

## Advanced Materials

### Aratherm<sup>®</sup> CW 2731

100 pbw

**Pasty, prefilled, hot-curing, single component epoxy casting system with excellent thermal conductivity.**

#### Application

Potting of motors, generators, actuators, modules and sensors.

#### Processing methods

Casting / vacuum casting.  
Automatic Pressure Gelation (APG).

#### Key Properties

Very high thermal conductivity.  
Single component resin (self-reactive).  
High operating temperature.

## Product Data (Guideline Values)

### Aratherm® CW 2731

Pasty, single component, highly filled epoxy resin.

Viscosity at 50 °C	ISO 3219	mPa·s	5'000 – 20'000 *
Specific Gravity at 25 °C	ISO 2811	g/cm <sup>3</sup>	2.6
Appearance	Visual		Greyish paste

\*Specified range

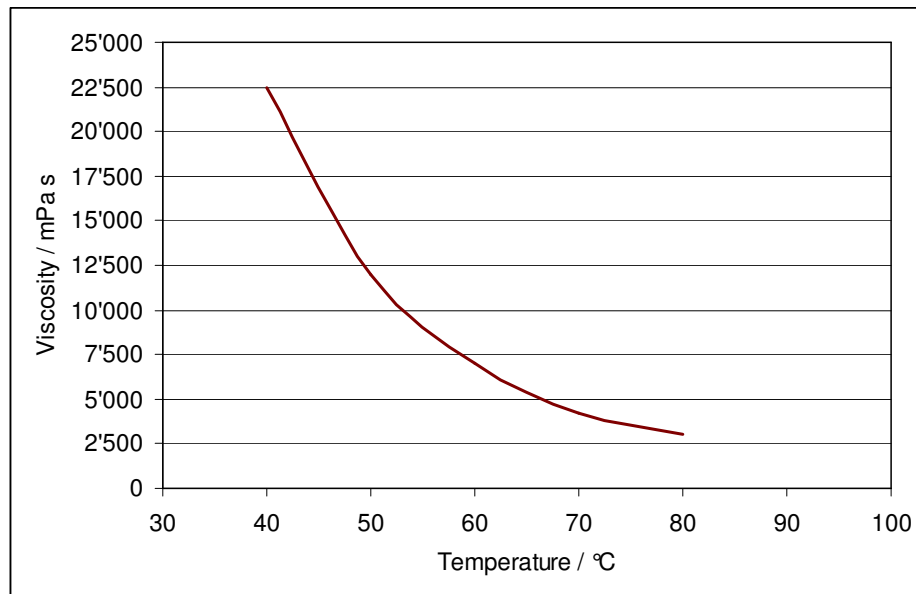


Fig.1: Viscosity f(T)

## Processing Data (Guideline Values)

### Gel Time, Viscosity and Curing

Gel time at 100 °C	Gelnorm (DIN 16945)	min	80
Gel time at 120 °C	Gelnorm (DIN 16945)	min	25
Gel time at 160 °C	Gelnorm (DIN 16945)	min	1.5 – 4 *
Pot life at 60 °C (Time to reach 100 Pa·s)	ISO 3219	min	1'600
Minimum Curing Cycle	1 hours at 120 °C + 1.5 hours at 180 °C		

\*Specified range

# Processing and Storage (Guideline Values)

## Important instructions for safe handling and processing

Aratherm® CW 2731 is a single component self-reactive material which should be stirred if the temperature exceeds 40°C. Without stirring the thermoset can start to react and can cause hot spots. These hot spots can further accelerate the reaction. It will cause especially for bigger volumes a runaway reaction and thermal decomposition of the thermoset with high heat and heavy smoke development.

Recommended maximum time at temperature with stirring: 80°C/1h, 70°C/3h, 60°C/9h, 50°C/12 h, 40°C/96h.

If the material has a temperature > 40°C and processing is paused or interrupted the material must be cooled down under slight stirring. It is important that the agitator allows a sufficient homogenous blending with low power to avoid temperature increase. This stirring prevents the creation of hot spots in the material which could lead to a viscosity increase or in worst case to the already above mentioned runaway reaction.

## Preparation

Aratherm® CW 2731 contains fillers, which tend to settle over time. It is therefore recommended to homogenize the complete contents of the container before use. The use of ceramic materials is recommended, due to the abrasiveness of the filler.

The material should be stirred with high speed at 40-80°C (s. warning below) for approx. 10-20 min and homogenized in the original container before use. After the sediment is homogenized stir for about 2 hrs at a lower speed. This lower speed should allow to stir the material without increasing the temperature.

If not homogenized under vacuum a lot of air bubbles will be entrapped in the material! These air bubbles have an influence on the thermal conductivity and the electric properties. This means that the material which is homogenized under atmospheric pressure must be afterwards evacuated to remove all air bubbles.

## Processing

Potting: Resin 50-60°C.

Part preheating recommended. Temperature depends on gap width. Deep small gaps need lower preheat temperature (70-100°C) to avoid curing before voids have reached the surface.

Curing cycle: 1 h/ 180°C.

For reduced internal stress: 1h/ 120°C + 45 min/ 180°C.

APG: Resin 50-60°C.

Mould 130-140°C.

Cycle time can be 30-50% shorter than standard systems.

Curing depends on part (e.g. 8h/ 150°C).

## Curing

To determine whether cross-linking has been carried to completion and the final properties are optimal, it is necessary to carry out relevant measurements on the actual object or to measure the glass transition temperature. Different gel and cure cycles in the customer's manufacturing process could lead to a different degree of cross-linking and thus a different glass transition temperature.

## Storage Conditions

Store the material in a dry place according to the storage conditions stated on the label in tightly sealed original containers. Under these conditions, the shelf life will correspond to the expiry date stated on the label. After this date, the product may be processed only after reanalysis. Partly emptied containers should be tightly closed immediately after use.

For information on waste disposal and hazardous products of decomposition in the event of a fire, refer to the Material Safety Data Sheets (MSDS) for these particular products.

## Mechanical and Physical Properties (Guideline Values)

Determined on standard test specimen at 23°C. Cured for 1h/120°C + 1.5h/180°C.

Color of castings			greyish
Glass transition temperature	ISO 11359-2	°C	165
Density	ISO 1183	g/cm <sup>3</sup>	2.6
Hardness	DIN 53505	Shore D	92
Flexural modulus	ISO 178	MPa	23'000
Flexural strength	ISO 178	MPa	80
Strain of outer fibre	ISO 178	%	0.4
Critical stress intensity factor $K_{IC}$	PM 216-0/89	MPa $\sqrt{m}$	3.0
Specific energy at break $G_{IC}$	PM 216-0/89	J/m <sup>2</sup>	340
Coefficient of linear thermal expansion ( $\alpha_1 / \alpha_2$ )	ISO 11359-2	ppm/K	24 / 48
Thermal conductivity	ISO 8894-1	W/mK	3.0
Flammability (12mm)	UL 94		V0
Specific heat ( $C_p$ , 25°C)	ISO 11357-4	J/g K	1.0

## Electrical Properties (Guideline Values)

Determined on standard test specimen at 23°C. Cured for 1h/120°C + 1.5h/180°C.

Dielectric loss factor ( $\tan \delta$ , 50Hz, 25°C)	IEC 60250	%	5.8
Dielectric constant ( $\epsilon_r$ , 50Hz, 25°C)	IEC 60250		16.9
Volume resistivity ( $\rho_D$ , 25°C)	IEC 60093	$\Omega \text{ cm}$	$1.3 \cdot 10^{11}$

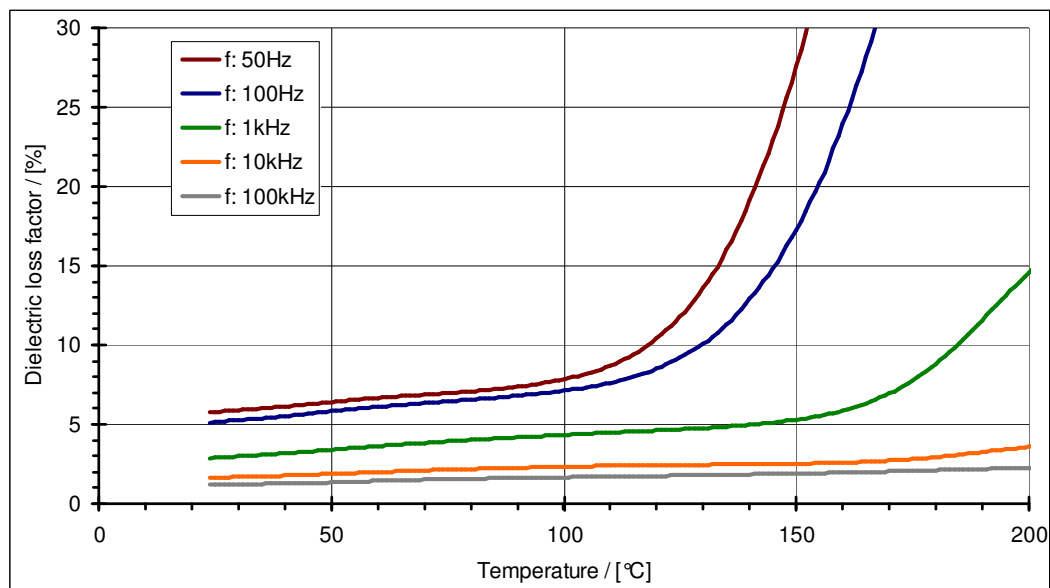


Fig. 2: Dielectric loss factor  $f(T, \nu)$

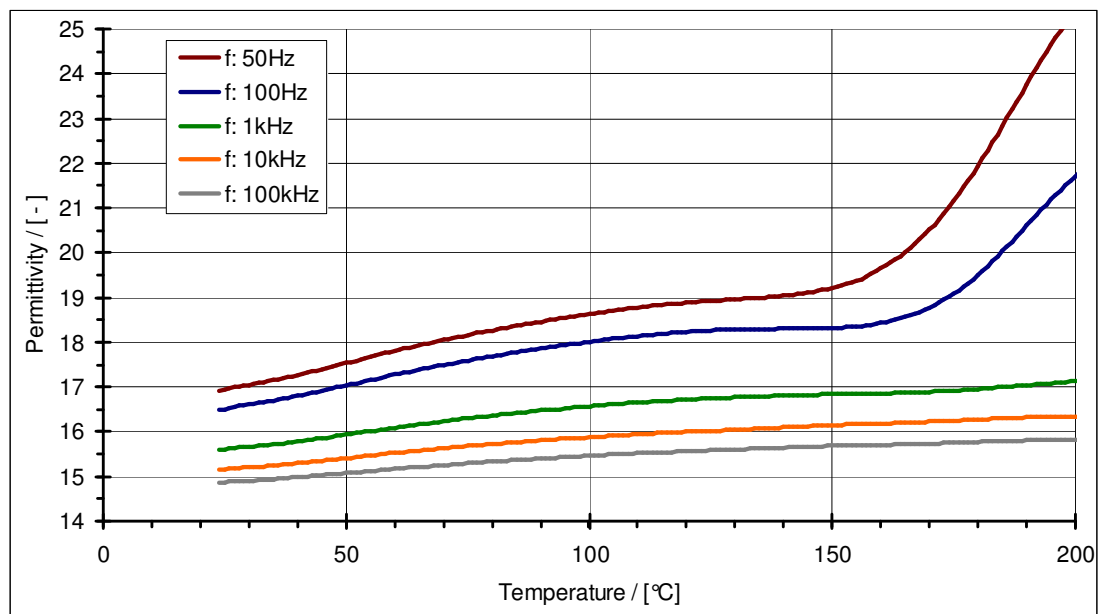


Fig. 3: Permittivity  $f(T, \nu)$

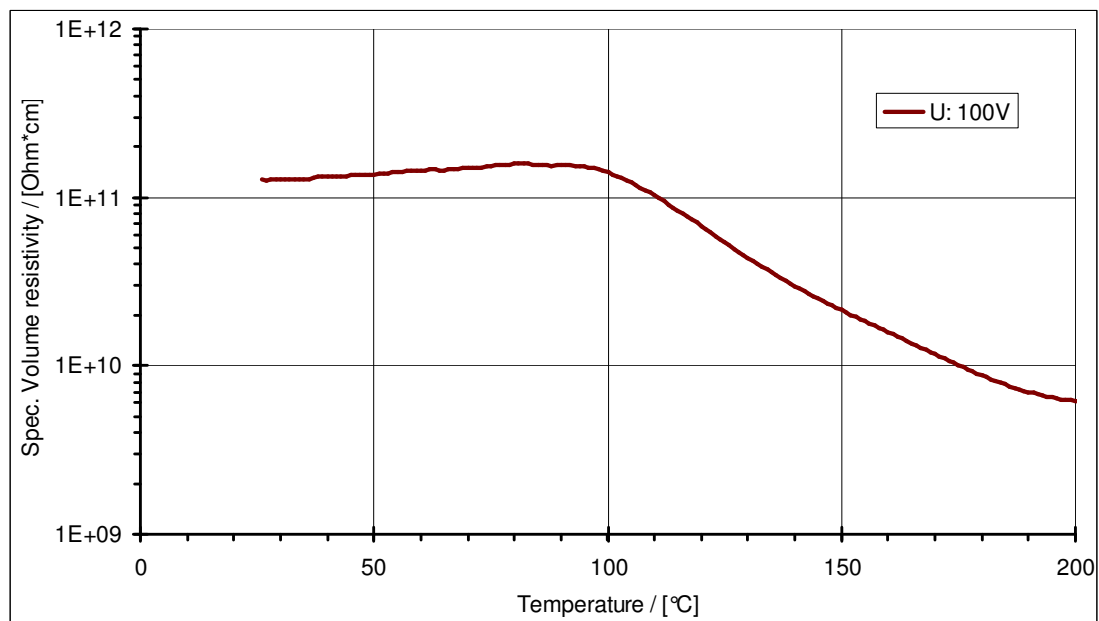


Fig. 4: Spec. volume resistivity  $f(T)$

# Legal Notice

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