



# GRI™C and GRI™CC Insulation

Technical Data Sheet 4045

## 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™C and GRI™CC insulation panels feature GRI™ insulation with carbon fiber composite (CFC) facing on one or both sides. The CFC face sheet provides superior impact and abrasion resistance, ensuring longer product life in harsh environments. These products are designed for use in high pressure gas quenching processes as well as other applications that require a high degree of protection for the insulation component.

## 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

\* Panel dimensions are easily customized

## GRI™ Insulation - Typical Properties at Room Temperature\*\*

Characteristic	Unit	WG	AG	Unit	WG	AG
Bulk Density	lbs/ft <sup>3</sup>	11.2		g/cm <sup>3</sup>	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 <sup>2</sup> °F	0.22	0.090	W/mK	0.39	0.18
Thermal Conductivity 1500°C in Argon	BTU-ft/hr ft <sup>2</sup> °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 <sup>-6</sup> /°F	1.7	1.9	10 <sup>-6</sup> /°C	3.0	3.3
CTE (RT to 2000°C)	10 <sup>-6</sup> /°F	2.0	2.2	10 <sup>-6</sup> /°C	3.6	4.0

## Carbon Fiber Composite Facing - Typical Properties at Room Temperature\*\*

Characteristic	Unit	WG	AG	Unit	WG	AG
Thickness	in	0.020		mm	0.5	
Bulk Density	lbs/ft <sup>3</sup>	93		g/cm <sup>3</sup>	1.5	
Open Porosity	%	10		%	10	
Flexural Strength	psi	16,000		MPa	110	
Flexural Modulus	ksi	9,400		GPa	65	
CTE (RT to 1000°C x-y)	10 <sup>-6</sup> /°F	0.3		10 <sup>-6</sup> /°C	0.5	
Minimum Process Temperature***	°F	3630		°C	2000	

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

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