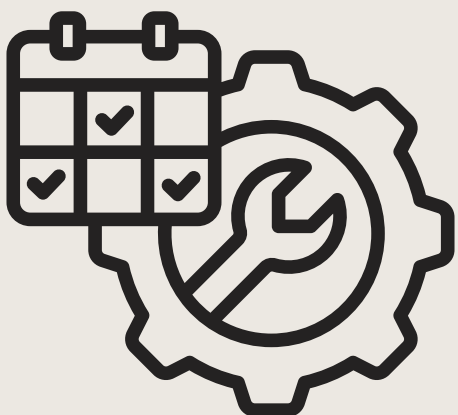


# Nanobubble **water conditioning** for Swimming Pools and Spas.



**CRS**  
CHEMICAL REDUCTION SOLUTIONS

## Transform Your Pool and Spa Experience.



### Pool and Spa Maintenance Is Hard

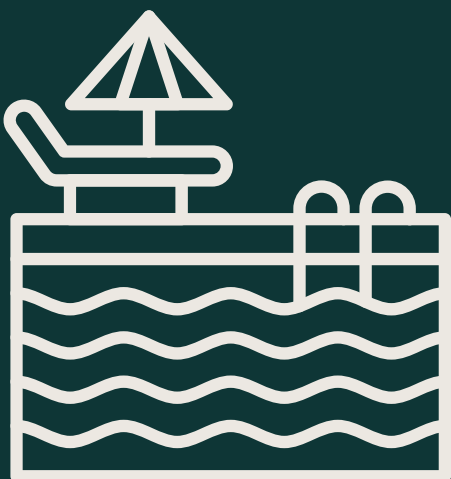
Mineral scale, biofilm, and organic buildup cloud pool water, strain circulation equipment, increase chemical demand, and drive frequent shock treatments and service calls

All of this adds cost, labor, and downtime to any residential or commercial pool operation



### CRS Solution

CRS installs a patent-pending, passive nanobubble generator inline on the pool pump water loop. Using hydrodynamic cavitation and electro-ionization, the system continuously conditions incoming water before it reaches the filter



### Key Benefits

- Increases Filtration Efficacy
- Biofilm and bacteria control
- Reduced chemical usage
- Improved efficiency and reliability
- Clearer more sparkly water
- Extended equipment life
- Fewer service calls
- No electricity or consumables

### Connect with CRS

[www.chemicalreduction.com](http://www.chemicalreduction.com)

BETTER WATER. BETTER EQUIPMENT. BETTER ECONOMICS.



# CRS

CHEMICAL REDUCTION SOLUTIONS

## WHAT IS A NANOBUBBLE?



### Tiny. Stable. Game Changing.

2500 times smaller than a grain of sand, nanobubbles are so small that they have a lower bouyancy and will remain suspended in water for a long time

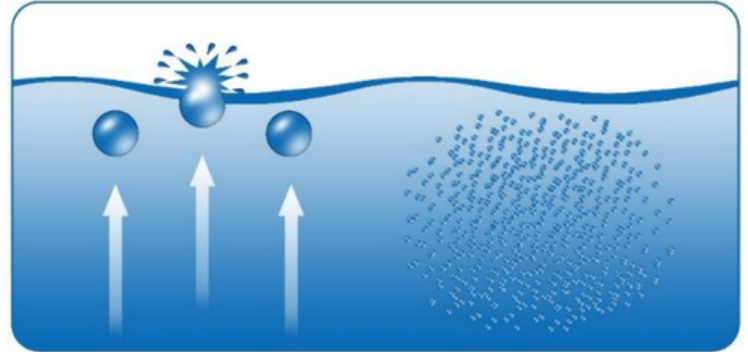


### Industrially Useful

Nanobubbles are useful in removing and preventing scale and biofilm growth, improving heat transfer, inhibiting rust, reducing surface tension and improving filtration efficacy

## We are the **future** of your business

CRS is on a mission to use their economical and simple nanobubble generator, The Shaft, to improve profitability and reliability of water systems



nanobubbles remain suspended in water

# 575+

CRS SHAFTS  
DEPLOYED IN 2025

MORE THAN  
**15 years**

OF EXPERIENCE

# 500+ million

GALLONS OF WATER  
TREATED BY THE SHAFT PER  
MONTH



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HOW ARE NANOBUBBLES FORMED?



**Hydrodynamic Cavitation**

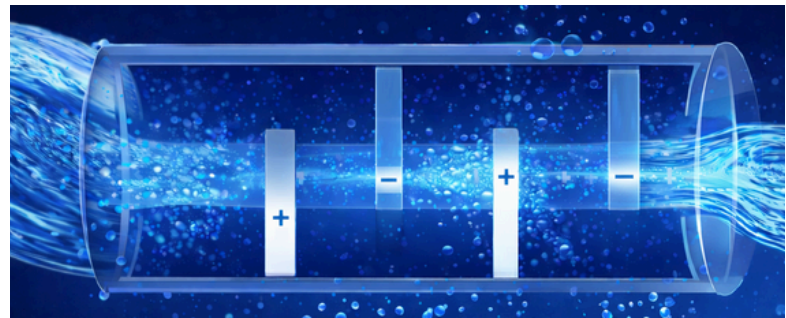
As water flows through The Shaft, the internal geometry creates localized pressure differentials and high shear zones. Under appropriate flow conditions, these effects induce controlled hydrodynamic cavitation



**Ionization of Entrained Gas**

Nanobubbles are formed under more lenient flow conditions when the gasses that are entrained in water are ionized or charged by The Shaft's proprietary metal alloy baffles

**Hydrodynamic cavitation plus entrained gas ionization**



Hydrodynamic cavitation is a well-documented physical phenomenon in which microscopic vapor- or gas-filled cavities form and collapse due to transient pressure reductions in a moving liquid. In The Shaft, this process also results in the formation of stable micro- and nanobubbles

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# CRS SHAFT® NANOBUBBLE GENERATOR

## Swimming Pool Installation Instructions

### APPLICATIONS

- Suitable for residential and commercial pools of all sizes
- Designed for municipal or treated fill water
- No power, no programming, no maintenance required
- Installs inline on the circulation loop
- Can flow in either direction

### IMPORTANT INSTALL LOCATION

The CRS SHAFT may be installed BEFORE the water filter. Why? Nanobubbles cause suspended minerals and impurities to coagulate, which:

- Extends filter life
- Improves filtration effectiveness
- Reduces scale and biofilm inside the filter



### THREAD SEALANT REQUIREMENT

- Use Loctite 55 cord or another NSF-certified thread sealant
- Apply to all NPT threads
- Do not use excessive sealant



**CRS**  
CHEMICAL REDUCTION SOLUTIONS



### INSTALLATION STEPS

**01**

Shut Off Pool Pump

**02**

Install PVC Socket to NPT Unions on the CRS SHAFT

**03**

Cut PVC and Deburr

ideal installation location is immediately on the discharge of the pump

**04**

Install CRS SHAFT and Unions Using PVC Cement

**05**

Connect the unions and Install the SHAFT

**06**

Turn on Pump and Check for Leaks

### TECH NOTES (FOR SERVICE MANAGERS)

- Use 2" NPT to PVC Socket Unions for easy install
- Passive device – cannot fail electrically
- Use a bonding clamp if local code requires

Installation Diagram

