

# **Complete Guide to Thermal Insulation Using Silica/Glass/Ceramic Fiber Products**

## **Introduction to High-Temperature Insulation**

Thermal insulation materials made from silica, glass, and ceramic fibers are essential for industrial applications requiring heat resistance up to 1,260°C (2,300°F). These materials are used in gaskets, furnace linings, pipelines, and power plants to improve energy efficiency and safety.

### **Manufacturing Technology**

#### **Materials & Production Process**

Material	Composition	Max Temp (°C)	Manufacturing Process
Silica Fiber	96-99% SiO <sub>2</sub>	1,100°C	High-purity silica melted & spun into fibers
Glass Fiber	Alumino-silicate	650°C	Melted glass drawn into fine fibers
Ceramic Fiber	Al <sub>2</sub> O <sub>3</sub> + SiO <sub>2</sub> (50/50)	1,260°C	Blown or spun into wool-like fibers

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## Product Forms

Form	Description	Common Uses
Tapes	Adhesive-backed for wrapping pipes	Boiler insulation
Fabrics	Woven fiber cloth for gaskets	Expansion joints
Blankets	Needled mats for furnace linings	Kiln insulation
Ropes	Braided for sealing flanges	High-temp gaskets

## Technical Features & Standards

### Performance Specifications

Property	Test Standard	Silica Fiber	Ceramic Fiber	Glass Fiber
Max Temp (°C)	ASTM C892	1,100	1,260	650
Thermal Conductivity (W/m·K)	ASTM C177	0.06-0.12	0.10-0.15	0.04-0.08
Tensile Strength (MPa)	ASTM D579	0.5-1.2	0.8-1.5	0.3-0.7
Chemical Resistance	ASTM C795	Excellent (acid)	Good (alkali)	Fair (moisture)

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## Standard Sizes & Dimensions

Product	Thickness (mm)	Width (mm)	Length (m)
Blankets	12–50	600–1,200	5–30
Tapes	0.5–3.0	25–100	10–50
Ropes	6–50 (dia.)	-	10–100
Fabrics	1.0–5.0	1,000–1,500	10–50

## Industrial Applications

Industry	Application	Recommended Product
Power Plants	Boiler & turbine insulation	Ceramic fiber blankets
Oil & Gas	Pipe & flange gaskets	Silica fiber ropes
Steel Mills	Furnace linings	Ceramic fiber modules
Aerospace	Exhaust insulation	Glass fiber tapes

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## Handling & Storage

### Safety & PPE Requirements

- Gloves (Kevlar/leather) to prevent fiber irritation
- Respirators (N95) when cutting to avoid inhalation
- Safety goggles to protect from airborne fibers

### Storage Guidelines

Condition	Requirement
Temperature	<30°C (avoid direct sunlight)
Humidity	<60% RH
Stacking	Flat for blankets, rolls for tapes

### Shelf Life

- Unopened: 5 years in original packaging
- Opened: Use within 6 months (reseal with desiccant)

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## Troubleshooting Common Issues

Issue	Cause	Solution
Fiber degradation	Exceeding max temperature	Upgrade to higher-grade ceramic fiber
Insulation cracks	Thermal cycling stress	Use flexible blankets with needled mats
Moisture absorption	Poor storage conditions	Replace with hydrophobic-treated fibers

## Ordering Guide

### How to Specify Insulation Kits

1. Select Material:
  - Silica (best for acidic environments)
  - Ceramic (best for >1,000°C)
  - Glass (budget option for <650°C)
2. Provide Dimensions:
  - For gaskets: Flange size (ID/OD), thickness
  - For blankets: Length, width, density
3. Certifications Needed:
  - ASTM C795 (industrial use)
  - NACE MR0175 (corrosive environments)

### Lead Times

- Stock items: 24–48 hours
- Custom cuts: 1–2 weeks

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