



Pure, safe water.

*Always.*

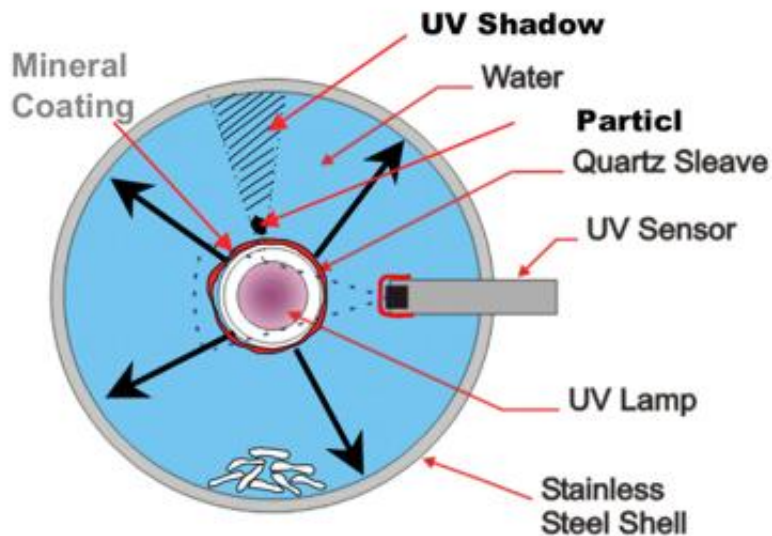
**HALLETT™ SYSTEM'S PATENTED CROSSFIRE TECHNOLOGY™ ACCEPTS PRE-TREATMENT HARDNESS OF UP TO 50 GRAINS WITH NO SOFTENING REQUIRED.**

Hallett™ system's patented Crossfire Technology™ is self-cleaning; Accepts pre-treatment hardness of up to 50 grains with no softening required. Conventional systems specify pre-treatment softening in all water with hardness of greater than 7 grains.

Iron content in water is a complicating factor; the more iron present in the water chemistry, the more rapidly all minerals precipitate and bio-film forms to coat quartz tubes. (Please see [Fouling of UV Lamp Sleeves: Exploring Inconsistencies in the Role of Iron](#); K. Sehaoui and R. Gehr, McGill University, Montreal, Canada.) Most conventional systems specify less than 0.3 ppm of iron as the upper limit; Hallett systems can operate without fouling in 3.0 ppm, or ten times conventional systems' limit for iron.

Hallett 13 GPM and 30 GMP systems have been operating for over three years in difficult hard-water installations without quartz fouling or cleaning. We have extensive field data and experience which supports the innovative self-cleaning technology's superiority when compared to conventional systems.

Water treatment professionals know that conventional UV systems are prone to fouling of quartz tubes and require frequent manual cleaning to ensure effective operation. Fouling in conventional systems occurs because they are designed with the quartz inside the water column. The quartz is subject to fouling from bio-film, or when minerals like calcium, iron, and manganese come out of solution and adhere to the quartz. When this happens, the amount of radiation, the effective dose for pathogen inactivation, decreases. Even a light coating of minerals, which can occur in a few days or even hours in extreme cases, can cause the dose, or power, to drop below minimum effective levels of 40mJ per centimeter squared (as determined by NSF/ANSI 55 Class A standards and many regulatory agencies). As a result, conventional systems need to be cleaned frequently, by draining the water from the system, removing the quartz and manually cleaning and de-scaling it.

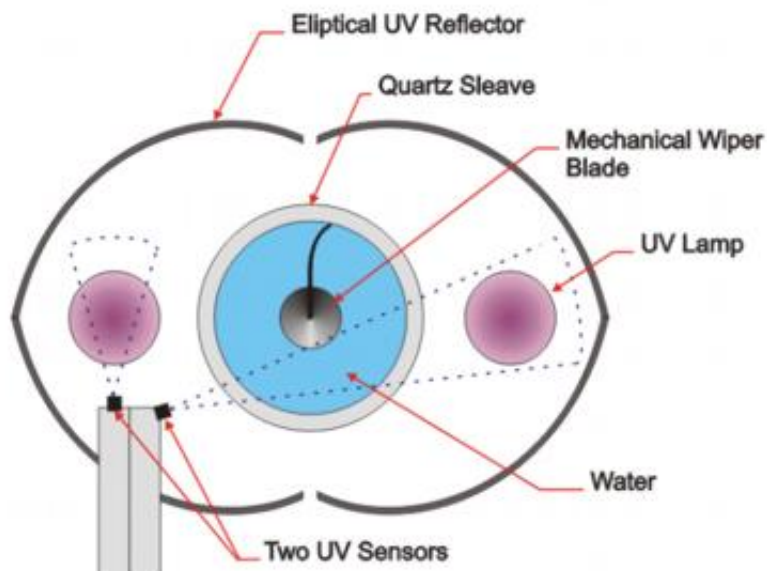


*Conventional diagram showing baked on fouling*

Fouling happens faster, in conventional systems, especially in low or no flow situations, where the heat of the lamp tends to "bake" minerals onto the surface of the quartz.

Most manufacturers of conventional UV systems recommend expensive pre-treatment of water, like softening systems, if the hardness is greater than 7 grains. Of course, this adds cost and complexity to water treatment systems. In addition, softening systems add chemicals, like salt, to the drinking water distribution system, and eventually to the water table since 95% of system water is returned to the environment. This is considered detrimental to health and one cause of increasing salinization of the water table.

Hallett systems' patented design makes self-cleaning possible and eliminates fouling in even extremely hard pre-treatment water conditions.



*Crossfire Technology addresses conventional UV problems*

Hallett systems have patented wipers that rotate four times per hour, or more if its smart sensor technology senses a need for more cleaning. This self-cleaning feature keeps the inside of the quartz water column scale free in high hardness, high iron and other high mineral-content

pre-treatment water conditions. Since the lamps are mounted in air, and convection cooled, water temperatures remain lower and more stable than conventional systems even in low or no flow situations. This unique design significantly reduces photolization of minerals caused by high heat, and its resulting fouling or scaling of quartz. The revolving wipers remove any deposits on the quartz that may start, and return the minerals to solution.

A British Columbia based dealer, Pure Solutions Water, reports that two Hallett 30's have operated continually in very hard water for nearly two years with no fouling at all. The water at Island Lake Resort tests at 38 grains of hardness (650 ppm); no softener is required due to Crossfire Technology's patented self-cleaning mechanism. Mr. Bourne said "The Hallett design is by far the most advanced ultraviolet treatment unit for water that we have used. In our experience we have not seen any unit out-perform the Hallett unit, especially when dealing with high hardness in the water." (See appendix A for the entire text of Mr. Bourne's [report](#).)

Ron Hallett, UV Pure Technologies Chief Technology Officer said, "In fact, we routinely install test units in extreme pre-treatment conditions, even including wells with hardness of up to 100 grains, to ensure fail-safe operating and to test the limits of our Crossfire technology. This data and field experience is used to drive the company's pursuit of continually improving its globally leading technology."

To find out everything, visit [www.puresafewater.com](http://www.puresafewater.com) or call 888-407-9997.

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