

CTE Technology

Developed from direct contact water heating science which was first introduced more than five decades ago, Complete Thermal Exchange (CTE) technology has revolutionized high efficiency water heating methods. Today CTE enjoys a proven record and has rapidly become the new standard in high efficiency water heating and energy savings.

While traditional direct contact water heating can offer significant energy savings when compared to a conventional steam boiler system, the Hamilton Engineering SOLSTREAM™ direct fired water heater offers an unparalleled, 99.7% high heat value (110% approx. low heat value) efficiency rating* throughout each phase of its operation cycle.

The sustained operational efficiency of SOLSTREAM™ direct fired water heaters creates the most energy efficient method of hot water production currently available.

No Scale Build-Up

The SOLSTREAM™ direct fired water heater's unique design prevents scale build-up because there are no "hot spots" internally or externally, and because calcium is prevented from completely falling out of suspension during operation. As a result, the mineral content of the influent water and the effluent water will be equal.

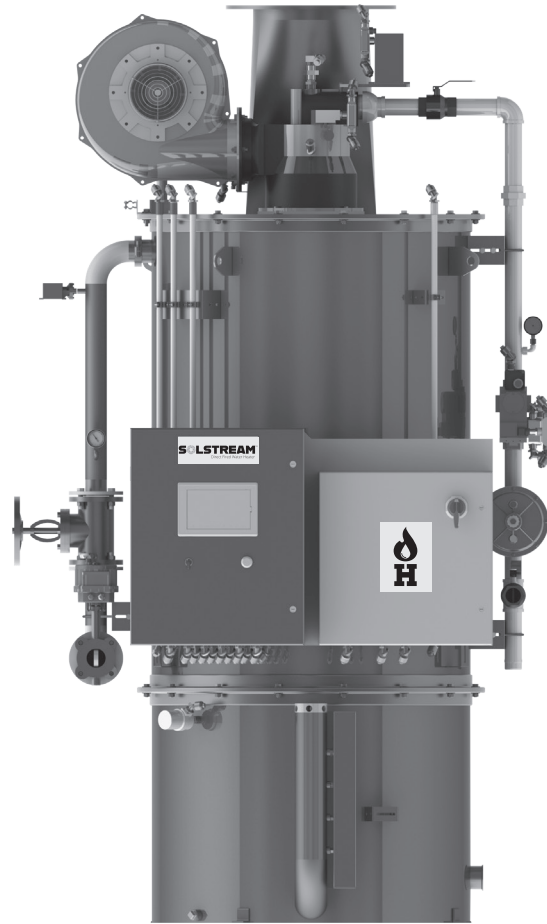
Hamilton Engineering SOLSTREAM™ direct fired water heaters achieve CTE Standards

The SOLSTREAM™ direct fired water heaters meet four standards not available with the older designs and traditional methods of direct contact water heater technology:

1. CTE units maintain a minimum of 99.7% high heat value (110% approx. low heat value) efficiency in all modes of operation, not just under optimal conditions.
2. CTE units have multiple thermal passes. Water and the combustion gases (or heat from the combustion) repeatedly come in contact. This ensures that the maximum amount of heat or energy from combustion is transferred to the water.
3. CTE units maintain complete combustion at all times, utilizing a dry combustion chamber.
4. CTE units must have a built in water quality integrity system. Operational procedures must be in place to ensure that effluent water quality is equal to the influent water quality.

Complete Combustion = Complete Water Quality

While many traditional-method direct contact water heaters spray water directly on the flame – sometimes called "flame quenching" – SOLSTREAM™, using CTE technology, avoids this process altogether. According to the Industrial Heating Equipment Association's "Combustion Technology Manual," flame quenching promotes incomplete combustion, and produces alcohols, aldehyde, formic acid, higher order acids and carbon monoxide, as well as carbon dioxide and water vapor. With CTE technology, SOLSTREAM™ maintains 99.7% high heat value* (110% approx. low heat value) combustion efficiency, while maintaining water quality at all times.



Global Water Quality Standards

SOLSTREAM™ direct fired water heaters using CTE technology significantly limit the effluent water chemical additives typically attributed to other process water heating systems.

Our unique CTE water heating process deaerates the water significantly. Independent third party testing has verified CTE technology can actually remove some chemical constituents from the influent water.

NSF test results show that the effluent water from a SOLSTREAM™ direct fired water heater meets US, European Union and PRC bottled drinking water standards* and has been tested and documented as fully compliant with:

- USFDA—The United States Food and Drug Administration, Code of Federal Regulations Bottled Water Standard: Chapter I, Title 21, Part 165, Subpart B, Section 165.110.
- EU-TRW—The European Union Directives(s)–Treated Waters: 98/83/EC.

* Peoples Republic of China Standards for Drinking Water: GB5749-2006

* Statement presumes influent water also meets listed standards.

SOLSTREAM™

Direct Fired Water Heater

Specifications	
Gas Supply Pressure	2 – 6 psig / .14 - .41 bar
Dynamic Water Supply Pressure	Constant water pressure (+/-5 psi variation maximum) within a minimum of 30 psig/2 bar and a maximum of 100 psig/6.8 bar range is required for optimum performance.
Maximum Inlet Water Temperature	120°F (49°C)
Minimum Inlet Water Temperature	32°F (0°C)
Maximum Effective Outlet Temperature	185°F (85°C)

Materials	
Upper and Lower Canister	Type 304 Stainless Steel #10 Glass Finish
Inlet Gas Train Piping	Malleable Iron with Standard Yellow Finish
Inlet Water Train Piping	Copper with Brass/Bronze Fittings
Spray Ring	Type 304/316 Stainless Steel
Canister Gaskets	Warco White
Flame Tube	Type 304 Stainless Steel
Pall Rings	Type 304 Stainless Steel

Optional/Custom materials of construction available upon request.

Standard Sizing Formulas

$$\frac{\text{gpm} \times \Delta T}{2} = \text{DCH Model}$$

$$\frac{(\text{DCH Model}) \times 2}{\Delta T} = \text{gpm}$$

$$(\text{DCH Model}) \times 2 = \Delta T \text{ gpm}$$

Standard Formula Key

gpm = Gallons per Minute

ΔT = Temperature rise (°F)

DCH = Hamilton SOLSTREAM™
(e.g., 1000, 5000)

Metric Sizing Formulas

$$\frac{\text{lpm} \times \Delta T}{4.2} = \text{DCH Model}$$

$$\frac{(\text{DCH Model}) \times 4.2}{\Delta T} = \text{lpm}$$

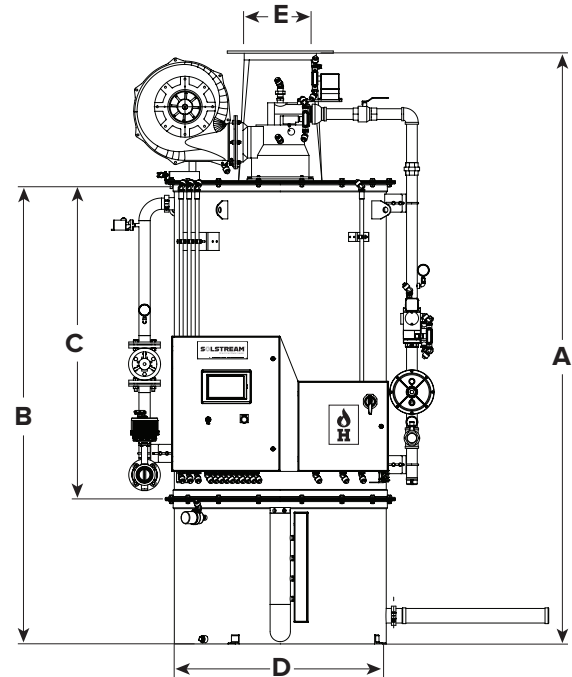
$$(\text{DCH Model}) \times 4.2 = \Delta T \text{ lpm}$$

Metric Formula Key

lpm = Liters per Minute

ΔT = Temperature rise (°C)

DCH = Hamilton SOLSTREAM™
(e.g., 1000, 5000)



SOLSTREAM™ Dimensions and Weights

Model	Connections				Dimensions										Weight		btu/hr
	1		2		A		B		C		D		E		lb	kg	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm			
1000	1	25	1	25	95	2413	71	1803	39	991	24	610	8	203	825	375	1,000,000
1500	1	25	1	25	97	2464	73	1854	41	1041	26	660	8	203	850	386	1,500,000
2000	1-1/2	40	1-1/2	40	100	2540	76	1930	44	1118	30	762	10-3/4	273	1500	680	2,000,000
3000	2	50	1-1/2	40	100	2540	76	1930	44	1118	36	914	12	305	1600	725	3,000,000
5000	2-1/2	65	2	50	127	3226	97	2464	65	1651	44	1118	16	406	2500	1136	5,000,000
6000	3	80	2	50	132	3353	100	2540	70	1778	47	1194	18	457	2900	1316	6,000,000
7000	3	80	2	50	139	3531	107	2718	77	1956	50	1270	18	457	3200	1455	7,000,000
9000	3	80	2	50	169	4293	139	3531	107	2718	60	1524	20	508	5000	2273	9,000,000
10000	3	80	2	50	181	4597	151	3835	119	3023	61	1549	20	508	5200	2405	10,000,000
12000	4	100	3	80	181	4597	151	3835	119	3023	61	1549	22	559	5500	2495	12,000,000
15000	4	100	3	80	192	4877	161	4089	129	3277	70	1778	24	610	7000	3175	15,000,000

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.