

## EPOXY VETRONITE (FR-4)

### COMPOSITION & FORM:

*Epoxy FR4 is an insulating laminate made of glass fabric bonded together with a self extinguishing epoxy resin, complying with FR-4 grade of NEMA (characteristics similar to G-10 + self extinguishing)*

### FR4 IS SUPPLIED:

- IN SHEETS 1020 x 2040MM
- IN THICKNESS 0.2 – 50MM
- IN MACHINED PARTS ACCORDING TO DRAWINGS.

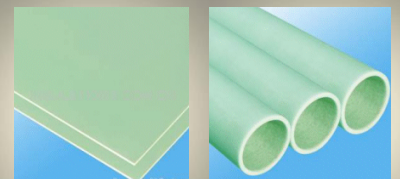
### PROPERTIES:

- SELF EXTINGUISHING
- LOWER WATER ABSORPTION
- GOOD ELECTRICAL PROPERTIES
- EXCELLENT MECHANICAL PROPERTIES
- GOOD PUNCHABILITY

### CHARACTERISTICS:

SEE TABLE OVERLEAF

DIMENTIONAL TOLERANCES: SEE DATA SHEET (BELOW)



PROPERTY	TEST METHOD	TEST CONDITIONS	VALUE	UNIT
<b>MECHANICAL CHARACTERISTICS</b>				
// TENSILE STRENGTH	ISO 527	R; M23° C/50%	200	MPa
ζ FLEXURAL STRENGTH AT 23°C	ISO 178	R; M23° C/50%	400	MPa
ζ COMPRESSIVE STRENGTH (10MM)	ISO 604	R; M23° C/50%	450	MPa
// COMPRESSIVE STRENGTH (10MM)	ISO 604	R; M23° C/50%	300	MPa
ζ SHEARING STRENGTH	NF C 26.150	R; M23° C/50%	130	MPa
// SHEARING STRENGTH	NF C 26.150	R; M23° C/50 9o	25	MPa
// NOTCHED IMPACT STRENGTH: - CHARPY METHOD (10MM THICK)	ISO 179	R; M23° C/50%	5.5	J/cm"
BONDING STRENGTH (10MM THICK)	ASTM D 229	R; M23° C/50%	9 000	N
<b>ELECTRICAL CHARACTERISTICS</b>				
SURFACE RESISTIVITY	IEC 93	1h/105°C n< 20%; M23° C/50%	10 <sup>13</sup>	∅
SURFACE RESISTIVITY	IEC 93	24h/23°C/water; M23° C/50%	10 <sup>11</sup>	∅
VOLUME RESISTIVITY	IEC 93	1h/105°C/<20%; M23° C/50%	10 <sup>14</sup>	∅.cm
VOLUME RESISTIVITY	IEC 93	24h/23°C/water; M23° C/50%	10 <sup>11</sup>	∅.cm
INSULATION RESISTIVITY	IEC 167	1h/105°C/<20%; M23° C/50%	10 <sup>13</sup>	∅
INSULATION RESISTIVITY	IEC 167	24h/23°C/water; M23° C/50%	10 <sup>11</sup>	∅
FLATWISE ELECTRIC STRENGTH (3MM THICK)	IEC 243	1h/105°C/<20%; M23° C/oil	15	kV/mm
FLATWISE ELECTRIC STRENGTH (3MM THICK)	IEC 243	1h/105°C/<20%; M90° C/oil	13	kV/mm
EDGEWISE BREAKDOWN VOLTAGE (taper pin electrodes)	IEC 243	1h/105°C/<20%; M23° C/oil 48h/50°C/water; M23°C/oil	45 40	Kv
DISSIPATION FACTOR AT 50 Hz	IEC 250	1h/105°C/<20%; M23° C/50%	0.02	
RELATIVE PERMITTIVITY 50 Hz	IEC 250	1h/105°C/<20%; M23° C/50%	5	
<b>PHYSICAL CHARACTERISTICS</b>				
DENSITY	ISO 1183	R; M23° C/50%	1.95	g/cm≥
WATER ABSORBITION	ISO 62	24h/23°C/water; M23° C/50%	20	mg
WATER ABSORBITION	ISO 62	24h/23°C/water; M23° C/50 9o	0.15	%
FLAMMABILITY - CLASSIFICATION ACCORDING TO UL94 TEST METHOD	UL94	R; M/20-130°C	94 V -0	
COEFFICIENT OF LINEAR EXPANSION //	VSM 77110	R; M/20-130°C	15.10 <sup>-6</sup>	K <sup>-1</sup>

*NOTE: UNLESS INDICATED, THE TESTS HAVE BEEN CARRIED OUT ON A THICKNESS OF 4mm*

<b>CLASSIFICATION:</b>		<b>SYMBOLS:</b>	
NF C 26-151	Vm EM 2	ζ	PERPENDICULAR TO LAMINATIONS
NEMA LI.1	FR-4	//	PARALLEL TO LAMINATIONS
DIN 7735	HGW 2372.1		
ISO 1642	EP GC 2		

#### **TEST CONDITIONS ACCORDING TO IEC 21 2**

<b>CONDITIONING</b>	<b>CODE</b>
AS RECEIVED	R
ATMOSPHERIC PRECONDITIONING & CONDITIONING	(hours) h/ (temperature) °C (r.h) %
IMMERSION CONDITIONING	(hours) h/ (temperature) °C/liquid
TESTING (M)	M/temperature °/(r.h) %