



CUMING MICROWAVE

C-RAM RGD

RoHS
Compliant

TECHNICAL BULLETIN 330-1

RIGID EPOXY/IRON LOSSY MAGNETIC SHEET AND ROD STOCK

C-RAM RGD is a series of iron filled epoxy sheet materials having a high magnetic loss. It is available in several grades, as given in the table below, having a range of permittivities and complex permeabilities.

C-RAM RGD can be machined into terminations and loads for attenuators, waveguides, coaxial lines, and microstrip circuits. It can also be used for lowering the Q of cavities and eliminating unwanted resonances.

C-RAM RGD is a hard epoxy plastic and can be readily sawed, ground, milled or otherwise machined to complex shapes. Since it is ferromagnetic, it is easily held in place with magnetic chucks during machining.

The material has good thermal conductivity and can be used to dissipate heat, including that generated by its own magnetic loss mechanism.

C-RAM KR (see Technical Bulletin 330) is the two component liquid resin version of RGD. It can be mixed, poured and cast into molds or cavities; when cured, it will have the properties of C-RAM RGD.

TYPICAL PROPERTIES

Color: Grey
Specific Gravity: 2.0 to 4.8
Thermal Expansion per °C: 30×10^{-6}

Thermal Conductivity: .003 cal-cm/sec-cm²-°C
Max. Service Temperature: 180 °C (350°F)
Tensile Strength: 560 kg/cm² (8000 psi)
Hardness, Shore D: 85
Water Absorption, 24 hrs: <0.1%
Volume Resistivity, ohm-cm: $>10^{11}$
Dielectric Strength: >1000 v/mm
Dielectric Strength, kV/mm: >400 (>100 V/mil)

MACHINING AND APPLICATION

C-RAM RGD is typically machined into finished parts. It can be readily machined using carbide tools, using techniques similar to machining soft metals. Coolants should be used to prevent the material from overheating. Particular care should be taken not to expose the machining dust to sparks, high heat, or flames, as it can readily burn and/or smolder. A fire extinguisher designed for metal fires (type D) should be kept nearby – do not use water to extinguish burning material.

Finished pieces of C-RAM RGD can be bonded in place using an epoxy adhesive such as C-BOND 245. Tapped holes can be machined into parts for mechanical fastening, or tapped metal inserts can be bonded into drilled holes.

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Table of Permittivity and Permeability of C-RAM RGD

	-----Properties at 1.0 GHz-----					-----Properties at 10.0 GHz-----				
	e'	e''	m'	M''	dB/cm	e'	e''	m'	m''	DB/cm
RGD-112	6	0.24	1.4	.03	.16	4.8	.19	1.1	.25	5.6
RGD-114	11	0.55	2.1	.17	.57	9.7	.49	1.1	.44	13.2
RGD-116	17	1.2	3.0	.39	1.3	16	.96	1.5	1.0	32
RGD-117	28	2.5	4.1	.82	2.8	21	.42	1.1	1.7	56
RGD-124	32	2.6	5.0	2.3	6.5	23	.71	1.5	2.1	67
RGD-190	40	2.8	7.0	5.6	12.6	25	.50	1.3	2.4	75

Note: Permittivity = $e' - je''$ Permeability = $m' - jm''$

dB/cm represents attenuation within the material

These values are nominal and should not be used for writing specifications without consulting

AVAILABILITY

Standard product sizes for all grades are flat sheets 12 x 12 in (305 x 305 mm), available in several standard thicknesses from 0.25 to 3.0 inches (6.4 to 76mm). The sheets are normally supplied "as cast", approx. 0.05 to 0.10 inches over the nominal thickness, with a skin that must be machined off.

Cuming Microwave can supply RGD sheets precision machined to thickness, as well as machined to rods, other shapes, and can machine parts to engineering drawings. Consult one of our sales engineers.

Specify the product as C-RAM RGD-*nnn* axbxc, where *nnn* is the grade, and a, b, c are the dimensions, for example:

C-RAM RGD-124 12x12x1.0 inch.

Material will be supplied as cast unless specified otherwise.

The information in this technical bulletin, although believed to be accurate, is not to be taken as a warranty for which Cuming Microwave assumes legal responsibility, nor as permission or recommendation to practice any patented invention without license; it is offered for verification by the customer, who must make the final judgment of suitability for any application.

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