

# UNIFLUX®

## Convection Fired Heaters



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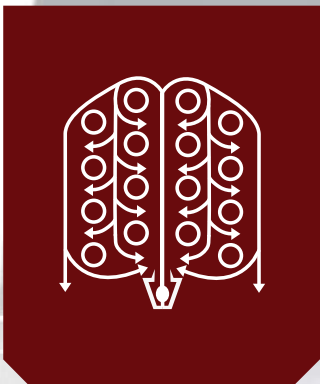


# UNIFLUX®

## The Global Answer to Heat Transfer

The UNIFLUX® heater was originally developed in Oklahoma by BS&B (Black Sivalls & Bryson). It was specifically designed for heating thermally sensitive fluids using convective rather than radiant heat transfer. The process coil geometry along with the custom built high velocity short flame burner effectively "pump" the flue gas within the heater. This flow pattern minimizes radiant heat transfer and maximized convective heat transfer.

The convective heating of the UNIFLUX® heater provides exceptionally long tube and thermal fluid life compared to any other heat transfer method. The UNIFLUX® heater was so successful that a stand alone company was created within the BS&B group of companies.



The UNIFLUX® heater is now manufactured by Exotherm Corporation, a privately owned company headquartered in Houston, Texas, USA. Exotherm has an experienced team of specialists with a wide range of product, combustion, and heat transfer knowledge.

Exotherm Corporation's primary product is the UNIFLUX® heater, which is a completely packaged, economically priced, forced draft, convective process heater. The UNIFLUX® heater has a proven reputation in a large range of industries worldwide, such as the processing of crude oils, natural gas and other hydrocarbon products.

The unique technology in the UNIFLUX® heater design provides superior process heater reliability and longevity. The UNIFLUX® heater is a result of significant research and design activities developed over the past 50 years. This technology development, along with superior application knowledge and experience has allowed Exotherm Corporation to provide quality process heating solutions for difficult applications worldwide.

### FORCED CONVECTION OFFERS:

- \*Uniform Heat Flux
- \*No Flame Impingement
- \*High Thermal Efficiency
- \*Safe Operation
- \*Lower Bulk Temperatures
- \*Longer Tube Life
- \*Much Longer Thermal Fluid Life

### APPLICATIONS:

- \*Heat Transfer Fluid (Hot Oil Heaters)
- \*Regeneration Gas
- \*Glycol-Water
- \*Crude Oil
- \*Steam Superheaters
- \*Air
- \*Cryogenic
- \*Emulsions
- \*Offshore Production



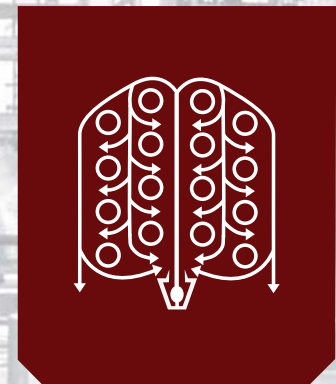
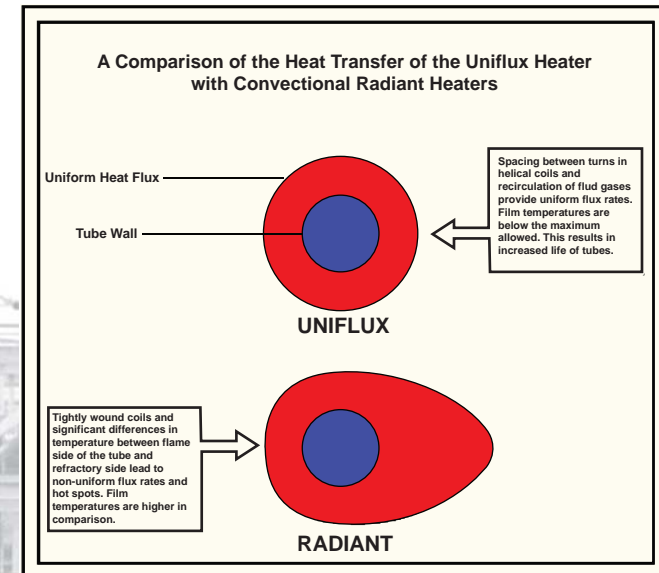
# UNIFLUX®

## Fuel Reactor

### PRINCIPLE OF OPERATION

The UNIFLUX® process heaters consist of a fuel reactor and heat exchanger cabin. In some applications, a process preheat economizer is incorporated for increased fuel efficiency. The fuel reactor is the heat source and generates a high velocity, high momentum discharge of hot combustion gases. Combustion air is forced into the fuel reactor tangentially from a combustion air blower. From the annulus of the reactor, the air enters the "inner" cone at the back of the reactor with rotational flow that generates a vortex at the point of fuel injection.

The vortex created inside the reactor generates a rapid mixing for the fuel and air in the ignition zone. Primary and secondary combustion zones inside the reactor are highly turbulent, creating a very short flame which minimizes radiant heat in the cabin.





# UNIFLUX®

## PRINCIPLE OF OPERATION

Because combustion is completed within the reactor there is essentially no flame extending into the cabin.

High temperature inert gas from the reactor enters the heat exchanger at high velocity. The hot jet-stream of combustion products passes through the center of the cabin, away from the coil. As the gases travel through the center of the cabin, cooler exhaust gases are entrained and mixed into the hot jet stream. This mixing provides a uniform bulk temperature of flue gases passing over the coil. The uniform temperature passing over the coil at high velocity is the key to a uniform flux rate throughout the entire UNIFLUX® heater.

The mixed flue gas rapidly reverses flow direction 180-degrees and turns back down and across the process helical coil. The rapid counter flow of high velocity hot combustion gases circulates around each process tube in the exchanger cabin. This creates an extremely uniform convective heat transfer flux rate around the surface of each process tube.



## UNIFLUX®

### QUALITY OF CONSTRUCTION

Exotherm does not compromise on the quality of our heater construction. Our heaters are designed and built to last. The coil is typically designed per ASME Section VIII code, which is more conservative than API guidelines. UNIFLUX® heater shells are at a minimum made of ¼" steel plate (thicker on larger heaters). The layers of ceramic fiber and mineral wool insulation are held in place with 5/16" stainless steel pins and a stainless steel liner, so they will stay in place. We don't use any hard refractory, or spray on binders. Rapid heat up and rapid cooling will not harm the UNIFLUX® heater. Frequent heat cycles do not pose a problem for a UNIFLUX® heater. Our fuel trains and control panels are made only with high quality components suitable for many years of service in harsh outdoor and offshore environments. Exotherm uses components and construction techniques second to none. Our customers don't buy replacement UNIFLUX® heaters, they buy more UNIFLUX® heaters as their facilities expand!

## UNIFLUX®

### VERSATILITY OF PERFORMANCE

(Typical UNIFLUX® applications)

- Burning of low pressure fuel gas, including flare gas, with low fuel pressure required.
- Intermittent heater operation capability.
- Heats sensitive process fluids.
- Can utilize low BTU fuel gases.
- Multiphase process heating capable.
- Direct heating of crude emulsions.
- Regeneration gas.
- Heat transfer fluids.
- High temperature air heating.
- Cryogenic process fluids.
- Low emission (Low NOx) burners available.



## UNIFLUX®

### DESIGNED TO MEET YOUR REQUIREMENT

Provide the following information and Exotherm Corporation will design, fabricate, and commission a heater to meet your requirements:

- Composition of process medium to be heated (Maximum and minimum values).
- Flow rate.
- Specific gravity of fluid.
- Inlet process temperature.
- Process properties (viscosity, thermal conductivity, specific heat capacity).
- Outlet process temperature.
- Ambient temperature.
- Stack emission requirements.
- Fuel gas composition.
- Fuel gas pressure.
- Corrosion allowance, NACE requirement.
- Site elevation.
- Hazardous area zone classification.
- Design code.



# UNIFLUX®

## THE BENEFITS

(Uniform Heat Flux = Maximum Heat Transfer)

Flux density around the periphery of each process tube is uniform. The average flux rate is essentially equal to the maximum possible flux rate. Uniform heat flux, without flame impingement, eliminates coking, uneven heating of process fluids and tube burnout, lowering total cost of operation.

NO FLAME IMPINGEMENT - Complete combustion within the fuel reactor means no flames within the tube area. Tube walls are safe from the flame. Coking of process tubes is minimized.

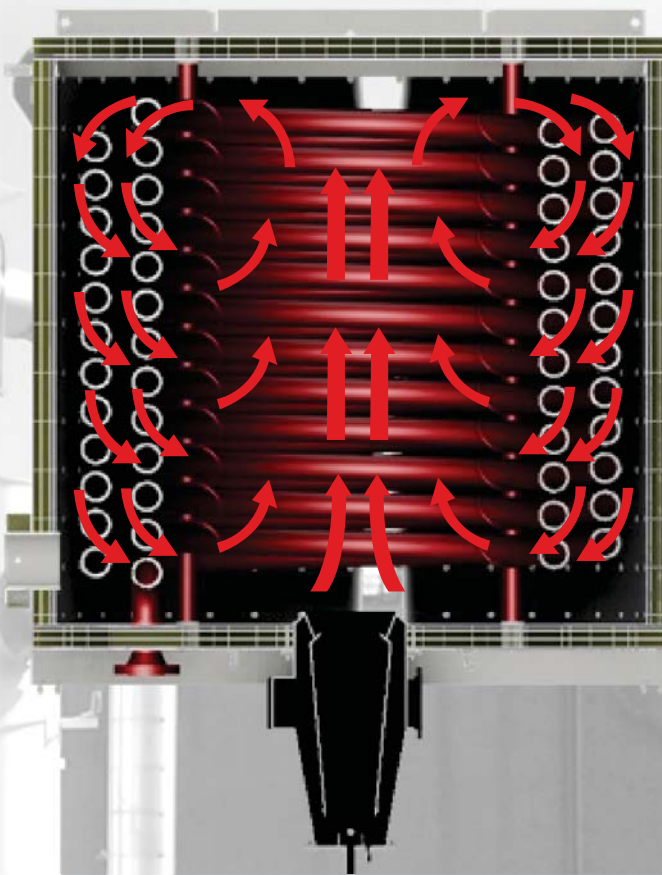
HIGH THERMAL EFFICIENCY - Using UNIFLUX® banks alone, efficiencies of 80% are possible. With the addition of an exhaust stack economizer, efficiencies up to 95% are possible.

SAFE OPERATION - No flashbacks. Inert gases in the heat exchanger cabin cannot support combustion. Not need for flame arrestors.

STOICHIOMETRIC COMBUSTION - The fuel reactor is adjustable to stoichiometric fuel/air ratios with complete combustion assured within the reactor. It operates over a wide range of turndown with stable combustion.

FAST RESPONSE - UNIFLUX® is ideal for intermittent operation. Nearly instant firing rate changes allows for very rapid response to PROCESS LOAD CHANGES.

# UNIFLUX® HEAT EXCHANGER



LOW PRESSURE FUELS - With a vortex at the point of fuel injection, low pressure fuels can be effectively burned in the reactor.

ALL METAL CONSTRUCTION REACTOR - Cooling effect of inlet combustion air keeps outer cone of the reactor cool, even when the reactor is operating at full capacity. Temperature on outer cone approaches temperature of inlet air. This eliminates the need for refractory.

SKID ASSEMBLED - Minimal heater assembly with no field welding required. The heater is assembled on a skid and factory tested. Only process piping, fuel gas, and electrical connections are required at plant site in most cases.



# OTHER EXOTHERM PRODUCTS

## Q-PAK AIR HEATER

The Q-PAK direct fired air heater is utilized for applications where the combustion products can be directly introduced into the process air stream. The Q-PAK heater is ideal for drying applications, and has been used extensively for Oil Tool testing applications.



## PUMP SKID PACKAGES

Exotherm can custom design pump skid packages for your heat transfer fluid application. We can provide ANSI or API pumps with expansion tank, piping, isolation valves, relief valves, meter runs, minimum flow by-pass lines, and instrumentation to meet your specific requirements.



## BURNER MANAGEMENT CONTROLS

Exotherm provides heaters complete with all the combustion safety controls required by NFPA. We can customize our control systems to meet your requirements. Whether you desire a basic flame relay control system with temperature and pressure switches as safety interlocks, or a more sophisticated PLC pro-



## LOW NOX BURNERS

Exotherm can provide low NOx burners for new heater applications, or retrofit existing heaters with new low NOx burners to meet today's stringent emission requirements.

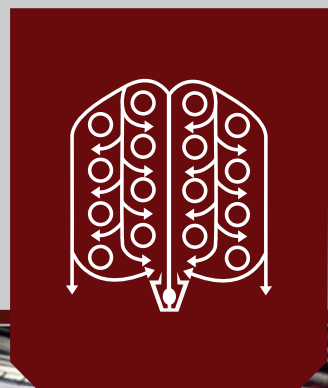


## INDIRECT BATH HEATERS

Exotherm can custom design high quality forced draft indirect bath heaters to meet your requirements. Our bath heaters are designed for durability and reliability with the highest efficiencies.







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RELIABILITY**

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