

FREE CHLORINE

The purpose of a disinfectant is to sanitize, disinfect, and oxidize. The most popular type of disinfectant is chlorine. The chlorine that is active and able to sanitize and oxidize contaminants in the water is called free chlorine residual. The free chlorine residual in the pool should be between 1ppm to 3ppm, and between 3ppm to 5ppm for spas.

Pool

12/11/1999 – 12/31/1999	Average F.C. = 1.9	
01/01/2000 – 01/31/2000	Average F.C. = 1.9	*CO2 put online on 01/24/2000
02/01/2000 – 02/15/2000	Average F.C. = 1.7	
02/16/2000 – 03/10/2000	Average F.C. = 1.5	*F.E.D. installed on 02/16/2000

Spa

01/17/2000 – 01/31/2000	Average F.C. = 2.9	
02/01/2000 – 02/17/2000	Average F.C. = 2.4	
02/18/2000 – 03/08/2000	Average F.C. = 2.0	*F.E.D. installed on 02/18/2000

pH AVERAGES FOR THE POOL AND SPA

The right pH range for pool and spa water is 7.2 to 7.8, with an ideal range of 7.4 to 7.6 pH levels greater than 7.8 can cause swimmer discomfort (skin and eyes), produce scale on the pool and equipment, and reduce the sanitizing action of chlorine. pH levels less than 7.2 can also cause swimmer discomfort and cause corrosion of pool fixtures and equipment.

Pool

12/11/1999 – 12/31/1999	Average pH = 6.9	
01/01/2000 – 01/31/2000	Average pH = 6.9	*CO2 put online on 01/24/2000
02/01/2000 – 02/15/2000	Average pH = 7.1	
02/16/2000 – 03/10/2000	Average pH = 7.5	*F.E.D. installed on 02/16/2000

Spa

01/17/2000 – 01/31/2000	Average pH = 7.4	
02/01/2000 – 02/17/2000	Average pH = 7.0	
02/18/2000 – 03/08/2000	Average pH = 7.6	*F.E.D. installed on 02/18/2000

ALKALINITY

Total alkalinity measures the amount of alkaline substances in the water.

Alkaline substances buffer the water against sudden changes in pH. It is important to prevent pH changes that can cause scaling or corrosion of metal fixtures. The right range for total alkalinity for pools and spas is 80ppm to 120ppm.

Pool

12/16/1999 – 84ppm

01/21/2000 – 60ppm

01/28/2000 – 56ppm

*CO2 put online on 01/24/2000

02/19/2000 – 60ppm

*F.E.D. installed on 02/16/2000

02/26/2000 – 100ppm

Spa

01/28/2000 – 24ppm

02/19/2000 – 80ppm

*F.E.D. installed on 02/18/2000

02/28/2000 – 80ppm

HARDNESS

Total hardness refers to the amount of calcium and magnesium in your pool or spa water. When hardness is too high, scale can form causing pool filters or plumbing, to clog and water to appear cloudy. If water is too soft, it will slowly dissolve plaster walls and corrode metal fixtures. Swimming pools and spas should have a total hardness range of 250ppm to 500ppm.

Pool

12/16/1999 – 236ppm

01/21/2000 – 248ppm

01/28/2000 – 284ppm

*CO2 put online on 01/24/2000

02/19/2000 – 360ppm

*F.E.D. installed on 02/16/2000

02/26/2000 – 400ppm

Spa

01/28/2000 – 260ppm

02/19/2000 – 420ppm

*F.E.D. installed on 02/18/2000

02/28/2000 – 440ppm

Fluid Excelleration Devices© were installed on the main pool and sauna filtering systems at Wheaton College. Testing was performed from 2/16/2000 to 3/10/2000. Testing data was also supplied by Wheaton College two months prior to testing. Testing was performed by Wheaton College staff during the 24 days of testing. The volume of the pool is 378,000 gallons, which circulates through the filters four times in 24 hours, this amounts to 1, 512,000 gallons of water treated a day. The volume of the sauna is 3000 gallons of water being recycled at 50 gallons per minute, when in use. The type of filters used for the pool are diatomaceous earth. pH control and stabilizers used: liquid chlorine and CO2.



ONE F.E.D. I-121.5 WAS INSTALLED ON THE MAKE UP
WATER LINE.



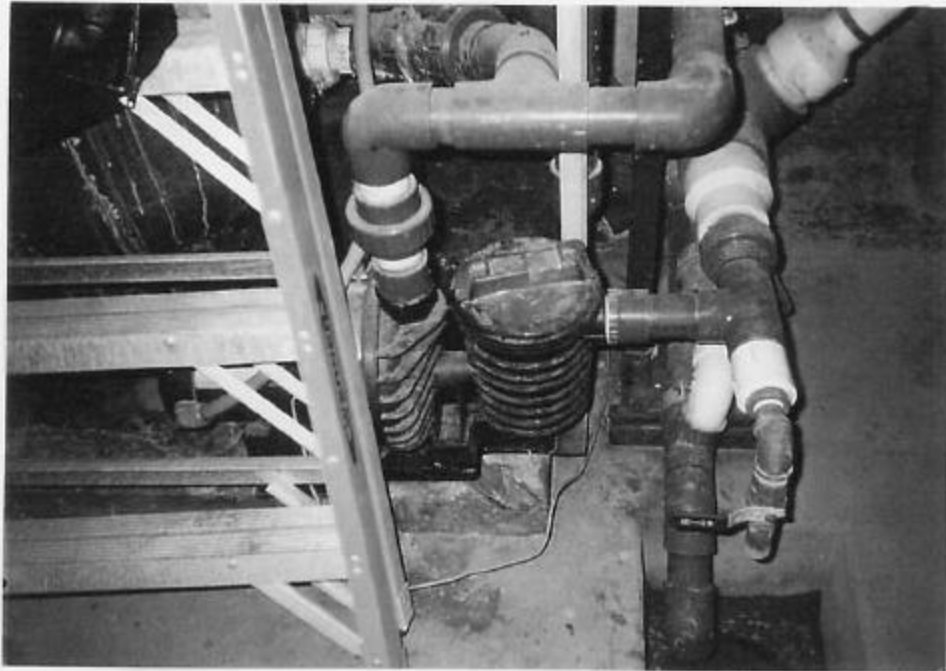
**DEARBORN TECHNOLOGIES
FLUID EXCELLERATION DEVICES©**

**WHEATON COLLEGE
WHEATON, IL
TESTING AND EVALUATION OF F.E.D.'S ON THE
POOL AND SAUNA
BY: DR. RANDALL W. SMITH
START DATE: 02/16/200
END DATE: 03/10/200**

ONE F.E.D. I-51 WAS INSTALLED IN THE FILTER PUMP
FOR THE SAUNA.



ONE F.E.D. I-122 WAS INSTALLED IN THE HYDROJET
PUMP FOR THE SAUNA.



ONE F.E.D. I-604 WAS INSTALLED IN THE POOL FILTER
ON THE WATER INTAKE PIPE.



SUMMARY OF TESTING DATA
of a Fluid Excelleration Device

The following numbers are based on National Spa & Pool Institute standards for minimum, ideal, and maximum ranges of, free chlorine, pH, alkalinity, and hardness. All testing data before and after installation of the F.E.D. was supplied and performed by maintenance staff at Wheaton College in Wheaton, Illinois. Dates of testing the F.E.D.: 2/16/2000 - 3/10/2000.

Pool					
	Minimum	Ideal	Maximum	Before Installation of F.E.D.	After Installation of F.E.D.
Free Chlorine	1.0	1.0 - 3.0	3.0	1.7	1.5
pH	7.2	7.4 - 7.6	7.8	7.1	7.5
Alkalinity	60ppm	80 - 120ppm	180ppm	56ppm	100ppm
Hardness	150ppm	200 - 400ppm	500 - 1000ppm	284ppm	400ppm

Spa					
	Minimum	Ideal	Maximum	Before Installation of F.E.D.	After Installation of F.E.D.
Free Chlorine	2	3 - 5	10	2.4	2.0
pH	7.2	7.4 - 7.6	7.8	7.0	7.6
Alkalinity	60ppm	80 - 120ppm	180ppm	24ppm	80ppm
Hardness	150ppm	200 - 400ppm	500 - 1000ppm	260ppm	440ppm