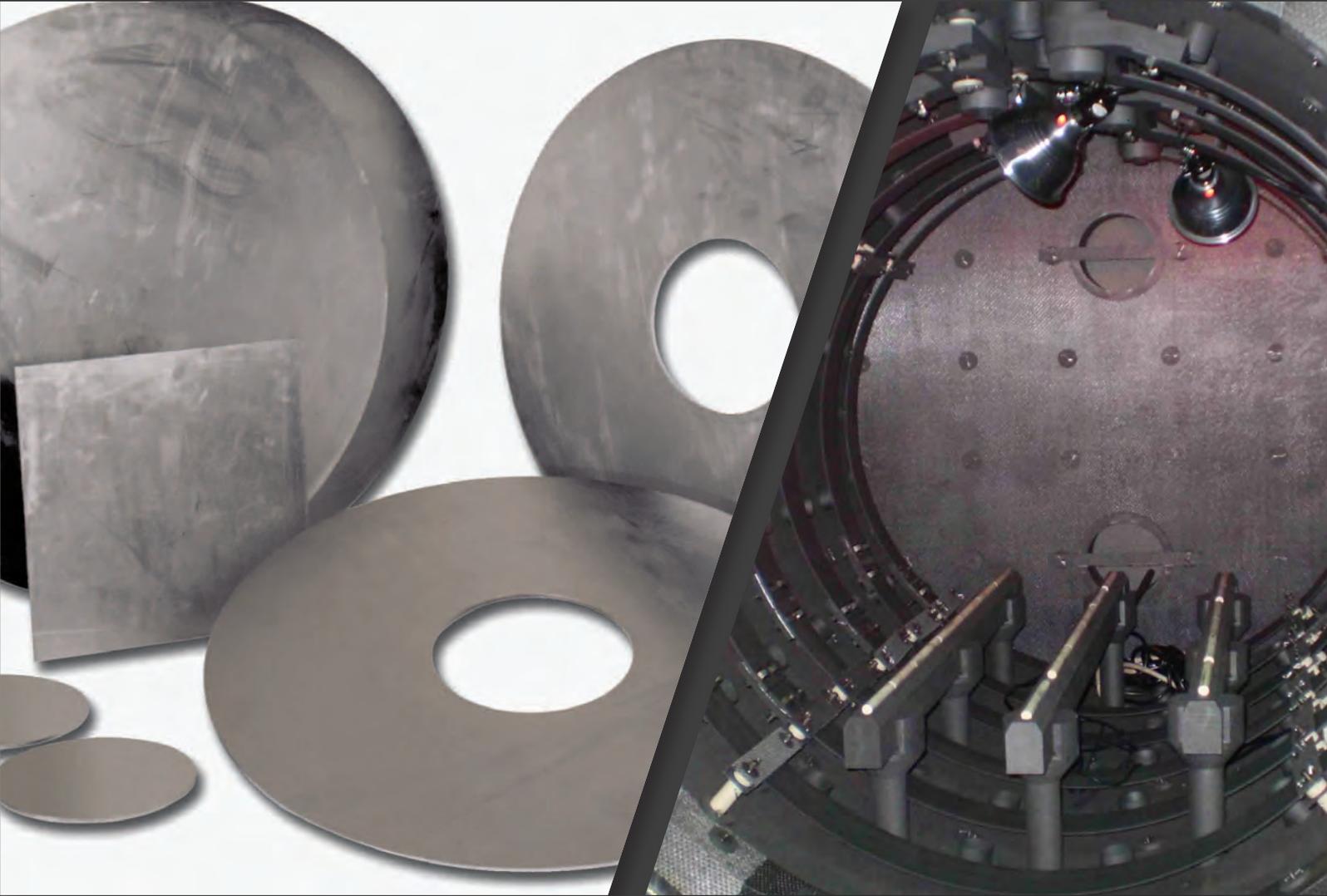


GRAFTech
International

GRAFSHIELD™

Industrial Heat Management Solutions

Compact, Lightweight and Durable Graphite Insulation



PRODUCT OVERVIEW

GRAFSHIELD™ industrial heat management solutions manage radiant, conductive and convective heat transfer with compact, lightweight and durable insulation components. They are specially designed to help customers improve their performance and profitability by reducing their energy and maintenance costs. GrafTech's product uniformity and consistent high quality ensure our customers are always getting the absolute best insulation material to meet their needs.

TYPICAL APPLICATIONS



Vacuum Furnaces



Directional Solidification System (DSS) Furnaces

PRODUCT PORTFOLIO



AMW™ Heat Shield

- Proprietary insulator that features superior strength and rigidity
- Ideal for applications requiring a rugged product with good thermal performance

GRAFBOARD® Insulation

- GRI™ insulation faced with our AMW™ heat shield
- Enhances the benefits of GRI™ insulation with a superior gas barrier that also provides excellent impact and wear resistance

GRI™C and GRI™CC Insulation

- GRI™ insulation faced with carbon fiber composite on one or both sides
- Delivers the benefits of GRI™ insulation along with superior impact and wear resistance

GRI™G and GRI™GG Insulation

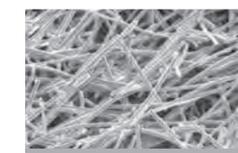
- GRI™ insulation faced with GRAFOIL® flexible graphite on one or both sides
- Enhances the benefits of GRI™ insulation by minimizing radiative heat losses and providing a superior gas barrier that also protects against minor impacts

GRI™ Insulation

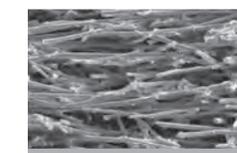
- Rigid, high-temperature insulator made with 100% bonded carbon fiber
- Available with an anti-dust coating for sensitive applications
- Superior insulator with the consistent quality required for tightly controlled, energy-efficient processing of high-value materials and parts

IMPROVED HEAT MANAGEMENT = PROCESS EFFICIENCY

The carefully-controlled fiber orientation of GRI™ insulation allows for better process efficiency by ensuring that the energy is trapped within the hotzone, minimizing heat transfer across the insulating plane.



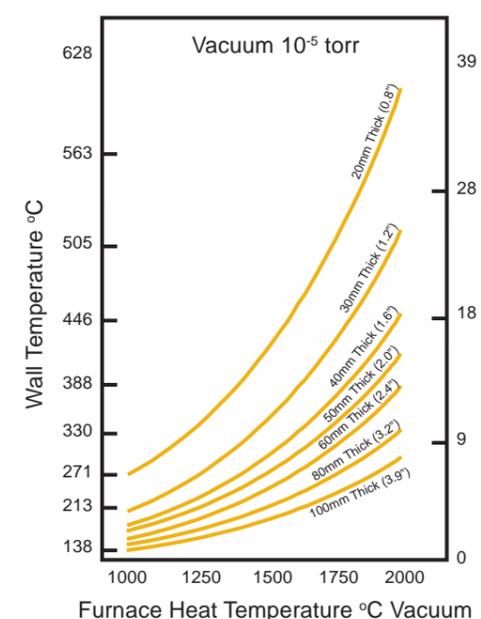
Top View of Board



Cross-Section of Board

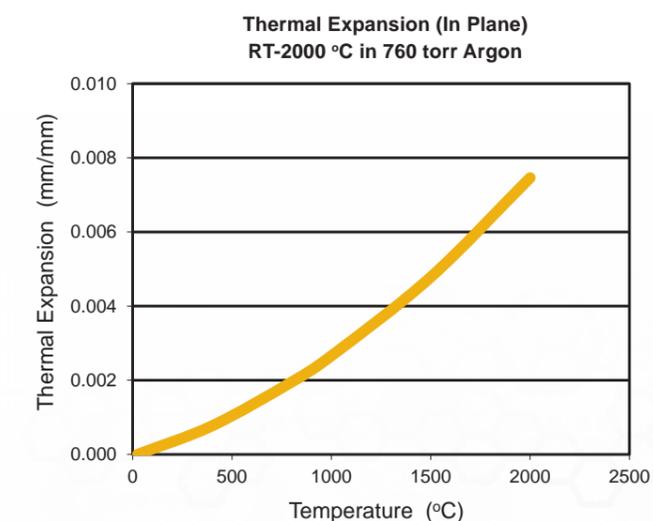
EXCELLENT INSULATION PROPERTIES = COST EFFECTIVENESS

Heat loss of various thicknesses of GRI™ insulation.



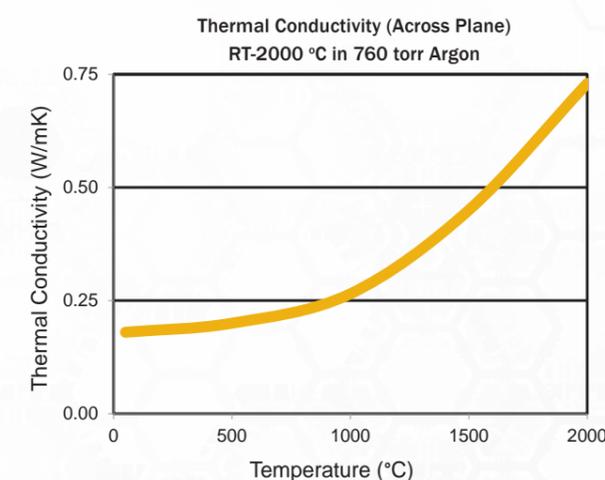
LOW CTE = INCREASED PRODUCT LIFE

A very low CTE ensures the GRI™ insulation will not suffer from fatigue as it cycles through the high and low temperature points of the process cycle. This increases insulation life and decreases downtime and replacement costs.



LOW THERMAL CONDUCTIVITY = ENERGY SAVINGS

GRI™ insulation's low thermal conductivity ensures low heat losses and better insulation.



LOW IMPURITIES = CLEAN PROCESSING

GrafTech offers both standard purity materials (GRI™ Insulation) and ultra high purity materials (GRI™-W Insulation).

Element	GRI-W (ppm)
Ash	~ 5.0
Aluminum	< 0.05
Calcium	< 0.05
Copper	< 0.05
Iron	0.4
Nickel	< 0.05
Silicon	0.06
Titanium	< 0.05

Redefining Limits for More Than 125 Years

GrafTech International is a global company that has been redefining limits for more than 125 years. We offer innovative graphite material solutions for our customers in a wide range of industries and end markets, including steel manufacturing, advanced energy, industrial heat management and latest generation electronics. GrafTech operates 20 principal manufacturing facilities on four continents and sells products in over 70 countries. Headquartered in Parma, Ohio, GrafTech employs 3,000 people.



Our global team of Applications Engineers are knowledgeable about graphite and applications spanning multiple industries. These include metallurgical casting, electronics, chemical, nuclear, defense/aerospace, solar, LED, semiconductor, and other high temperature processes.

Regardless of your product design phase (concept, prototyping, or mass production), we offer technical answers to some of your most challenging problems with a fast response time.



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10.18.2013