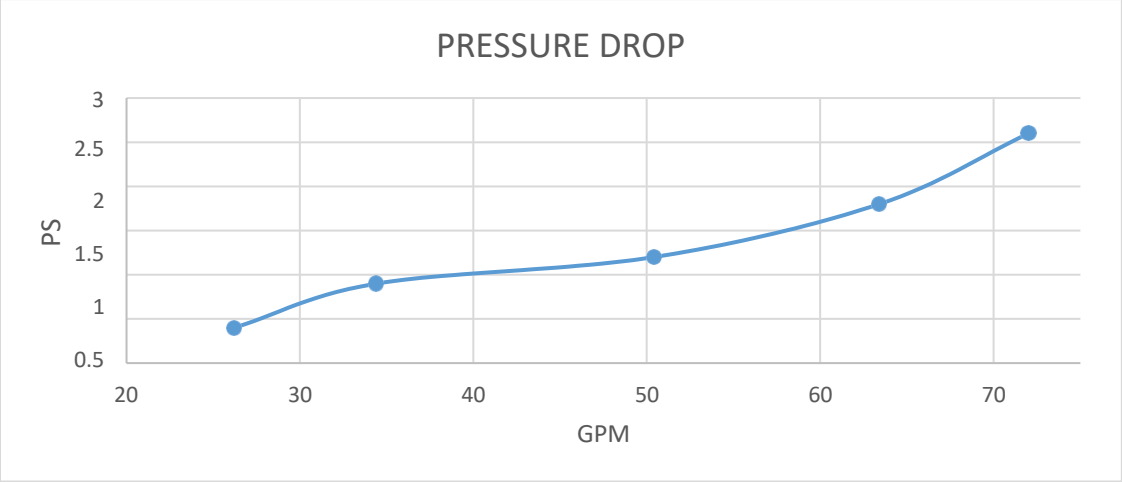


Figure 1-Pressure Drop Across Sample

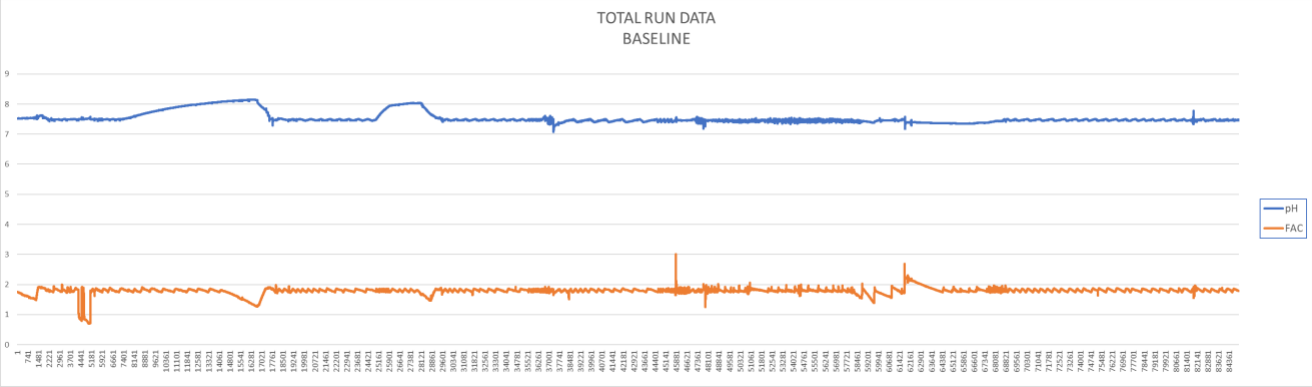


Figure 2- pH and Free Available Chlorine During the Baseline Run

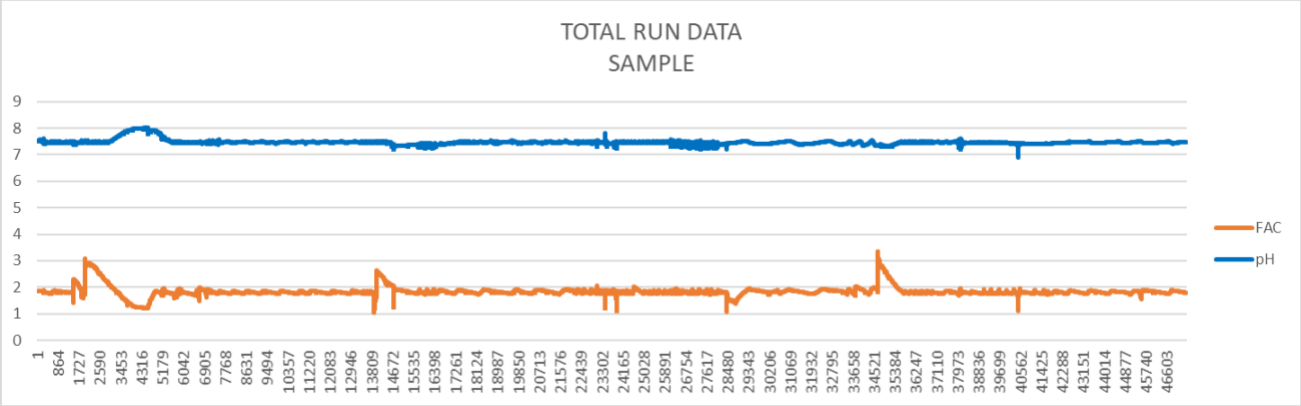


Figure 3- pH and Free Available Chlorine During the Sample Run

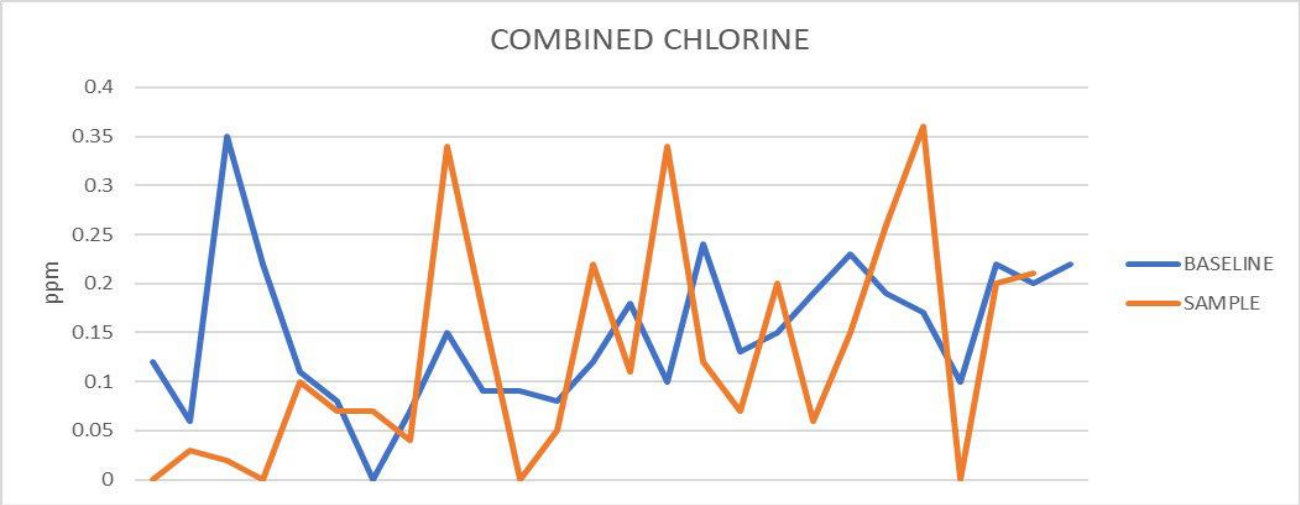


Figure 4- Combined Chlorine

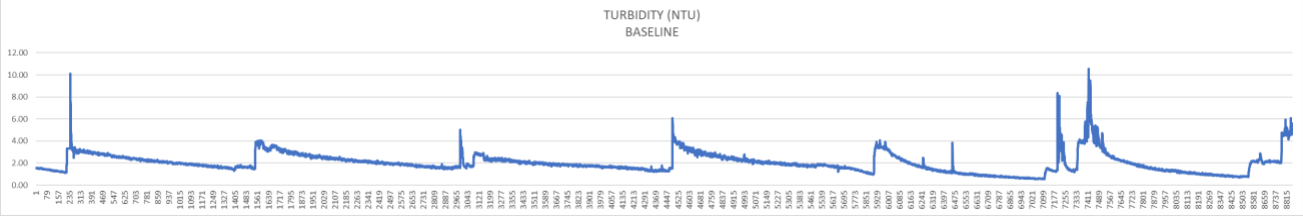


Figure 5- Turbidity During the Baseline Run

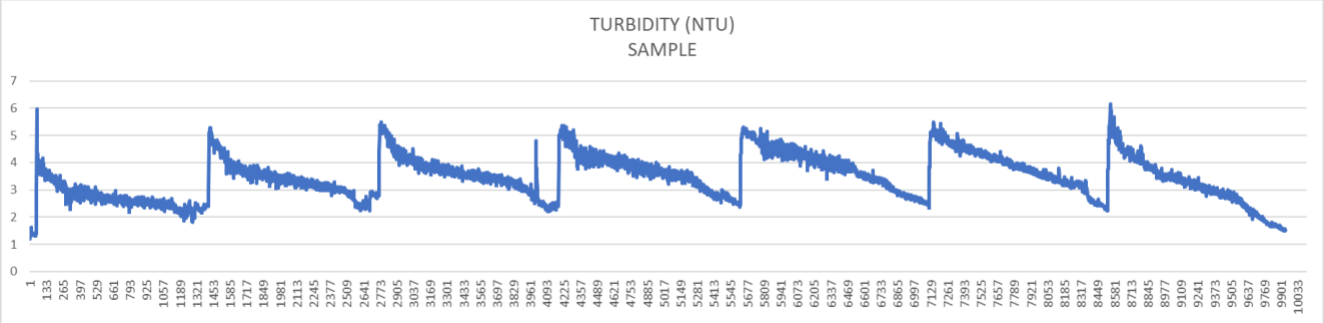
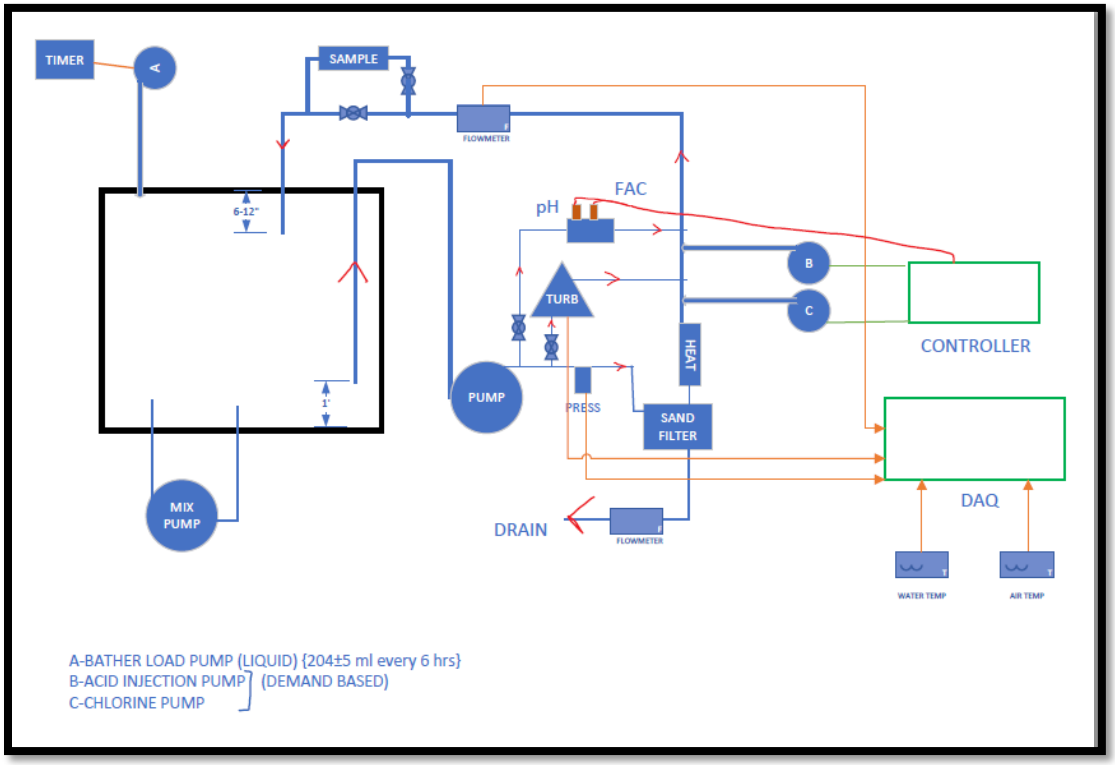


Figure 6- Turbidity During the Sample Run

Figure 7- Sample Under Test



A-BATHER LOAD PUMP (LIQUID) {204±5 ml every 6 hrs}
B-ACID INJECTION PUMP] (DEMAND BASED)
C-CHLORINE PUMP