

Heat Insulating Plates Characteristics

Characteristics of Insulation Plate

MISUMI heat insulating plates provide excellent heat insulation. These plates are laminated heat resistant sheets which are made of the glass fiber (that is forming frames) and the highly heat resistant combined material. They are asbestos-free new materials. Eight grades of heat insulating plates are available to meet various applications.

- Standard Grade: It serves as the heat resistant structural material for heating presses and die spacers.
- Heat Resistant Grade: It can be used as heat resisting structural material in much higher temperature and is more cost-effective than the standard grade.
- High Strength Grade: It has excellent compression and bending strength properties and is suitable to use as heat insulating material for the outside of heating furnaces.
- High Temperature Resistant Grade: It maintains compression strength property under high temperature and is suitable for a use of heat resisting and insulating material for the outside of electric furnaces.
- High Temperature Insulating Grade: As both of low heat conductivity and high strength were realized, it provides excellent heat insulation effect with smaller thickness of plate.
- High Temperature Super Insulating Grade: Low temperature conductivity, lightweight and strength in high temperature provide excellent insulation.
- Very High Temperature Resistant Grade: Excellent heat resistance up to 1000°C. Usable for heating furnaces with high temperature.
- Free Cutting Grade: It has excellent mechanical strength and dimension stability. It can be used as cement board for electric insulation.

Characteristics of Thermal Plate

MISUMI's Insulation Plates are light-weighted and provide excellent heat insulation effect.

The Heat Insulation Plates make it possible to improve operational environment such as heat reservation of equipment and prevention of burns at a low cost.

Item	Part Number	Insulation Plates, Insulation Sheets									Thermal Plates
		Standard	Heat Resistant	High Strength	High Temp. Resistant	High Temperature Insulating	High Temperature Super Insulating	Very High Temp. Resistant	Free-cutting		
		P.1677 P.1688	P.1677 P.1688	P.1679 P.1687 P.1688	P.1679 P.1687 P.1688	P.1681 P.1688	P.1681	P.1683	P.1685	P.1685	
Plate		P.1677 P.1688	P.1677 P.1688	P.1679 P.1687 P.1688	P.1679 P.1687 P.1688	P.1681 P.1688	P.1681	P.1683	P.1685	P.1685	
Product		P.1689	P.1689	-	P.1689	-	-	-	-	-	
Unit		HIPA KJLHP ENJHP	HIPHA KJLHH ENJHH	HIPYA HIPYKH ENJHY	HIPLA HIPLKH KJLHL ENJHL	HIPJA ENJHA	HIPAL	HRMB	HIPMA	HIPCA	
Main Base Material	-	Glass Fiber	Glass Fiber	Glass Fiber	Glass Fiber	Glass Fiber	Glass Fiber	Calcium Silicate	Glass Fiber (Small Amount)	Glass Felt	
Main Material	-	Silicic Acid Base	Borate Type	Super Heat Resistant Epoxy Resin	Calcium Silicate Base Binder	ISO Type Unsaturated Polyester	Calcium Silicate Base Binder	Calcium Silicate	Cement	Calcium Silicate Base Binder	
Dielectric Breakdown in Crosswise	kV/mm	6	3	27	10	10	10	-	2.9	-	
Volume Resistivity	4h/150°C	Ω · cm	2.0x10 ¹⁴	1.0x10 ¹²	2.0x10 ¹⁵	5.7x10 ¹⁶	6.0x10 ¹⁶	1.3x10 ¹⁵	-	1.0x10 ¹⁰ (Note 4)	2.4x10 ¹⁰
	100h / 25°C / 90%RH	Ω · cm	3.0x10 ⁹	1.0x10 ⁷	1.0x10 ¹⁴	8.2x10 ¹⁵	-	7.2x10 ¹⁴	-	1.0x10 ⁹	-
	Surface Resistance	Ω	-	-	2.0x10 ¹⁵	3.0x10 ¹⁶	4.3x10 ¹⁶	3.4x10 ¹⁵	-	1.0x10 ¹¹ (Note 5)	8.0x10 ¹³
Insulation Resistance	Ordinary Condition	Ω	-	-	10 ¹³ ~10 ¹⁴	1.0x10 ¹⁴	3.0x10 ¹⁵	1.0x10 ¹³	-	-	3.0x10 ¹³
	After Boiling	Ω	-	-	10 ¹¹ ~10 ¹³	2.0x10 ⁹	1.3x10 ⁹	2.0x10 ⁹	-	-	-
Bending Strength	MPa	100~150	45~55	390~540	145	142	94	8.8	19.6~29.5 (Note 5)	8.8	
	(kgf/mm ²)	{10~15}	{4.6~5.6}	{40~55}	{14.8}	{14.5}	{9.6}	{0.90}	{2.0~3.0}	{0.9}	
	Perpendicular to Lamination	MPa	150~200	120~150	500~588	439	313	182	4.4	108	1.2 (Note 3)
Compression Strength	(kgf/mm ²)	{15~20}	{12~15}	{51~60}	{44.7}	{31.9}	{18.5}	{0.45}	{11}	{0.12}	
	Parallel to Lamination	MPa	-	-	270~390	98	235	59	-	-	1.8 (Note 3)
	(kgf/mm ²)	-	-	{27~40}	{10}	{24}	{6.0}	-	-	{0.18}	
Izod Impact Strength	J/cm	-	-	4.6 or More	2.9	5.6	5.1	-	-	0.12	
Cleavage Strength	kN	2.6~3.4	1.8~2.4	7.8~10.8	3.1	4.2	2.6	-	-	-	
Recommended Operating Temperature (Note 1)	°C	Room Temp. ~ 220	Room Temp. ~ 500	Room Temp. ~ 180	-80~400	Room Temp. ~ 180	Room Temp. ~ 400	Room Temp. ~ 1000	Room Temp. ~ 300	Room Temp. ~ 350	
Reference - Destructive Temp. (Note 2)	°C	-	-	-	-	230	500	-	-	450	
Expansion Coefficient	°C ⁻¹	6.6x10 ⁻⁶	9.0x10 ⁻⁶	1.6x10 ⁻⁴	2.6x10 ⁻⁵	1.4x10 ⁻⁴	7.3x10 ⁻⁵	-	-	9.2x10 ⁻⁵	
Thermal Conductivity	W/m · K	0.3	0.3	0.3	0.24	0.13	0.08	0.20	0.44	0.07	
	(cal/cm · sec · °C)	{0.71x10 ⁻³ }	{0.71x10 ⁻³ }	{0.71x10 ⁻³ }	{0.58x10 ⁻³ }	{0.36x10 ⁻³ }	{0.19x10 ⁻³ }	{0.50x10 ⁻³ }	{1.22x10 ⁻³ }	{0.19x10 ⁻³ }	
Arc Resistance	sec	180	240	180	345	75	250	-	240~370	250	
Water Absorption Ratio	%	2~5	4~6	0.03	0.05~0.06	0.06	0.09	-	15	6.3	
Specific Gravity	-	2.0~2.2	2.0~2.2	1.8~2.0	2.0	1.41	1.2	0.84	1.75	0.5	

④ Testing method conforms to JIS K6911. ⑤ The values are representative values and not a guarantee. ⑥ Thermal conductivity is measured using the steady-state method.

(Note 1) "Recommended Operating Temperature" is the temperature in which some long-term use does not reduce the quality rapidly. (Refer to next page "Insulation Plates Characteristics Graphs".)

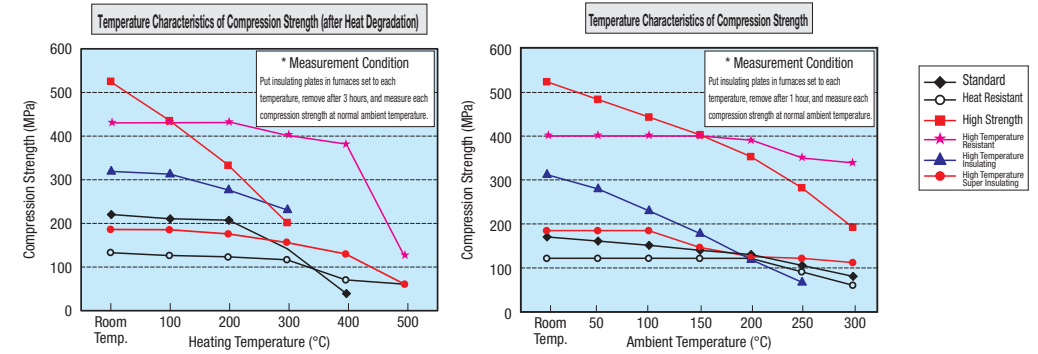
(Note 2) "Destructive Temperature" is a temperature where carbonization, collapse, and meltdown will begin.

(Note 3) "Compression Strength" of Thermal Plate (HIPCA) is the value for 5% deformation.

(Note 4) Condition for "Volume Resistivity" of Free-cutting Grade (HIPMA) is 24h/150°C.

(Note 5) Values of "Surface Resistance" and "Bending Strength" of Free-cutting Grade (HIPMA) are those after drying.

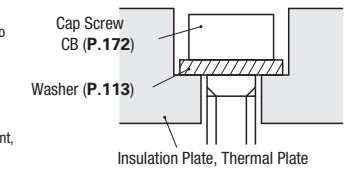
Insulating Plate Characteristic Graph (The following graph is an example of actual measurement. The data are reference values because of variations depending on measurement conditions.)



Notes on Usage of Insulating Plate and Thermal Plate

- ① Be sure to use a washer with a bolt. The insulating plate may break when the bolt is tightened too hard. Especially, thermal plate (HIPCA) must be handled with care because of its softness. (Fig. A)
- ② Do not use in places where there may be splashes of water, chemicals. Insulating plates that have absorbed moisture are the most likely to be cracked or sharply degraded in performance due to rise in temperature. Especially, Free Cutting Grade (HIPMA) is more likely to absorb moisture and water and thus, must be dried sufficiently before use.
- ③ They are laminated products, so do not apply load in the direction of the layer (cleavage direction).
- ④ When using the heat resisting grade (HIPHA) and thermal plates (HIPCA) at 300°C higher, initial smoke and slight odor may occur (i.e. the thermal plates (HIPCA) may have slight odor) but is not seriously harmful. In such a case, take the same measures as for usual smoke agent, such as ventilating air and keeping face away from the above devices.
- ⑤ High Insulating Plates have a hollow to provide excellent heat insulation. They may have lines on the surface, but the lines do not affect the property and heat insulating effect.

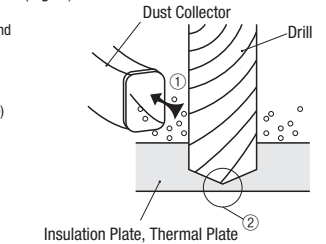
(Fig. A)



Notes on Machining of Insulating Plate and Thermal Plate

- ① When machining, vacuum dust into a dust collector so that it will not scatter. (Figure B-①)
Be sure to firmly fix a Insulating Plate on the bench because it is soft.
The dust does not contain the designated chemicals such as asbestos, but safety measures for usual works in dust, such as masks and goggles, are required.
It may affect the skin such as itching, because it contains glass fiber. Wear gloves when handling the plates. In addition, when dusts adhere to the sliding parts of machine tools, there may be degradation in accuracy due to abrasion.
- ② Drilling of the insulating plate may cause cracks. Be careful with hole pitches, hole diameters, machining conditions, etc. (Figure B-②)
- ③ They are laminated products, and not suitable for tapping and three-dimensional machining. Especially, machining such as drilling or cutting in the direction of lamination may cause cracks and should be avoided. (Fig. C)

(Fig. B)



Machinable Ceramic Process Conditions

Tool	Circular Cut	Milling	Drilling
	Carbide (K-10)	Carbide (K-10)	Carbide (K-10)
Cutting Speed V (m/min.)	Large ~ Small Blades 45~200	Large ~ Small Blades 100~300	Large ~ Small Blades 120~350
Rotational Speed (r.p.m.)	Large ~ Small Blades 50~1000	Large ~ Small Blades 300~1000	Ø2 Through 1000 ~ 1500 Ø5 Through 500 ~ 1000
Cutting Depth (mm)	0.3~0.5	0.5~2.0	-
Feed (mm/Rotation)	0.1~0.2	0.1~0.2	0.1~0.5

④ The above values are references only.

⑤ Because insulating plates and thermal plates are very fragile in periods when drilling is interrupted, be sure to use underlay plate.

(Fig. C)



⑥ Avoid machining in the direction as shown in the above figure.

For Plastic Plates, see P953.

Available in "Material Shop 24" as well.

MISUMI's Insulating Plates / Thermal Plates are available in the catalog or "Material Shop 24".

[Material Shop 24 Insulating Plates / Thermal Plates Website Content]

- Selectable from 10 types of Insulating Plates / Thermal Plates
- MISUMI part numbers, lead times and prices are automatically generated after selecting the specifications, and the order can be placed directly from the web site.

Selection Steps

1	Selecting Specifications	Maximum Operating Temperature, Size, Quantity, Hole Machining
2	Auto Product Extraction	List up MISUMI Part Numbers, Days to Ship and Prices
3	Selecting How to Order	Ordering through WOS
		Print FAX Ordering Sheet
		Download CSV data

* Please register with "MISUMI EC Service ID Registration" and "WOS ID Registration" to use WOS.

