

Heat Insulating Plates Characteristics

Characteristics of Insulation Plate

MISUMI heat insulating plates provide excellent heat insulation. These plates are laminated heat resistance sheets which are made with glass fiber (that is forming frames) and combined material with high heat resistance.

They are asbestos-free new materials. Seven grades of heat insulating plates are available to meet various applications.

- Standard Grade: It is suitable for a use of a 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.

Characteristics of Thermal Plate

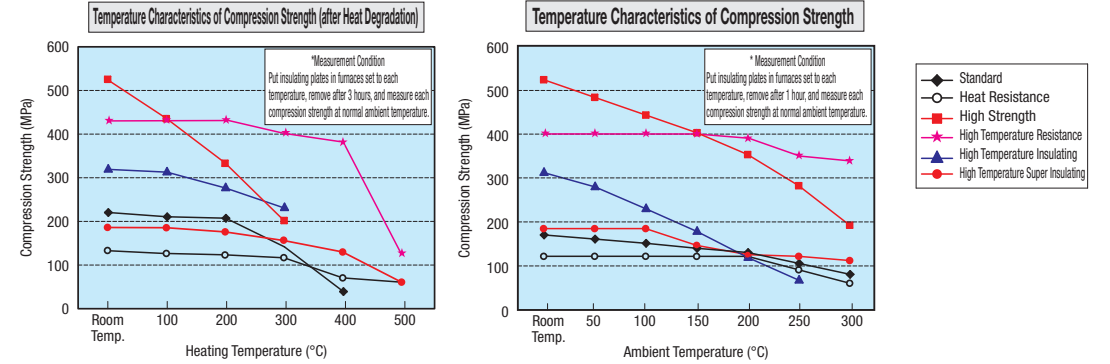
MISUMI's Insulation Plates are light-weighted and provide excellent heat insulation effect.

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 Resistance	High Strength	High Temp. Resistance	High Insulation	High Temp. High Insulation	Very High Temp. Resistance	Free-cutting			
		P.1563 P.1574	P.1563 P.1574	P.1565 P.1573 P.1574	P.1565 P.1573 P.1574	P.1567 P.1574	P.1567	P.1569	P.1571	P.1571		
Plate	Product	Unit	HIPLA KJLHP ENJHP	HIPLA KJLHH ENJHH	HIPYA HIPYKH ENJHY	HIPLA HIPLKH KJLHL ENJHL	HIPIA ENJHA	HIPAL	HRMB	HIPMA	HIPCA	
Component	Main Base Material	-	Glass Fiber	Glass Fiber	Glass Fiber	Glass Fiber	Glass Fiber	Glass Fiber	Calcium Silicate	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	
Electrical Characteristic	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 ¹⁵ ~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 ⁸	-	-	-	
Mechanical Property	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}	
	Compression Strength	Perpendicular to Lamination	MPa	150~200	120~150	500~588	439	313	182	4.4	108	1.2 (Note 3)
		(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}		
Izot 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	-	-	-		
Thermal Characteristic	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 (cal/cm sec °C)	0.3 {0.71x10 ⁻³ }	0.3 {0.71x10 ⁻³ }	0.3 {0.71x10 ⁻³ }	0.24 {0.58x10 ⁻³ }	0.13 {0.36x10 ⁻³ }	0.08 {0.19x10 ⁻³ }	0.20 {0.50x10 ⁻³ }	0.44 {1.22x10 ⁻³ }	0.07 {0.19x10 ⁻³ }	
Others	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	-	1.75	0.5	

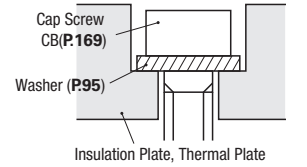
④ Testing method conforms to JIS K6911. ⑤ The values are representative values and not a guarantee. ⑥ Thermal conductivity is measured using the steady-state method.
 (Note 1) "Recommended Operating Temperature" is the temperature where a long-term use does not reduce the quality rapidly. (Refer to next page "Insulation Plates Characteristics Graphs").
 (Note 2) "Destructive Temperature" is the 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 Graphs (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

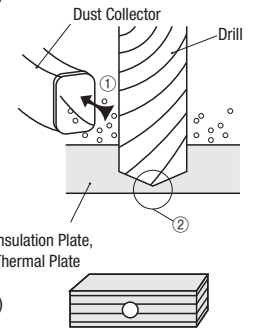
- Be sure to use a washer with a bolt. The insulating plate may break if the bolt is tightened too hard. Especially, thermal plate (HIPCA) must be handled with care because of its softness. (Fig. A)
- Do not use in places where there may be splashes of water, chemicals. Insulation plates that have absorbed moisture may cause cracks or significant performance deterioration due to increased temperature. Especially, Free Cutting Grade (HIPMA) should be used when absolutely dry due to its water absorption.
- They are laminated products, so do not apply load in the direction of the layer (cleavage direction).
- Initial smoke and slight odor (thermal plates (HIPCA) have slight odor) may occur when using heat resisting grade (HIPHA) and thermal plates (HIPCA) at 300°C and above. Take equivalent measures for usual smoke agent such as ventilation and keep away from face.
- 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.



Notes on Machining of Insulating Plate and Thermal Plate

- When machining, vacuum dust into a dust collector so that it may not scatter. (Fig. 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.
- Drilling of the insulating plate may cause cracks. Attention should be taken to hole pitches, hole diameters, machining conditions, etc. (Fig. B-②)
- 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)



(Fig. C)

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

- ① The above values are references only.
- ② Because insulating plates and thermal plates are very fragile in periods when drilling is interrupted, be sure to use underlay plate.

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