

# OPTIMAX® Heat Exchanger

# High Efficiency Heat Exchanger Helps You Achieve a More Efficient CAPEX

Watlow® has over 40 years of experience designing and manufacturing heat exchangers, and we have the knowledge, experience and expertise required to create optimal heating solutions. Watlow has taken tried and true, critical design criteria and improved it to create a new generation heating technology - the OPTIMAX® heat exchanger.

Watlow's new OPTIMAX technology combines optimal fluid dynamics, efficient heat transfer, low pressure drop and a compact and reliable package to create a world-class system solution.

Watlow's EFD (enhanced fluid dynamics) technology provides advanced flow throughout the system without compromising the integrity of the fluid, heating elements and/or vessel. Fluid temperatures are further optimized through the use of OFT (optimized film temperature) technology in the heating elements. These, coupled together, provide an accelerated heat transfer rate, allowing the vessel to perform consistently at shorter lengths, or smaller shell diameters. In addition, the OPTIMAX can be designed for backwards compatibility with existing designs.

Watlow has validated these technologies through CFD/FEA modeling, as well as over 5,000 hours of laboratory testing.

In addition, OPTIMAX is compatible with Watlow's WATCONNECT® control panel systems.











## **Features and Benefits**

Smaller and lighter than traditional heat exchangers

Helps reduce overall footprint by almost 50 percent Enhanced fluid dynamics (EFD) and optimized film temperature (OFT) proprietary technologies

- Provides advanced flow throughout the system improving heat transfer
- Allows vessel to perform consistently at shorter lengths

#### Over 5,000 hours of laboratory testing

Validates proprietary technologies

## **Performance Capabilities**

- Wattages up to 3 megawatts
- UL® and CSA component recognition up to 600VAC and IEC and ATEX recognition up to 690VAC
- ANSI compatible 3 through 48 inch flanges
- Hazardous area ratings:
  - ATEX 2 G Ex d IIC, T1 6 Gb
  - IEC Ex d IIC: T1 6 Gb
  - ATEX 2 G Ex e IIC T1 6 Gb
  - IEC Ex e IIC T1 6 Gb
  - Class 1, Divisions 1 & 2, Groups B, C & D
  - PESO, Zone 1 Group IIC
- ASME code welding
  - Flange assemblies and pressure vessels can be provided with an ASME Section VIII, Div. 1 or Section IV code stamp upon request
- OPTIMAX is compatible with Watlow's WATCONNECT control panel systems
  - Contact your Watlow representative for more details



## Powered by Possibility

To be automatically connected to the nearest **North American Technical Sales Office:** 

1-800-WATLOW2 • www.watlow.com inquiry@watlow.com

**International Technical Sales Offices:** 

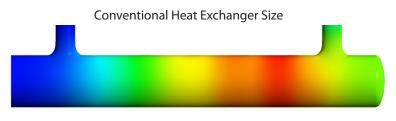
China +86 21 3532 8532 France +33 1 41 32 79 70 **Germany** +49 7253 9400 0 +91 40 6661 2700 Italy Japan Korea Mexico +52 442 256 2200

+39 02 4588841 +81 3 3518 6630 +82 2 2169 2600 **Singapore** +65 6773 9488 Spain +34 91 675 1292 Taiwan +886 7 288 5168 IJK

+44 115 964 0777



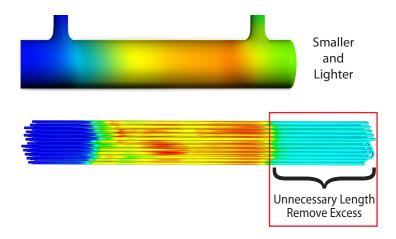
# **Conventional Heat Exchanger**



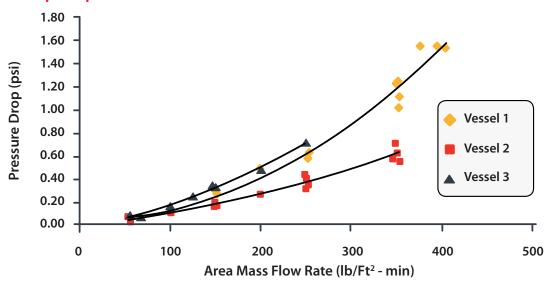
**Conventional Element Sheath Temperatures** 



## **New OPTIMAX**



## **Pressure Drop Graph\***



\* The Pressure Drop Graph shown above is for example only. The estimated pressure drop for your specific OPTIMAX product must be calculated. Watlow will provide the estimated pressure drop with all OPTIMAX quotations.



## **OPTIMAX Size Improvement**

## Continuous Catalytic Regeneration (CCR) Reduction Gas Heater No. 2

#### **Application Parameters**

Service	Reduction Gas No. 2		Allowable Pressure Drop	1.0	psi
Gas Composition	HCBN & Hydrogen		Max. Immersion Length	Not Specified	
Flow Rate	126.42	kg/hr	Max. Sheath Temperature	704	°C
Total Power	92	kW	Max. Watt Density	15,500/31,000	W/m <sup>2</sup>
Inlet Temperature	369	°C	Design Temperature (Shell)	650	°C
Outlet Temperature	553	°C	Design Temperature (Flange)	570	°C

Watt density specification can artificially constrain heater design, which results in higher costs.

#### **Design Comparison: Traditional to OPTIMAX**

Design Options	Traditional Design Heater A	Traditional Design Heater B	OPTIMAX Design
Heater Size	6 in. w/15	6 in. w/15	6 in. w/15
Total # of Heaters	2		1
Immersed Length (inch)	97	97	86
Watt Density (W/m²)	15,500	31,000	52,700
Sheath Temperature (°C)	648	686	703.4
Shell Temperature (°C)	601	589	628.2
Wire Temperature (°C)	709.8	811.1	907.8
Wire Gauge (AWG)	20	18	24T
Pressure Drop (psi)	0.009	0.0088	0.0164
h₅ (BTU/ft²-hr-°F)	28.73	28.2	39.3
Re	5751	6089	5751
Total Surface Area (in²)	4540	4540	4114
Amperage per Circuit (A)	13.58	27.14	40.72

Watt density
is above the
specification, but
all other critical
specifications are
still met!
Significant reduction
in heater size
as a result.

**Size Improvement limited by:** 

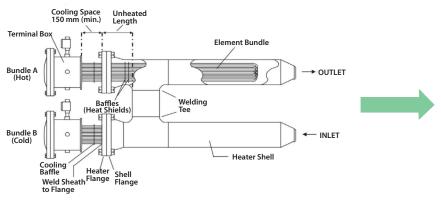
Customer Watt Density Spec.

Customer Watt Density Spec.

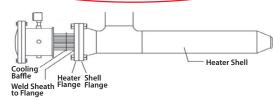
Max. Sheath Temperature

Meets the specification

Alternative to specification



An entire element bundle and heater shell can be eliminated with OPTIMAX technology.



## **Improvement Summary**

	OPTIMAX Improvements				
Application	Number of Heater Bundles	Total Element Surface Area	Total Immersion Length		
Reduction Gas No. 2	50% less	51.4% less	108 in. shorter		