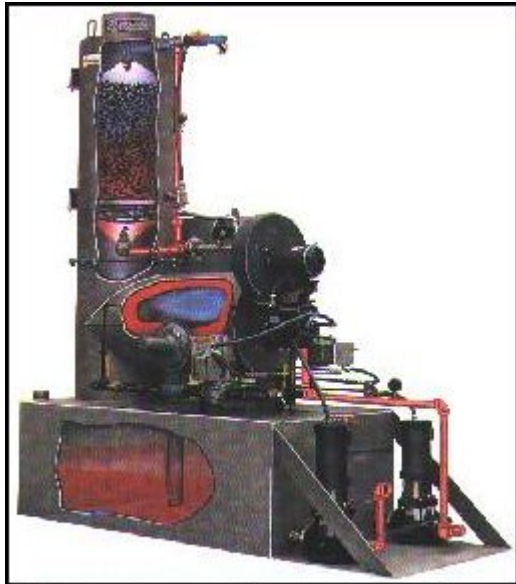


Direct-contact Water Heaters



Direct-contact water heaters reduce emissions and increase energy efficiency
Credit: Quikwater

직접 가열식 온수기



Twin Tower System with large integral storage tank undergo final integration and functionality testing outside the QuikWater plant.

Definition

A water heating device without a heat exchanger and in which flue gases are in direct contact with the water.

정의

열교환기 없이 연소가스가 직접 급수와 접촉하도록 설계된 온수기

Building Use

- highrise apartment
- food service
- institutional

Building Type

- new
- retrofit

Development Status

- mature technology

적용건물

- 고층 아파트
- 음식점
- 교육기관

건물종류

- 신축
- 리트로핏

개발단계

- 성숙된 기술

Description

Direct-contact water heaters heat large quantities of water for domestic and industrial purposes. Cold (mains) water enters the top of a heat exchanger column and flows down through stainless steel rings or other device. Natural gas is burned in a combustion chamber and the flue gases are directed up the heat exchanger column. As the gases move upwards through the column, they

개요

직접 가열식 온수기는 가정 및 산업 용도로 다량의 물을 가열할 때 사용한다. 주관으로부터 차가운 물이 열교환기 역할을 하는 칼럼으로 들어와 스테인리스 스틸로 된 링과 같은 기구를 따라 아래로 흐를 때, 천연가스를 연소실에서 태우면서 발생하는 연소가스는 열교환기 칼럼의 상부로 이동하게 된다. 가스는 칼럼을 통해 상부로 이동하면서 내재하고 있는 현열과 잠열을 물에 빼앗기게 된다.

Direct-contact Water Heaters

transfer their sensible and latent heat to the water. A heat exchanger or water jacket on the combustion chamber captures any heat loss from the chamber. The gases exit only a few degrees warmer than the inlet water temperature. Direct-contact water heaters can be 99 this is 15 to 20% higher efficiency than indirect water heaters. The low temperature combustion process results in low emissions of NO_x and CO, thus the system is in effect a low NO_x burner.

Although there is direct contact between the flue gases and the water, there is very little contamination of the water. Direct-contact systems are suitable for all water heating applications including food processing and dairy applications; the water used in these systems is considered bacteriologically safe for human consumption.

Benefits

- Increases part load and instantaneous efficiency
- Reduces NO_x and CO emissions
- Increases safety
- Increases system response time

Limitations

- High cost
- Less effective in high pressure or closed-loop applications

Application

The high cost of direct-contact water heaters restrict their use to where there is a large, almost continuous demand for hot water. Appropriate applications include laundries, food processing, washing and industrial processes. The system can be used for closed loop (or recirculating) applications such as space heating. However, efficiency – the primary benefit of direct contact water heating – will be reduced because of the higher inlet water temperature.

연소실 상부에 위치한 열교환기 또는 워터 재킷은 연소실로부터의 열손실을 막게 된다. 연도를 통해 빠져나가는 가스의 온도는 주관 입구의 수온보다 단지 몇 도만이 높게 된다. 직접 가열식 온수기는 열효율이 99%까지 나오며 이것은 간접 가열식 온수기의 효율보다 15% 내지 20% 높은 값이다. 저온 연소과정을 거침에 따라 NO_x와 CO의 방출량이 적게 되기 때문에 NO_x 저방출 버너라고 할 수 있다.

비록 연소가스와 물이 직접 접촉하지만, 물의 오염은 매우 적다. 직접 가열방식은 모든 온수용 시스템, 예컨대 조리과정이나 낙농업과 같이 세균학적으로 인체에 대한 안전성이 필수적인 시스템에도 적용이 가능할 정도이다.

장 점

- 국소 부하 및 순간 효율 향상
- NO_x와 CO의 방출량 감소
- 안전성 향상
- 시스템 반응 시간 증가

문제점

- 고가
- 고압 또는 폐쇄 배관계통 적용시 효율 저하

적용방안

직접 가열식 온수기는 고가이기 때문에 대용량인 면서 거의 연속적으로 온수를 필요로 하는 곳에 국한되어 이용되나, 그 용도는 세탁, 조리작업, 세척 및 산업용 등에 널리 적용된다. 직접 가열식 온수기는 난방과 같은 폐쇄 배관계(또는 재순환 방식)에도 적용될 수 있다. 그러나 직접 가열식 온수기의 최대 장점인 효율이 떨어지게 되는데, 이것은 공급수온이 높아지기 때문이다.

*Direct-contact Water Heaters***Experience**

Direct-contact water heaters are common in industrial processes, but have seen limited use in commercial applications. The London Hospital has successfully used a direct contact water heater for their laundry operations for over twenty years.

Cost

Direct-contact boilers are two to three times the price of indirect or conventional boilers primarily because of the stainless steel construction. In high and continuous water use applications, however, the payback period can be under two years.

Example Manufacturers

Quikwater

A Division of Webco Industries Inc.

P.O. Box 100

9101 W. 21st Street

Sandsprings OK

USA 74063

tel 1 800 241 1951

fax 1 918 241 5718

www.quikwater.com

Sofame Inc.

500, Rue Alphonse D. Roy

Montreal, Quebec

Canada H1W 3Y8

www.sofame.com

사 례

직접 가열식 온수기는 산업용으로 널리 사용되고 있지만 상업용으로는 제한적으로 적용되고 있다. 런던 병원의 경우 세탁용으로 20년 이상을 성공적으로 사용해 오고 있다.

비 용

직접 가열식 보일러는 스테인리스 스틸 구조이기 때문에, 간접 또는 전통적인 보일러보다 가격면에서 2~3배 정도 비싸다. 그러나 고온의 물을 연속적으로 사용해야 하는 경우에는 투자회수 기간이 2년 이하로 짧다.

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※ Appendix : 관련 Web-site

▷ QuikWater (www.quikwater.com)


QuikWater's direct contact water heaters have proven time and again to be the most energy efficient and environmentally compliant way to heat water for industrial and commercial applications.

Incoming water flows downward through a vertical column filled with stainless steel packing rings. As cold water comes into direct contact with rising hot combustion air from a gas burner, a very rapid heat transfer occurs, absorbing 99% of the heat energy into the water. Pure, heated water then accumulates in the storage tank for "On Demand" use, and clean CO₂ and H₂O combustion gas leaves the stack at near ambient temperature.

Patented Combustion Chamber

QuikWater's exclusive combustion design offers unequalled energy efficiencies, and has proven itself to be environmentally safe and extremely dependable at continuous high peak performance, while requiring minimal maintenance. The entire heat transfer process takes place at atmospheric pressure, removing the safety risks associated with standard pressurized systems. The patented water-jacketed combustion chamber provides an isolated "dry" atmosphere allowing complete combustion, unlike other models whose burner flames are positioned directly in the falling water. This technology assures total combustion without any water impinging directly on the flame, allowing the highest fuel efficiency without any water contamination.

- ▶ See next page for a comparison between Boilers and the QuikWater Direct Contact Water Heater

	VS	BOILERS
99% Energy Efficient	→	Average 60–75% efficiency
Safe, atmospheric pressure	→	Pressurized, ASME-code vessel, higher insurance cost
No certified operator required	→	Certified operator may be required
Not subject to ASME code, no inspections	→	Subject to ASME code requirements, including permits and annual inspections
Heats water as needed, heater shuts off when not needed.	→	Boiler feed system always "on" increasing energy costs.
Less frequent maintenance, more production time.	→	More frequent maintenance, less production time.
304/304L stainless steel vessel	→	Cast iron and carbon steel
Small footprint	→	Requires extra room

The "Clean Burn" Design.

The QuikWater "clean burn" design has no adverse effect on water quality. This system is recommended for use in USDA and FDA regulated facilities to provide heated potable water in direct food contact service and dairy plants. The Oklahoma State Health Department has also certified QuikWater's heated potable water as "safe for human consumption".



Twin Tower System with large integral storage tank undergo final integration and functionality testing outside the QuikWater plant.

The "Clean Burn" Difference.

The patented firing chamber provides the maximum heat output with lower emission levels of NOx and carbon monoxide. Unburned hydrocarbons are virtually eliminated. Emissions tests with standard burners reflect minimal NOx at full fire and our newly developed low NOx burners ensure emission levels with meet the ever-demanding and most stringent environmental requirements.

Direct-contact Water Heaters

Safety First.

When heat transfer occurs at atmospheric pressure the result is an inherently safer design. QuikWater's non-pressurized design eliminates the need for a full-time boiler engineer or pressure boiler permits and lowers insurance rates. It also eliminates the need for boiler feed chemicals and boiler's high maintenance. This design incorporates burners, gas trains, control panels and components which comply with ETL, U L, ULC, FM, CGA and IRI specifications, if required.

Uptime to a maximum.

QuikWater uses only the highest quality materials and components in the industry to guard against costly downtime. Unlike other Direct Contact Water Heaters, QuikWater provides easy open hatches for routine maintenance which saves hours of expensive labor and plant operating time. There are none of the hassles from burner flooding shutdowns and no maintenance requirements to remove build-up on internal linkages and sensors.

QuikWater Can Take The Heat

Each QuikWater unit is constructed from 304/304L stainless steel for exceptional service life and is fabricated in an ASME coded welding shop. An exclusive lower cooling system prevents metal burnout seen in other heaters.

Packaged Systems Save Money.

QuikWater heaters are entirely self-contained with no hidden costs for additional pumps, controls or external storage tanks. QuikWater's maximum BTU output produces hot water on demand with minimal storage in an integral tank. The unit's modular design configuration calls for minimal space and footprint. All heaters are pre-piped, pre-wired and factory tested, requiring only 5 installation connections:

- Fuel
- Electricity
- Cold Water Inlet
- Hot Water Outlet
- Exhaust Stack

Low Stack Emissions.

The patented firing chamber provides maximum heat output with lower emission levels of NOx and carbon monoxide. QuikWater's Low NOx models ensure emissions levels that will meet the ever-demanding and most stringent environmental requirements.

Direct-contact Water Heaters

"On Demand" Hot Water.

Incoming water is heated in a single pass through the QuikWater system, providing continuous hot water, "on demand."

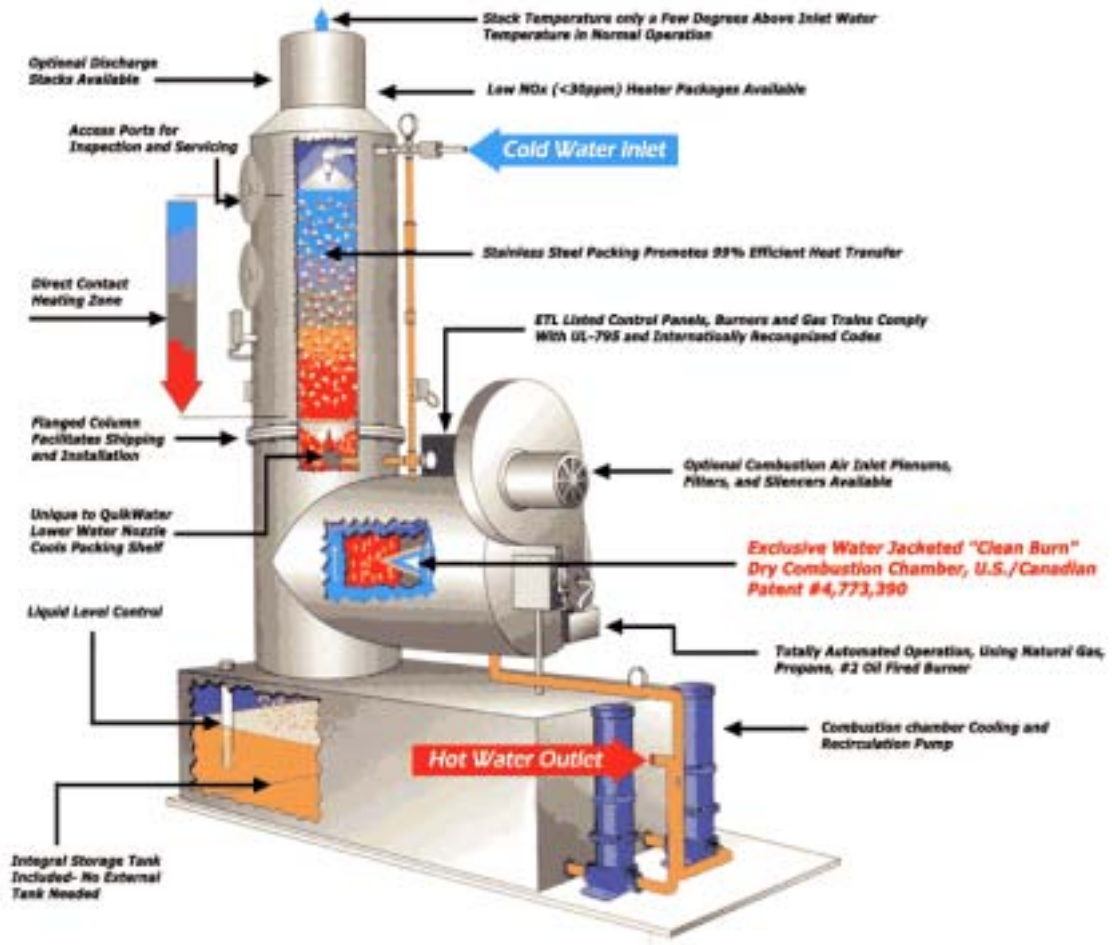
"Custom Design" Options.

QuikWater heaters can be custom designed to user specifications, including the following options:

- Customized External Storage Tanks
- Multiple or High Pressure Pumps
- Heat Reclaiming Systems
- Tie-In to Remote Tanks and Controls
- Flexibility in Equipment Footprint
- Special Utility Piping Locations
- Supplemental Closed Loop Heating
- Low NOx Burner Packages & Retrofits
- Multiple Temperature Design
- Tempered Water Systems
- Alternative Fuel Sources
- Water Distribution Systems
- Linkage w/ Existing Hot Water Equipment
- 99% Efficiency.
- Lower Emissions.
- Potable Hot Water.
- Hot water when you need it. And lots of it.

Direct-contact Water Heaters

The QuikWater 99% Efficient Water Heater



Direct-contact Water Heaters