

# USEFUL CONVERSIONS & FORMULAS

<b>AMOUNT CONVERSIONS</b>	
Ounces to Pounds =	Ounces ÷ 16 = Pounds
Fluid Ounces to Gallons =	Fluid Ounces ÷ 128 = Gallons
<b>DISTANCE CONVERSIONS</b>	
Yards to Feet =	Yards x 3 = Feet
Meters to Feet =	Meters x 3.28 = Feet
Sq. Inches to Sq. Feet	Square Inches ÷ 144 = Square Feet
<b>SURFACE AREAS</b>	
Rectangle / Square =	Length x Width = Square Feet
Circle =	Radius x Radius x 3.14 = Square Feet **RADIUS = diameter ÷ 2
<b>POOL VOLUME</b>	
Rectangle =	Length x Width x Average Depth x 7.5 = Gallons **AVERAGE DEPTH = (shallow + deep) ÷ 2
Circle =	Radius x Radius x 3.14 x Avg. Depth x 7.5 = Gallons
<b>TURNOVER RATE</b>	
Pool: Pool Volume (gallons) ÷ Flow Rate (gallons per minute) ÷ 60 = Hours	
Spa: Pool Volume (gallons) ÷ Flow Rate (gallons per minute)	= Minutes
<b>FLOW RATE</b>	
Pool: Pool Volume (gallons) ÷ Turnover Rate (hours) ÷ 60 = Gallons Per Minute	
Spa: Pool Volume (gallons) ÷ Turnover Rate (minutes) = Gallons Per Minute	
<b>FILTER SURFACE AREA (FILTER SIZE REQUIRED)</b>	
Flow Rate ÷ Filter Media Rate = Square Feet	
<b>HEATER SIZING</b>	
Pool Volume x 8.33 x Temperature Adjustment = BTU	
<b>SPA WATER REPLACEMENT FREQUENCY</b>	
Spa Volume ÷ 3 ÷ Average Users Per Day = Replacement Interval (Days)	
<b>REPLACEMENT &amp; MAKE-UP WATER</b>	
Length x Width x 0.0833 x 7.5 x inches lost = Gallons	
<b>TOTAL DYNAMIC HEAD</b>	
Multiply pump PRESSURE gauge reading by 2.31 = feet of head on pressure side	
Multiple pump VACUUM gauge reading by 1.13 = feet of head on vacuum side	
Add these two results together for Total Dynamic Head of system	

## B-1 Water Chemistry Guidelines

These commonly accepted chemical parameters do not supersede local or state codes and regulations.

Parameter	Min.	Ideal	Max	Pool Type
Free Chlorine (ppm or mg/L)	1.0	2.0 – 4.0	5.0	Pools, Waterparks
	2.0	3.0 – 5.0	10.0	Spas
Combined Chlorine (ppm or mg/L)	0	0	0.4	Pools, Waterparks
	0	0	0.5	Spas
Total Bromine (ppm or mg/L)	2.0	4.0 – 6.0	10.0	All Types
PHMB (ppm or mg/L)	30	30 – 50	50	All Types
pH	7.2	7.4 – 7.6	7.8	All Types
Total Alkalinity as CaCO <sub>3</sub> (ppm or mg/L)	60	80 – 100* 100 – 120**	180	All Types
Total Dissolved Solids (ppm or mg/L)	NA	NA	1500 over start-up	All Types
Calcium Hardness as CaCO <sub>3</sub> (ppm or mg/L)	150	200 – 400	1,000	Pools, Waterparks
	100	150 – 250	800	Spas
Heavy Metals	None	None	None	All Types
Visible Algae	None	None	None	All Types
Bacteria	None	None	Local Code	All Types
Cyanuric Acid (ppm or mg/L)	****	30 – 50	****	All Types
Temperature °F/°C	78°F (25.5°C)	80.5°F (26.9°C)	82°F (27.8°C)	Competition Pools
	-	-	104°F	Spas
	-	Personal Preference	104°F	Other Pools
Ozone (ppm or mg/L)	-	-	0.1 over 8-hr. time wtd. avg.	All Types
ORP	Calibrate to Disinfectant Level*****			All Types

- \* For calcium hypochlorite, lithium hypochlorite, or sodium hypochlorite
- \*\* For sodium dichlor, trichlor, chlorine, gas, BCDMH
- \*\*\* Start-up includes the TDS contribution of salt found in chlorine generating systems
- \*\*\*\* Dictated by local codes. Typically 100 ppm (mg/L). (Some codes are higher, some are lower)
- \*\*\*\*\* Some local codes may dictate a minimum and maximum

## B-2 Water Chemistry Adjustment Guide

These commonly accepted chemical parameters do not supersede manufacturers' instructions. Smart phone apps can help calculate associated pool volume and dosage.

Dosages to Treat	10,000 Gallons		40,000 Liters	
	Chemical	Desired Change	Desired Change	Desired Change
<b>Increase Chlorine</b>	<b>1 ppm</b>			Write this value in <b>Box #4</b>
Chlorine Gas	1.3 oz	}	}	Write the value for your selected chemical in <b>Box #1</b>
Calcium Hypochlorite (67%)*	2 oz			
Sodium Hypochlorite (12%)	10.7 fl.oz.			
Lithium Hypochlorite	3.8 oz			
Dichlor (62%)	2.1 oz			
Dichlor (56%)	2.4 oz			
Trichlor	1.5 oz			
<b>Increase Total Alkalinity</b>	<b>10 ppm</b>			<b>Box #4</b>
Sodium Bicarbonate	1.4 lbs	}	}	<b>Box #1</b>
Sodium Carbonate	14 oz			
Sodium Sesquicarbonate	1.25 lbs			
<b>Decrease Total Alkalinity</b>	<b>10 ppm</b>			<b>Box #4</b>
Muriatic Acid (31.4%)	26 fl.oz.	}	}	<b>Box #1</b>
Sodium Bisulfate	2.1 lbs			
<b>Increase/Decrease pH</b>	For more			
<b>Increase Calcium Hardness</b>	<b>10 ppm</b>			<b>Box #4</b>
Calcium Chloride (100%)	0.9 lbs	}	}	<b>Box #1</b>
Calcium Chloride (77%)	1.2 lbs			
<b>Increase Stabilizer</b>	<b>10 ppm</b>			<b>Box #4</b>
Cyanuric Acid	13 oz			<b>Box #1</b>
<b>Neutralize Chlorine</b>	<b>1 ppm</b>			<b>Box #4</b>
Sodium Thiosulfate	2.6 oz	}	}	<b>Box #1</b>
Sodium Sulfite	2.4 oz			

Chemical amounts have been rounded off for convenience. Always follow the instructions on the manufacturer's label for exact dosage amounts.

\*Other calcium hypochlorite products are available from 47% to 78%. Follow the label directions for dosage amounts.