

# The introduction of high-performance nano thermal insulation KROTECT™



KROTECT™ (Fig. 1) is a nanoporous thermal insulation material composed of fumed silica, infrared shielding materials, and inorganic fibers, offering exceptional insulation performance even under high-temperature conditions (Fig. 2). We have developed a new product with significantly lower thermal conductivity (i.e., higher insulation performance) and enhanced strength compared to conventional products<sup>1)</sup>, and launched it in 2025. KROTECT™ contributes to enhancing the value of our customers' products and solving their challenges from various perspectives, including energy saving, improved heat retention, cost reduction, environmental impact mitigation, and carbon neutrality.

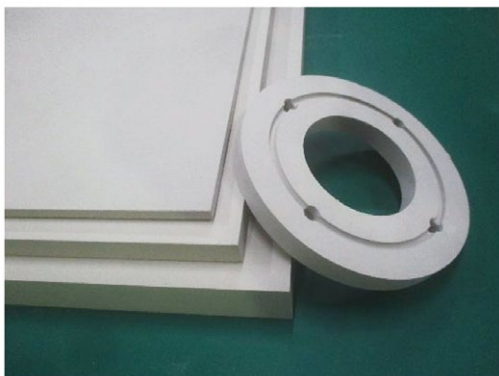


Fig. 1 KROTECT™.

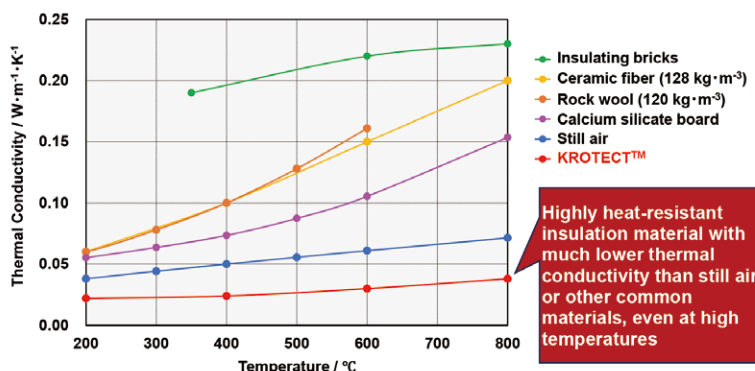


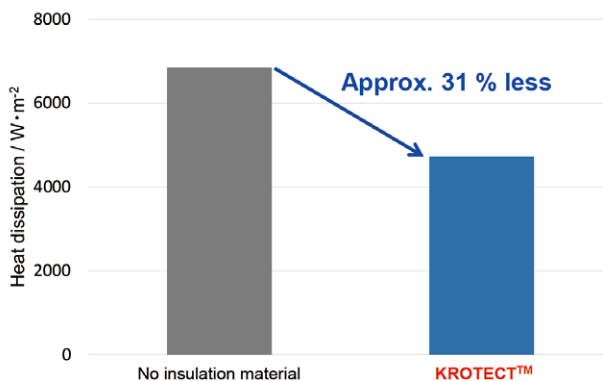
Fig. 2 Thermal conductivity of each insulation material.

## Customer benefit

### (1) Achieving energy savings in steel making processes

By improving thermal insulation performance, KROTECT™ reduces the amount of heat dissipation (i.e., energy loss) from equipment such as furnaces, thereby enhancing both energy saving and heat retention.

Our simulation of the energy-saving effect of KROTECT™ when applied to a steel ladle showed a reduction in heat dissipation by approximately 31 % (Fig. 3). (Please note that all figures obtained from this simulation are predictive values and do not guarantee actual performance.)



\* KROTECT™ (Low thermal conductivity type) 3 mm is applied.

Fig. 3 Simulation of KROTECT™ application effect (steel ladle).

### (2) Downsizing and weight reduction of fuel cells

Enhanced thermal insulation performance enables the downsizing of fuel cells (Fig. 4), which can offer the following benefits:

1. Reduction in material costs per fuel cell
2. Smaller installation footprint and greater flexibility in installation locations
3. Lower risk of damage to the insulation material during installation or assembly, thanks to its higher strength compared to conventional products

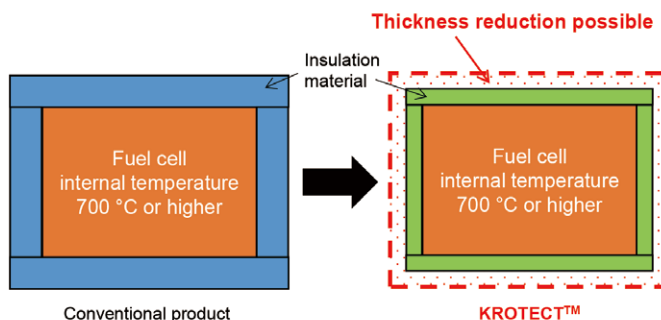


Fig. 4 Smaller and lighter fuel cell hot modules.

## Features

KROTECT™ is an innovative product developed using our proprietary technology, achieving approximately 17 % lower thermal conductivity at 600 °C (KROTECT-RX) and twice the compressive strength compared to a conventional product (Fig. 5).

To meet diverse customer needs, we also offer covering options such as laminated films, metal foils, and glass cloth, as well as complex shape processing using machining centers (Table 1).

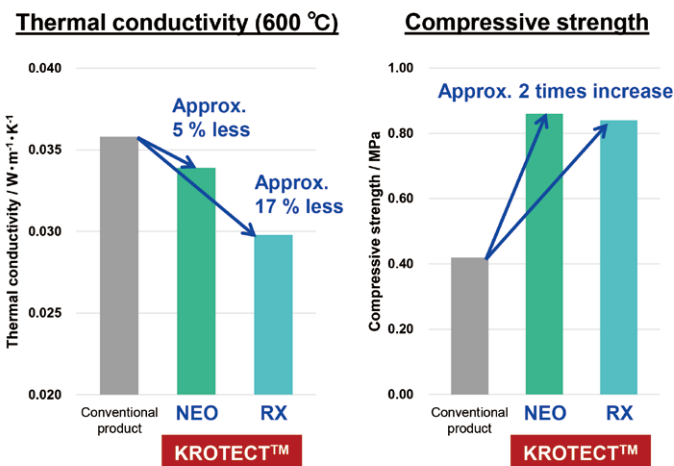


Fig. 5 Comparison of physical properties between KROTECT™ and conventional products.

Table 1 The specification of KROTECT™

Product			KROTECT-NEO	KROTECT-RX
Insulation type			High heat resistance	Low thermal conductivity
Thermal conductivity / $W \cdot m^{-1} \cdot K^{-1}$	200 °C	GHP method (JIS A 1412-1)	0.026	0.022
	400 °C		0.028	0.024
	600 °C		0.034	0.030
	800 °C (Estimation*)		(0.042)	(0.038)
Compressive strength / MPa (10 % compressive stress)		Our company	0.86	0.84
Bulk density / $kg \cdot m^{-3}$		original	285	285
Heat resistance temperature / °C		method	950	900
The board size / mm			1000×750×t10~50	
Covering materials			Laminated film, AL foil, Stainless foil, Glass cloth, etc.	
Machining			Possible	

\* The calculated value based on measurements from 200 to 600 °C

All values of the specification are not guaranteed. The specification can be changed without notice.

## Applications

KROTECT™ has excellent properties as an insulation material and can be covered or processed into various shapes, making it applicable to a wide range of products (Table 2). Furthermore, there are many other applications not listed in the table.

We provide support for thermal calculations, insulation design, selection of optimal product types, and processing proposals, so please feel free to contact us for consultation.

## References

- 1) T. Tsuruga, S. Yamashita, Y. Morikiyo and H. Sasayama; Krosaki Harima Technical Report, 172 3-17 (2024・2025).

Table 2 Applications Example

Application	Component
Steel manufacturing facilities	Blast furnaces, Electric furnaces, etc.
Aluminum manufacturing facilities	Ladles, Forge equipment
Fuel cells	Insulators for fuel cell stacks, fuel reformer
Automotive parts	Insulators for engines, exhaust pipes
Chemical plant	Piping, Petroleum refinery facility
Rechargeable batteries	Inter-cell insulation



Installing insulation in a metal (iron, aluminum) melting furnace