

Impervite®
graphite
the big advantage



IMPERVITE® SHELL AND TUBE EXCHANGERS

LONGER OPERATIONAL LIFE

CG Thermal Impervite®LT impervious graphite tube is manufactured by subjecting a fully graphitized porous graphite tube to our state-of-the-art proprietary vacuum/temperature/pressure impregnation of modified phenolic resin.

By carefully measuring the resin properties and matching the characteristics of the graphite, we can guarantee a final product that consistently meets our mechanical, thermal and corrosion resistant standards. All phases of the impregnation process are computer controlled, recorded and archived verifying the manufacturing process is exactly per our specification.

The result is an industry leading Impervite®LT graphite exchanger that meets or exceeds all other phenolic impregnated graphite units in the very important exchanger properties of thermal conductivity, thermal shock resistance and thermal stability. The absence of carbon in our fully graphitized tube minimizes the brittleness while maximizing the toughness and fatigue resistance.

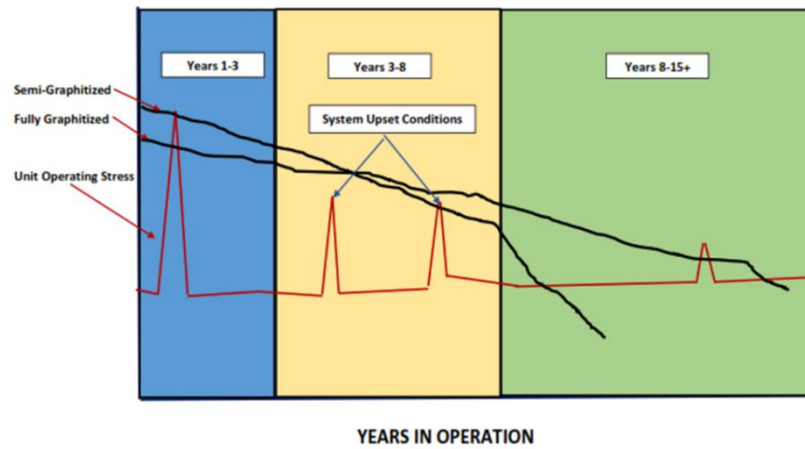
IMPERVITE®LT. IDEALLY SUITED FOR HEAT EXCHANGER SERVICE.

- + Highest thermal conductivity.
- + Exceptional thermal shock resistance.
- + High toughness, lower brittleness.
- + Low thermal expansion rate.
- + Exceptional Thermal Stability.
- + Fully Graphitized
- = **Excellent resistance to fatigue stress resulting in longer operational life**

CG Thermal, LLC.
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Some manufactures have made the decision to use a "graphite" tube that is not fully graphitized to lower costs. Minimizing graphitization and using a "carbon/graphite" tube does lower the production cost but also ***lowers the thermal conductivity, increases the thermal expansion rate, lowers the thermal shock resistance, and lowers the ability of the tube to absorb impact energy.***

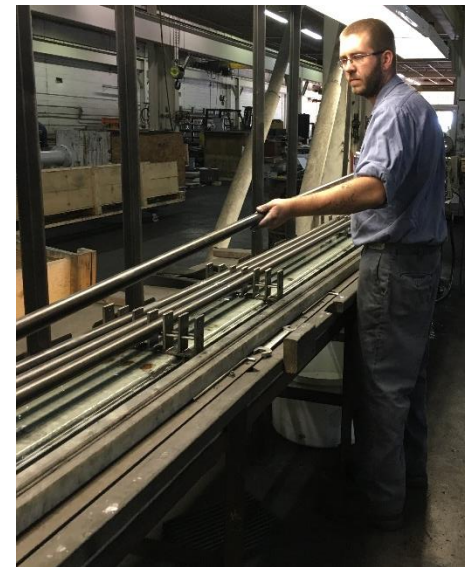
$$\text{Thermal Shock resistance} = \frac{\text{Conductivity} * \text{Tensile Strength}}{\text{CTE} * \text{Young's modulus}}$$



Advanced Design, Manufacturing

Recognizing that CG Thermal heat exchangers must perform during critical processes, they are designed, manufactured and tested to meet especially high internal standards as well as ASME SEC VIII Div 1 requirements.

- 100% of Impervite® tubing is subjected to both an air-under-water and higher pressure hydrotest after impregnation and prior to being assembled in an exchanger.
- Impervite® tubes are available up to a monolithic length 12' long. Should the optimum tube length exceed 12' the tubes are joined using our ASME certified, computer controlled and monitored cementing process. The assembled tubes are hydrotested after joining.



Impervite® Monolithic, Single Piece Tubesheet

CG Thermal only supplies monolithic, single piece tubesheets. Other manufactures have elected to use segmented tubesheets. In this design smaller sections are machined and cemented together to form larger diameter pieces. This design introduces many additional cement joints at the tubesheets.

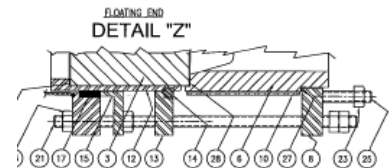
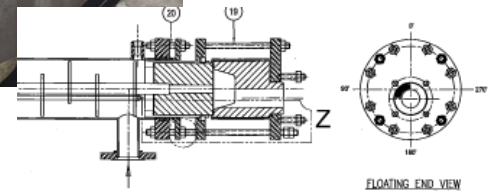


Ceramic. Graphite. Heat Exchangers. Process Equipment

Fully Metal Encased Tube Side Construction

As standard practice CG Thermal fully encases all exposed graphite components in ASME SEC VIII code stamped metal covers and skirts, protecting the graphite from external damage and eliminating dangerous tensile loads on the floating tube sheet. The design includes a high precision machined floating tube sheet “skirt” which transfers the floating head mechanical and hydraulic forces on to the back side of the floating tube sheet, putting this graphite component in compression, which is the “best practice” for graphite design.

It is worthwhile noting that virtually all graphite exchangers carry tube side process fluids which create class 1, div I or II hazardous area conditions in the workplace. Increased emphasis should therefore be placed on tube side integrity.



ASME Code Markings*

There are two options available for applying the ASME Certification Marks

ASME Sec. VIII Div. 1 Certification Mark with the U designator

Applied to a graphite heat exchanger without the need to apply the G mark designator when the following conditions have been met:

- All of the metal pressure retaining components of the completed unit have been designed and fabricated per the requirements of ASME Sec. VIII Div. 1.
- The assembled unit is tested per Code requirements.
- There are no external graphite pressure retaining components.

ASME Sec. VIII Div. 1 Certification Mark with the U and G mark designators

Applied when meeting the requirements of ASME Sec. VIII Div. 1 and applying the rules of Part UIG.

- The G mark is required when there are graphite components (tube sheets and process domes) not encased in metal, used as external pressure-retaining components (the pressure boundary)
- The Gmark is a design option openly acceptable to the industry and has the advantage of potentially reducing manufacturing costs due to the elimination of the metal pressure-retaining components on the graphite tube sheet and domes.
- An end user can elect to use this option with the metal encased design described above, for added protection against catastrophic failure.



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CUSTOMER FOCUS, SERVICE DRIVEN

“Wish all vendors were as responsible and responsive when errors are found. Incredibly refreshing!!!”

- Project Manager

CG Thermal understands the need and value to your operations of having in place exceptional customer technical support and service during all phases of the order process. We utilize only the most qualified field sales representatives coupling their services with our focused in-house engineering, technical sales, and compliance department resources. Should any unforeseen issues or mistakes arise we work closely with you to resolve them quickly to meet your project schedule and to your complete satisfaction.

As proof of this performance, CG Thermal delivers its heat exchangers with both thermal and mechanical guarantees. In addition, CG Thermal customers can rely upon support from a full engineering staff and field service personnel.



CG Thermal Sales Process
focusing on quality and customer needs



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