HUNTSMAN
Enriching lives through innovation

Advanced Materials

Aratherm® 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/cm³	2.6
Appearance	Visual		Greyish paste

*Specified range

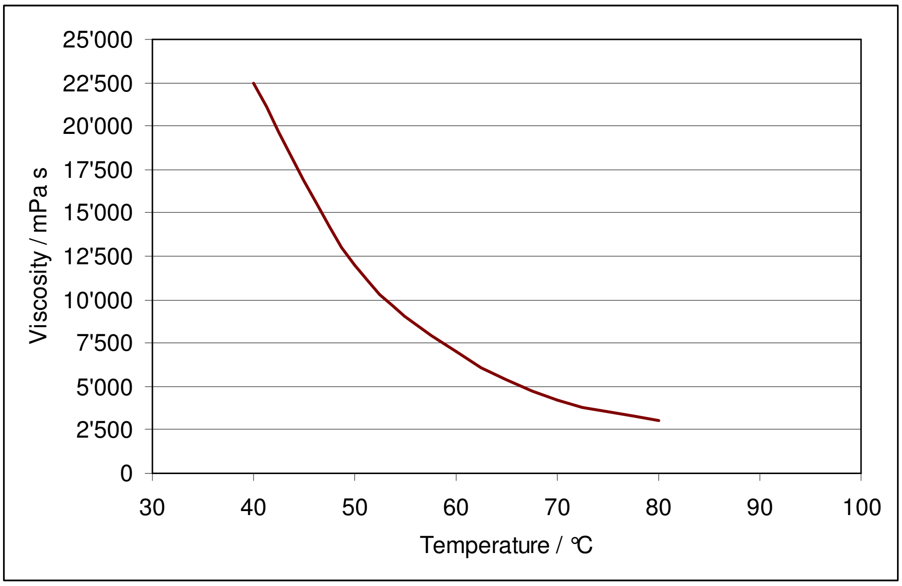

Fig.1: Viscosity f(T)

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/2 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 atmopheric 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 stess: 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^3	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 √m	3.0
Specific energy at break G_{IC}	PM 216-0/89	J/m^2	340
Coefficient of linear thermal expansion (α_1/ α_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 δ, 50Hz, 25°C)	IEC 60250	%	5.8
Dielectric constant (ε_r, 50Hz, 25°C)	IEC 60250		16.9
Volume resistivity (ρ_D,25°C)	IEC 60093	Ω cm	$1.3*10^{11}$

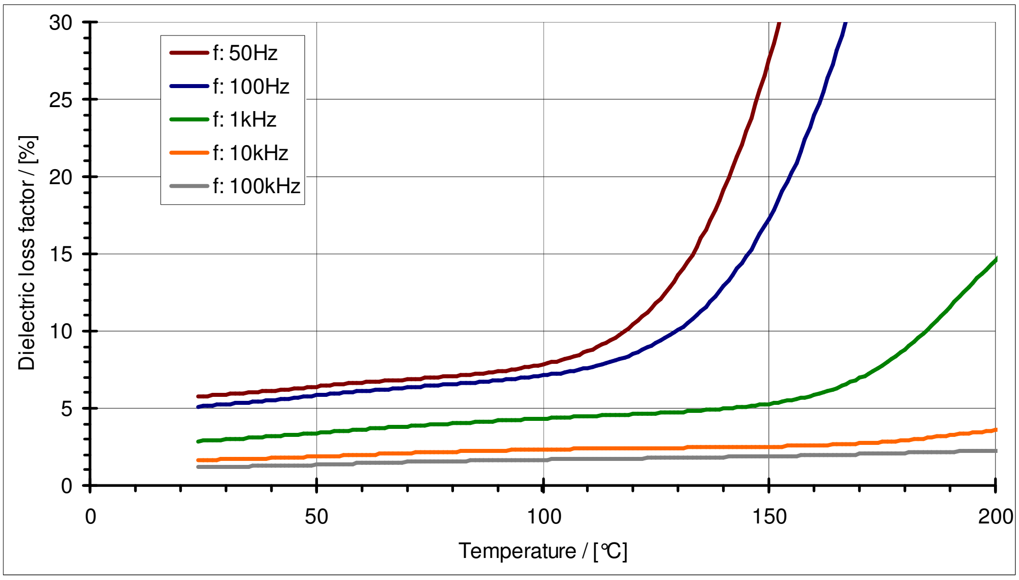

Fig. 2: Dielectric loss factor f(T, v)

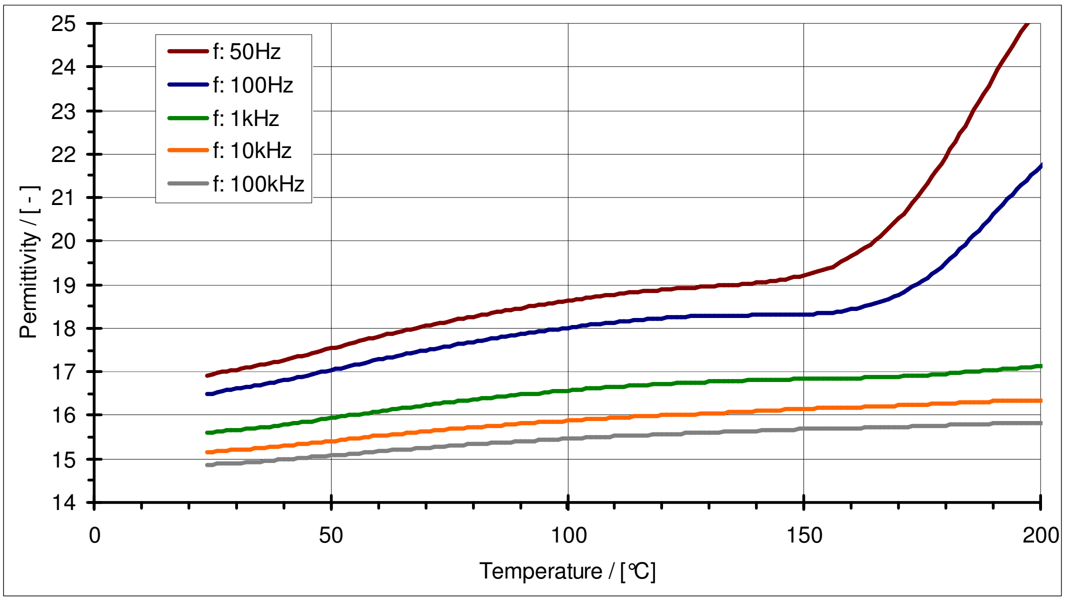

Fig. 3: Permittivity f(T, v)

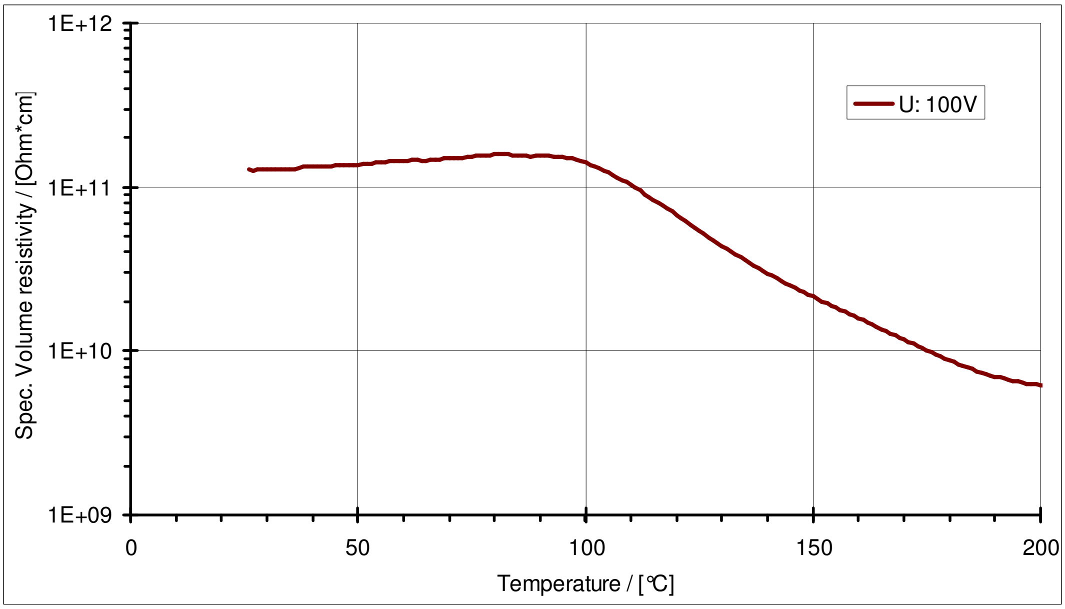

Fig. 4: Spec. volume resistivity f(T)

Legal Notice

Huntsman Advanced Materials
(Switzerland) GmbH
Klybeckstrasse 200
4057 Basel
Switzerland

Tel: +41 (0)61 299 11 11
Fax: +41 (0)61 299 11 12

www.huntsman.com/advanced_materials
Email:
advanced_materials@huntsman.com

ISO 9001
DNV
REGISTERED

Huntsman Advanced Materials warrants only that its products meet the specifications agreed with the user. Specified data are analysed on a regular basis. Data which is described in this document as 'typical' or 'guideline' is not analysed on a regular basis and is given for information purposes only. Data values are not guaranteed or warranted unless if specifically mentioned.
The manufacture of materials is the subject of granted patents and patent applications; freedom to operate patented processes is not implied by this publication. While all the information and recommendations in this publication are, to the best of Huntsman Advanced Material's knowledge, information and belief, accurate at the date of publication, nothing herein is to be construed as a warranty, whether express or implied, including but without limitation, as to merchantability or fitness for a particular purpose. In all cases, it is the responsibility of the user to determine the applicability of such information and recommendations and the suitability of any product for its own particular purpose.
The behaviour of the products referred to in this publication in manufacturing processes and their suitability in any given end-use environment are dependent upon various conditions such as chemical compatibility, temperature, and other variables, which are not known to Huntsman Advanced Materials. It is the responsibility of the user to evaluate the manufacturing circumstances and the final product under actual end-use requirements and to adequately advise and warn purchasers and users thereof.
Products may be toxic and require special precautions in handling. The user should obtain Safety Data Sheets from Huntsman Advanced Materials containing detailed information on toxicity, together with proper shipping, handling and storage procedures, and should comply with all applicable safety and environmental standards.
Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent on manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.
Except where explicitly agreed otherwise, the sale of products referred to in this publication is subject to the general terms and conditions of sale of Huntsman Advanced Materials LLC or of its affiliated companies including without limitation, Huntsman Advanced Materials (Europe) BVBA, Huntsman Advanced Materials Americas Inc., Huntsman Advanced Materials (UAE) FZE, Huntsman Advanced Materials (Guangdong) Company Limited, and Huntsman Advanced Materials (Hong Kong) Ltd.
Huntsman Advanced Materials is an international business unit of Huntsman Corporation. Huntsman Advanced Materials trades through Huntsman affiliated companies in different countries including but not limited to Huntsman Advanced Materials LLC in the USA and Huntsman Advanced Materials (Europe) BVBA in Europe.