

SHAPAL™ Hi-M SOFT MACHINABLE ALUMINIUM NITRIDE CERAMIC

Ceramic materials are distinguished from metals and polymers by their unique characteristics. Unfortunately, two of these characteristics, brittleness and hardness, make them difficult to machine and this can limit their applications.

Grades of ceramic have been developed which can be machined, but they are not suitable for all engineering applications due to their low flexural strength. SHAPAL™ Hi-M soft was developed by Tokuyama Corporation to specifically address these issues and is a machinable ceramic which offers both high mechanical strength and thermal conductivity.

SHAPAL™ Hi-M soft is based upon the first translucent aluminium nitride developed by Tokuyama Soda Co. Ltd. and is a composite sintered body of AlN and BN. This material has unique characteristics which make it suitable for a wide range of applications. Goodfellow Ceramic and Glass Division are able to offer SHAPAL™ Hi-M soft as rods, sheets and finished components.

Characteristics of SHAPAL™ Hi-M soft

> Excellent machinability

High precision, close tolerance components can be machined from SHAPAL™ Hi-M soft using a wide range of techniques including drilling, grinding, turning and milling.

> High Thermal Conductivity

The thermal conductivity of SHAPAL™ Hi-M soft is approximately 5x that of alumina.

> High Mechanical Strength

SHAPAL™ Hi-M soft has a flexural strength of 30kg/mm² which is comparable to that of alumina

In addition to the above mechanical properties, SHAPAL™ Hi-M soft offers the following:

> Excellent electrical insulation

> Low thermal expansion

> Low dielectric loss

> Excellent high temperature properties

> Suitability for vacuum applications



Typical Applications:

Prototyping & small volume production

Electrical components

Heat sinks

Vacuum components

Jigs & Fixtures

Crucibles for vacuum applications

For more information and advice please discuss your application with our sales staff.

SHAPAL™ Hi-M soft is a trademark of Tokuyama Corp.

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SHAPAL™ Hi-M SOFT - PROPERTIES MACHINABLE ALUMINIUM NITRIDE CERAMIC

Property/Test Conditions	Shapal™ Hi-M soft	Units
GENERAL		
Density Corrected to 4°C	2.88	g/cm ³
Porosity 25°C	0	%
ELECTRICAL		
Volume Resistivity 25°C, DC	1.0 x 10¹⁵	Ωcm
Dissipation Factor (tan δ) 25°C, 1MHz	10 x 10⁻⁴	
Dielectric Constant (ε) 25°C, 1MHz	6.8	
Dielectric Strength	65	kV/mm
THERMAL		
Thermal Expansion Coefficient RT~400°C	4.8 x 10⁻⁶	/°C
Thermal Expansion Coefficient RT~600°C	4.9 x 10⁻⁶	/°C
Thermal Expansion Coefficient RT~800°C	5.0 x 10⁻⁶	/°C
Thermal Conductivity 25°C	92	W/mK
Maximum Use Temp. (in air)	1000	°C
Maximum Use Temp. (in non-oxidizing atmosphere)	1900	°C
Thermal Shock Resistance Δt water quench	400	°C
MECHANICAL		
Bending Strength 25°C	300	MPa
Compressive Strength 25°C	100	kg/mm ²
Young's Modulus 25°C	1.8 x 10⁴	kg/mm ²
Poisson's Ratio 25°C	0.31	
Vickers Hardness (Hv) 25°C, 300g	380	kg/mm ²
CHEMICAL DURABILITY		
Resistance to Acid 10%HCl 24Hrs, 25°C	0.2	mg/cm ² wt loss
Resistance to Base 10%NaOH 24Hrs, 25°C	60	mg/cm ² wt loss

IMPURITIES	C	300ppm	Ca	1300ppm	Cr	1ppm
	Mg	1ppm	Ni	2ppm	Fe	8ppm
	Si	40ppm	O	0.9%	Ti	<20ppm

Properties shown are typical values, they are not absolute material properties, and should be used for guidance only. It is recommended that materials and components are tested for their suitability for a specific application.

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