

# Impervite® Advanced Graphite

Shell and Tube Heat Exchanger



New class of materials to address challenges in heat transfer!



Graphite Composite Material • Superior Resistance to Fouling, Corrosion, and Thermal Shock

## Impervite® Advanced Graphite Tube

The Impervite® Advanced Graphite tube combines the benefits of graphite and polymer materials to provide efficiency and reliability for water treatment, heat recovery, and process chemistries. This tube material provides an unequalled combination of resilience to operating stresses, corrosion resistance, thermal efficiency, low fouling, and maintainability.

## Maximum Corrosion Resistance

The Impervite® Advanced Graphite composite tube has been subjected to testing in corrosive acid streams at elevated temperatures with excellent results. The tube will not degradant with operation as would a metal tube having annual corrosion rate.

## Low Fouling / Ease of Maintenance

The material characteristics and excellent surface quality of the Impervite® Advanced Graphite in a low friction surface with a lower propensity to foul. In addition to a reduced potential to fouling, deposits have a weak bond with the tube. This non-adhesive behavior allows successful surface cleaning using only water at relatively low pressure. This equates to higher overall performance and lower maintenance costs.

**CGThermal**  
Process Technology Solutions  
for Harsh and Corrosive Process Streams



### Chemical resistance

		Test Conditions		
Medium		Concentration	Temperature	Duration
Water	Seawater	6.5 %	80 °C (176 °F)	180 d
	Hydrochloric acid (HCl)	36 %	100 °C (212 °F)	30 d
Acid	Sulfuric acid (H <sub>2</sub> SO <sub>4</sub> )	60 %	140 °C (284 °F)	180 d
	Phosphoric acid (H <sub>3</sub> PO <sub>4</sub> )	85 %	156 °C (313 °F)	180 d
	Hydrofluoric acid (HF)	40 %	100 °C (212 °F)	14 d
Mixed Acid	Hydrochloric acid (HCl)	0,003 %	90 °C (194 °F)	70 d
Condensate DIN EN 14471 Class 2	Nitric acid (HNO <sub>3</sub> )	0,02 %		
	Sulfuric acid (H <sub>2</sub> SO <sub>4</sub> )	0,04 %		



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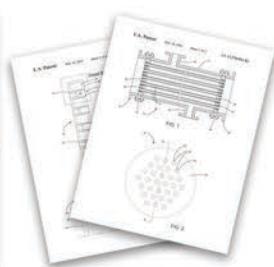


Twinsburg, Ohio, USA

# Impervite® Advanced Graphite

## Superior Thermal and Mechanical Shock Resistance

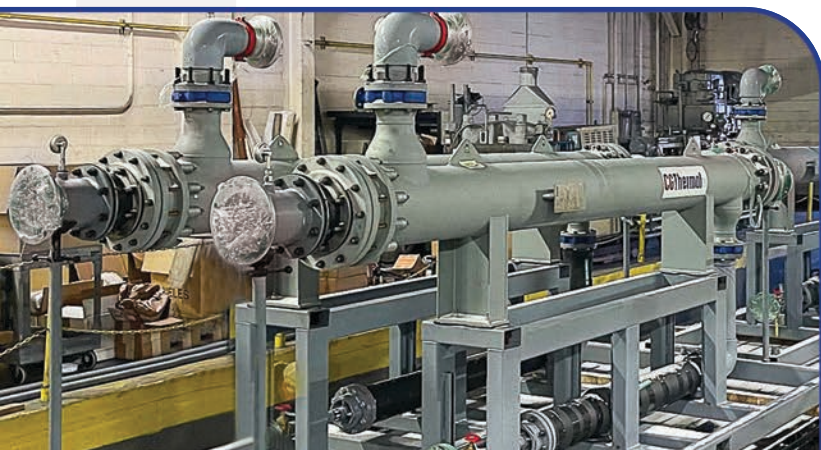
This Impervite® Advanced Graphite extruded graphite tube is much more ductile than traditional impervious graphite tubes. As a result, it is more resistant to vibration and other mechanical stresses. Additionally, its low CTE and tube to tubesheet seal of the Impervite® Advanced Graphite shell and tube exchanger build in superior resistance to thermal shock.



\*United States  
Patented XD  
tubesheet allows for  
larger diameter units  
with pressures up to  
150 psig at 400F.

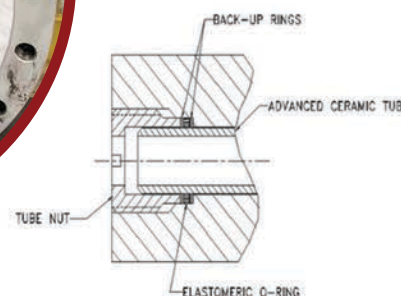
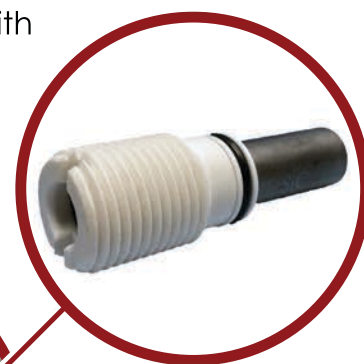
## Proprietary Self-Contained Elastomeric Sealing System

The proven tube to tubesheet\* seal system utilizes a combination of specifically selected elastomeric seals and Teflon support rings. When coupled together with the close tolerance tube nut and tubesheet hole it results in a highly reliable, static, self-contained seal that is 100% leak free with exceptional service life. Units in service have proven that after over 20 years the seal is still performing leak free without the need of maintenance or replacement. Impervite® Advanced Graphite tubes can optionally be used with a graphite tubesheet.



## Completely Field Repairable

If ever required, individual tubes can be replaced in the field simply and economically without the need for special tools and/or highly specialized welding procedures. Gaining access to the tubes is quickly and easily accomplished. A single tube can be removed and replaced without disturbing any other tubes. This can be accomplished on site, with a simple, straightforward operation eliminating shipping concerns and minimizing downtime.



## Superior Operational Value

- ✓ High purity
- ✓ Ductile material resistant to vibration stresses
- ✓ Higher design pressure
- ✓ Corrosion resistance against most harsh process streams
- ✓ Thermal conductivity similar to that of stainless steel
- ✓ Resistant to fouling and easily cleaned without damage to the tubes
- ✓ Completely field repairable with common tools
- ✓ Immune to thermal shock



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