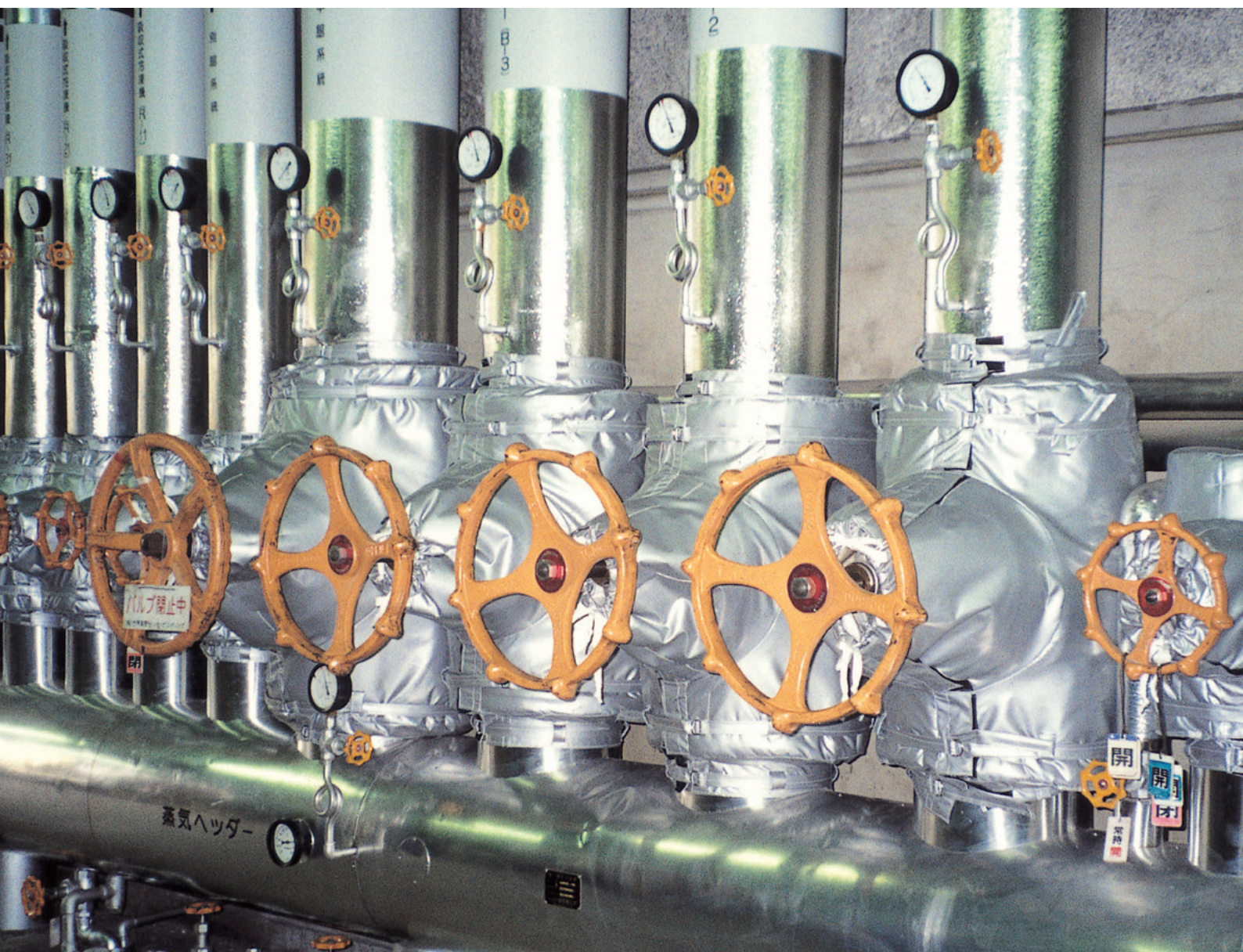


TOMBO™ BRAND

ENETHERMO™

Reusable heat insulation material

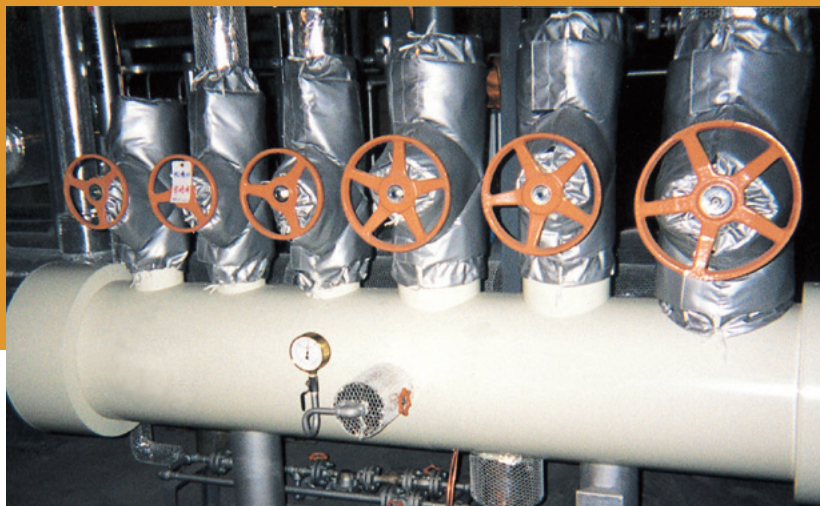


NICHIAS

TOMBO™ No.4500 ENETHERMO™ series

Heat insulation material removable and reusable with ease.

Installation of this material in buildings as well as factories in energy-saving objective lead to "Global environmental protection and improvement".



Features

- Easy removability and detachability
- Reusable

* We also manufacture for high temperature product according to your request, so please contact us.

Application

- Thermal insulation for valves, flanges, heat exchangers and vessels.
- Thermal insulation for towers and vessels
- Thermal insulation for heat radiation equipment.
- Thermal insulation for areas under regular repair and maintenance.

Main material

- Outer material: Silicone coating glass cloth
- Inner material: TOMBO No.4517, Glass mat GE
- Inside material: Glass cloth
- Yarn: Glass fiber, Fluorine coated glass fiber

* TOMBO is a registered trademark or trademark of NICHIAS Corporation.
* ENETHERMO is a trademark of NICHIAS Corporation.

Precautions for handling glass filament products

CAUTION

- Do not use a product for any other than the purpose described in the catalog and specification.
- Store products indoor at ordinary temperature and humidity, and strictly avoid to get wet.
- For disposal, follow local regulations.

Since this product contains continuous glass filament, please observe the following cautions.

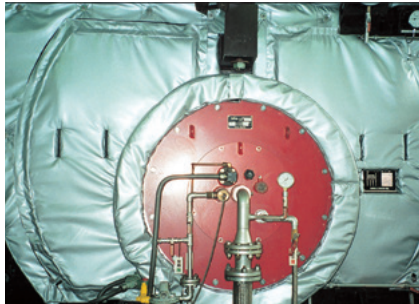
Contact to continuous glass filament may cause itching and/or inflammation of skin, eyes, a throat or a nose.

- Wear respirator, protective goggles, protective gloves and work clothes with long sleeves.
- Wash hands with warm water and soap and rinse mouth every time after handling.
- Waste by cutting shall be put in a waste bag immediately in order to prevent from scattering of the dust.
- Wash the work clothes separately from other clothing.
- Get medical advice/attention, when an itch, a pain continue.

TOMBO™ No.4500-R

ENETHERMO™ R

Standard type of ENETHERMO. We will propose the optimum specifications according to the usage conditions.



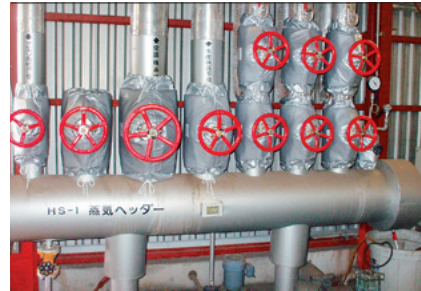
For boilers

ENETHERMO R is standard type. Applicable not only to boilers and valves but to parts of various shapes.

TOMBO™ No.4500-W

ENETHERMO™ W

Water-proof for outdoor use



ENETHERMO W is waterproof at the seams, but please note that it is not a completely waterproof type.

TOMBO™ No.4500-CR

ENETHERMO™ CR

Highly useful for improving the working environment in semiconductor manufacturing facilities, foodstuff factories and precision equipment plants where high cleanliness is essential.



Clean room

Widely used in clean rooms because of low dust generation (ISO14644-1 Class 6).



For injection molding machines

Used for heat insulation of semiconductor manufacturing equipment, valves and heat radiating machines.

Installation procedure of ENETHERMO™ R (on globe valve, flange type, 65A)

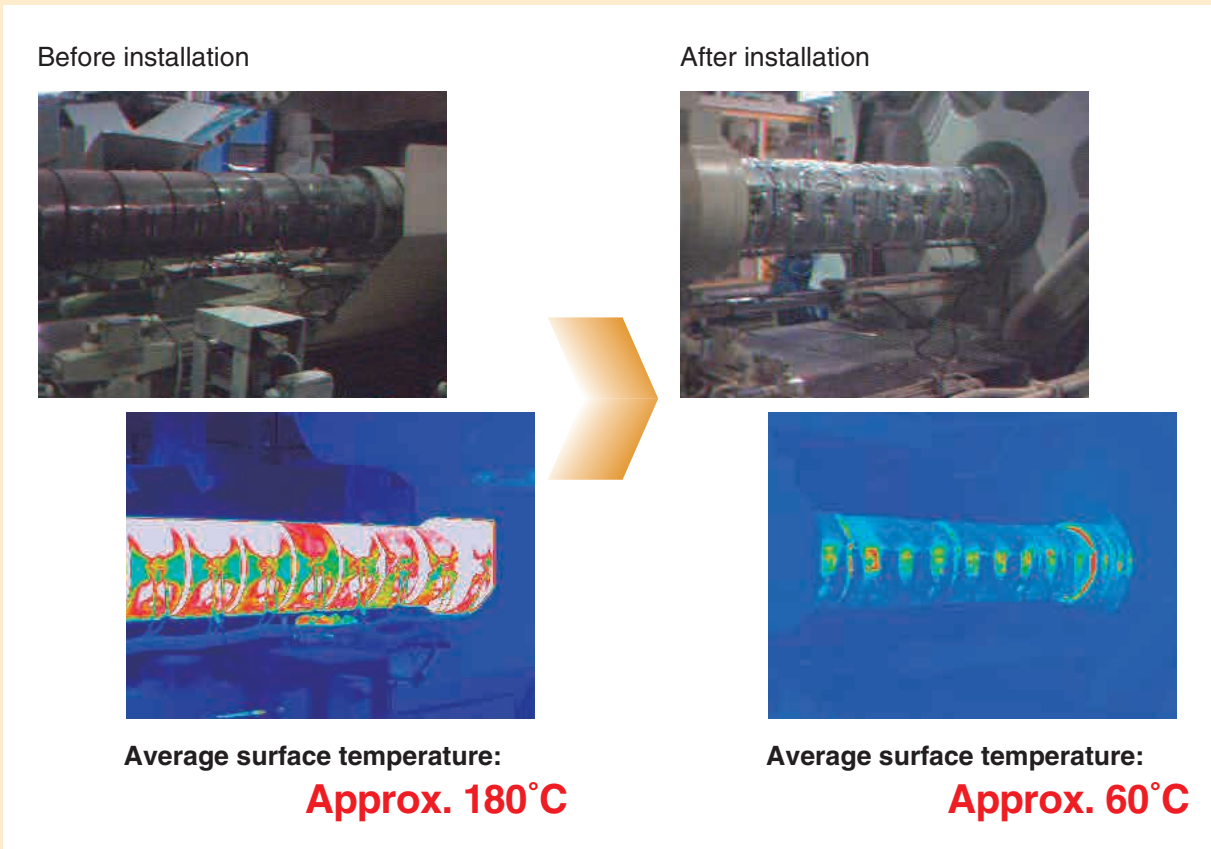


Before installation



After installation





Example of calculation of energy-saving effect

The radiation heat loss is the sum total of the heat transfer by convection (Q1) and that by radiation (Q2), expressed as $Q = Q1 + Q2$. The radiation heat loss from a non-heat-insulated surface with average surface temperature of 180°C is as follows (assuming an outside temperature of 20°C and emissivity of 0.7):

$$2.6 (180-20)^{1.25} + 5.67 \times 0.7 [\{ (180+273) \div 100 \}^4 - \{ (20+273) \div 100 \}^4] = 2850W/m^2$$

In the same way, the radiation heat loss from a heat-insulated surface with average surface temperature of 60°C is as follows (assuming an outside temperature of 20°C and emissivity of 0.9):

$$2.6 (60-20)^{1.25} + 5.67 \times 0.9 [\{ (60+273) \div 100 \}^4 - \{ (20+273) \div 100 \}^4] = 513W/m^2$$

Energy-saving effect

Based on the above calculation example, the energy-saving effect of ENETHERMO is: **2340W/m²**.

Specifically, if the annual operation time is 5000hr/year, unit cost of energy is ¥12/kWh, and installation area is 2m², the savings are as shown below.

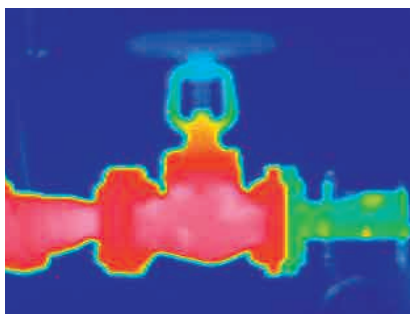
Power saving	Energy saving	Annual oil saving	CO ₂ reduction
23,400 [kWh/year per unit]	280,000 [yen/year per unit]	5.9 [kL/year per unit]	13 [ton/year per unit]

* The above figures are calculated based on heat simulations, and are not guaranteed.

* If the machine has a metal cover, the radiation heat loss before installation is low, so the energy-saving effect may become one third to two thirds of the above.

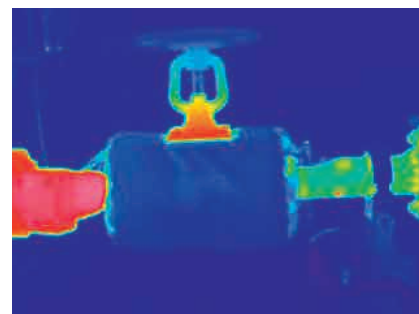
* The above data do not include the cost saving for air-conditioning. (If COP = 3, the above power saving value may be increased by approx. 1/3.)

Before installation



Average surface temperature:
Approx. 170°C

After installation



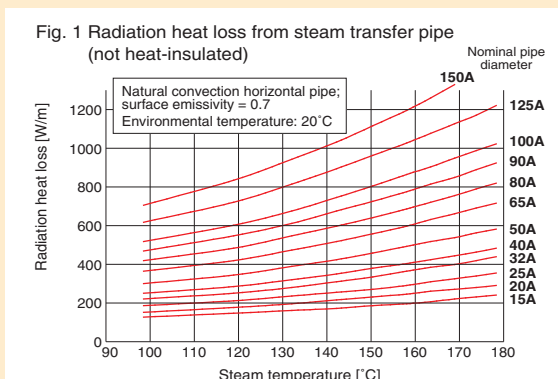
Average surface temperature:
Approx. 44°C

Example of calculation of energy-saving effect

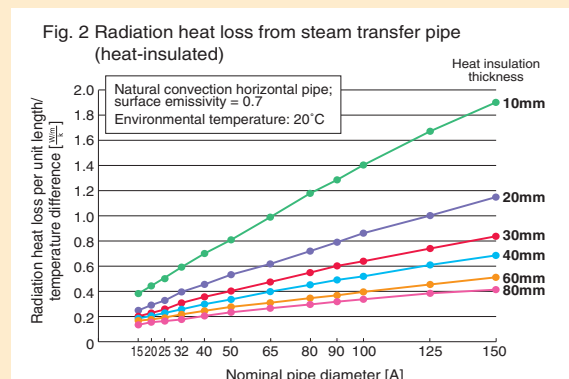
The valve is operated under steam pressure of 0.8MPa and temperature of 170°C, and surface area of the 40A steam valve is converted 1.11m of the equivalent pipe length (surface area: 0.17m²).

Radiation heat loss from the non-heat-insulated steam pipe: **440W/m** (Fig. 1)

Radiated heat loss from heat-insulated (20mm thick cover) steam pipe: **71W/m (=0.47×(170-20))** (Fig. 2)



(Source: Data sheet in "Energy Conservation, special issue", Energy Conservation Center, Japan)



(Source: Data sheet in "Energy Conservation, special issue", Energy Conservation Center, Japan)

Energy-saving effect

As indicated by the above calculations, the energy-saving effect is **410W/unit (= (440-71W/m)×1.11m)**

Specifically, if the annual operation time is 5000hr/year, fuel oil A is ¥75/L and boiler efficiency is 80%:

Energy saving	Annual oil saving	CO ₂ reduction
17,700 [yen/year per unit]	0.24 [kL/year per unit]	0.64 [ton/year per unit]

* The above figures are calculated based on heat simulations, and are not guaranteed.



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