GRAFTech International | GRAFSHIELD™

GRI™G and GRI™GG Insulation

Technical Data Sheet 4041

GRAFSHIELD™ Insulation Portfolio

- GRI™ Insulation - High-temperature insulator with 100% bonded carbon fiber
- **GRI™G and GRI™GG Insulation - GRI™ insulation faced with GRAFOIL® flexible graphite sheet**
- GRI™C and GRI™CC Insulation - GRI™ insulation faced with carbon fiber composite
- GRI™4 Insulation - GRI™ insulation faced with radiant, abrasion resistant, dust-inhibiting graphite coating
- AMW™ and AMW™100 Heat Shields - Proprietary shielding laminates
- GRAFBOARD® Insulation - GRI™ insulation faced with AMW™100 heat shield

Product Overview

GRAFSHIELD™ GRI™G and GRI™GG insulation panels feature GRI™ insulation faced on one or both sides with GRAFOIL® flexible graphite. The GRAFOIL® sheet layer performs several functions for enhanced insulation performance. This layer acts as a reflector and spreader of heat, increasing furnace energy efficiency as well as hot zone temperature uniformity. The lifetime of the insulation panel is maximized, due to the low permeability of the GRAFOIL® sheet layer to reactive gases. Furnace cleanliness is assured, as the GRAFOIL® sheet layer prevents the escape of particles from the insulation layers.

Applications

- Vacuum furnace insulation
- Inert atmosphere furnace insulation
- Inert atmosphere process equipment insulation
- Semiconductor crystal growth furnace insulation

Sizes*

Inches	Millimeters	Inches	Millimeters	Inches	Millimeters
1 x 24 x 52	25 x 600 x 1300	1.5 x 24 x 52	40 x 600 x 1300	2 x 24 x 52	50 x 600 x 1300
1 x 40 x 60	25 x 1000 x 1500	1.5 x 40 x 60	40 x 1000 x 1500	2 x 40 x 60	50 x 1000 x 1500
1 x 50 x 60	25 x 1250 x 1500	1.5 x 50 x 60	40 x 1250 x 1500	2 x 50 x 60	50 x 1250 x 1500

* Panel dimensions are easily customized

GRI™ Insulation - Typical Properties at Room Temperature**

Characteristic	Unit	WG	AG	Unit	WG	AG
Bulk Density	lbs/ft^3	11.2		g/cm^3	0.18	
Apparent Porosity	%	90		%	90	
Specific Resistance	Ωin	0.027	0.18	μΩm	670	4700
Flexural Strength	psi	150	20	MPa	1.1	0.2
Compressive Strength	psi	150	45	MPa	1.0	0.3
Thermal Conductivity 25°C	BTU-ft/hr ft^2 °F	0.22	0.090	W/mK	0.39	0.18
Thermal Conductivity 1500°C in Argon	BTU-ft/hr ft^2 °F	0.87	0.27	W/mK	1.5	0.45
Carbon Content	%	99.9		%	99.9	
Ash Content	ppm	1500		ppm	1500	
CTE (RT to 1000°C)	10^{-6}/°F	1.7	1.9	10^{-6}/°C	3.0	3.3
CTE (RT to 2000°C)	10^{-6}/°F	2.0	2.2	10^{-6}/°C	3.6	4.0

GRAFOIL® Flexible Graphite Facing - Typical Properties at Room Temperature**

Characteristic	Unit	WG	AG	Unit	WG	AG
Thickness	in	0.030		mm	0.76	
Bulk Density	lbs/ft^3	70		g/cm^3	1.12	
Thermal Conductivity	BTU-ft/hr ft^2 °F	140	1.7	W/mK	240	3.0
Gas Permeability	10^{-6} Darcy	5		10^{-6} Darcy	5	

** Properties listed are typical and cannot be used as accept/reject specifications

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