

HOT CURING CASTING RESIN SYSTEM - CH 517 / KH 517 / KA 13

CH 517 / KH517 casting resin system is a prefilled , pigmented & plasticized system used by the hot curing process, recommended to impregnate class 'F' motors and to cast or encapsulate other electrical components, which are rated for 155°C operation. Both Resin & Hardener systems are separately prefilled , pigmented , degassed & supplied in ready to use condition.

Typical usage applications include the following,

Post type insulators ,Transformer Coils , Bus Bar supports , Switchgear bushings , Current & Voltage transformers , Ignition coils used in the automotive industry & also by impregnation in Motors , Generators & High Voltage choke coils

Major Constituents of Epoxy Resin CH 517
1.Solvent free liquid epoxy resin of medium viscosity

Typical Properties of Liquid epoxy resin

Viscosity at 25°C(Hoeppler)	m Pa.s	9,000 - 13,000
Epoxy content	eq./kg	5.2 -5.5
Density at 25°C	g/cm ³	1.15-1.2

2.Suitable plasticizer for flexibility & resilience.

Typical Properties of Plasticizer

Viscosity at 25°C (Hoeppler)	m Pa.s	50 - 110
Flash Point (DIN 51758)	°C	169
Density at 25°C	g/cm ³	0.95- 1.05

Major Constituents of Hardener KH 517
1.Specially formulated liquid carboxylic acid anhydride curing agent

Typical Properties of Hardener

Viscosity at 25°C(Hoeppler)	m Pa.s	150 - 230
Flash Point (DIN 51758)	°C	150
Density at 25 °C	g/cm ³	1.15-1.25

Both Resin & Hardener systems are prefilled with **Predried, tested , moisture free Quartz silica of very high purity & optimal mesh size.** The use of filler helps improve the mechanical & electrical properties & also helps reduce shrinkage & exotherm in addition to reducing the cost of the mix.

As both Resin & Hardener systems are Prefilled & 'Ready to Use' faster processing is possible at customer premises in addition to avoidance of health & cleanliness issues associated with Silica fumes when being used as filler.

Accelerator KA 13 is used with CH 517 / KH517 to speed up the curing process as otherwise a prolonged cure time would be required.

Typical Properties of Accelerator KA - 13

Viscosity at 25 °C (Hoeppler)	m Pa.s	NMT 10
Gel Time at 80 oC	Minutes	70 - 130
Storage life	One Year	minimum

MIXING RATIO

Resin CH 517	100 pbw (parts by weight)
Hardener KH 517	100 pbw
Accelerator KA 13	0.10 – 0.30 pbw

PROCESSING

Resin CH 517 & Hardener KH517 are both heated separately to around 50 oC , the Resin & Hardener are then blended together at 50 – 70 o C under vacuum of approx 300 mmHg. Accelerator KA 13 is then added to the premix under closed conditions but not under vacuum as KA13 has lower vapor pressure & mixing under vacuum will eliminate KA13 from the mix.KA13 should be mixed for min of 20 minutes just prior to the casting operation.

The entire mix is then transferred into the pouring chamber. The pouring chamber has to be kept at mid vacuum (around 500 mmHg) during pouring into the moulds kept in the moulding chamber.

Volume of the mix increases during pouring under vacuum into the preheated moulds (containing the parts to be encapsulated). Hence it is preferable to first fill up the moulds only upto 75% under vacuum of 750 mmHg, after 75% of the mould has been filled it is preferable to fill the remaining 25% under a reduced vacuum of 650 – 700 mm Hg.

Allow the filled mould to remain in this condition for 20 – 30 minutes. The vacuum in the moulding chamber should then be released gradually in intervals & not suddenly.

The addition of accelerator only slightly increases the viscosity of the system but reduces its pot life , gelling & cure times. This facilitates shorter cycle times & higher output, but care must be taken to keep the exothermic temperature rise within limits. The plasticizer has been incorporated into the premix to help improve the resilience of the cast. It also reduces the viscosity of the mix & imparts a longer pot life. However the glass transition temperature (Tg) gets reduced.

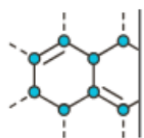
Prefilled liquid products always show a small filler sedimentation on storage. Before partial use it is recommended that the contents of the container be stirred up to get a homogenous mix or alternatively use each container as a complete unit.

CURING SCHEDULE

Cure Temperature oC	Curing time - hrs 0.10 pbw of KA 13	Curing time – hrs 0.16 pbw of KA 13
80	24 – 36	20 – 24
100	7 – 8	6
120	3	2
160	0.50	0.50

POT LIFE

Cure Schedule	--	--	8 Hr/80 oC + 8 Hr/130 oC
Tensile Stress Max.	23 °C	N/mm ²	70 - 80
Elongation at Break (ISO/R527)	23 °C	%	0.8 - 1.1
Compressive Stress Max. (ISO/R 604)	23 °C	N/mm ²	200 - 220



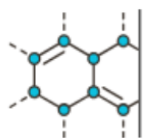
MECHANICAL AND PHYSICAL PROPERTIES OF CURED CASTINGS

Cure Schedule	--	--	8 Hr/80 oC + 8 Hr/130 oC
Tensile Stress Max.	23 °C	N/mm ²	70 - 80
Elongation at Break (ISO/R527)	23 °C	%	0.8 - 1.1
Compressive Stress Max. (ISO/R 604)	23 °C	N/mm ²	200 - 220
Bending Stress Max (DIN 53452)	23 °C	N/mm ²	115 - 125
Surface Strain (DIN 53452)	23 °C	%	1.0 - 1.5
Impact Strength (ISO/R179)	23 °C	LI/m ²	10 - 12
Elastic Modulus, Static Derived from Tensile Test (DIN 53457)	23 °C	N/mm ²	12000-14000
Martens Temperature (DIN 53458)		°C	80 - 90
Glass Transition Temp. (DSC)		°C	90 - 100
Thermal Conductivity (DIN 52612)		W/Mk	0.8 - 0.9
Glow Resistance (DIN 53459)		GRADE	2b
Co-efficient of Linear Thermal Expansion		K ⁻¹	30 - 35 X10 ⁻⁶
20-80 °C Range (VDE0304)			
Water Absorption (60X10X4mm samples),			
10 days at 23 °C (ISO/R62)		%	0.1 - 0.2
30 min at 100°C(ISO/R117)		%	0.1 - 0.2

ELECTRICAL PROPERTIES OF CURED CASTINGS

Cure Schedule	--	--	8 Hr/80 oC + 8 Hr/130 oC
Electrical Strength, 2mm Plaque, 20-S Value, 50Hz Electrodes: Plate to Plate, Ø25mm & Ø75 mm in Castor oil (IEC 243)	23 °C	KV/mm	18 - 20
Arc Resistance (ASTM D-495)		S	185 - 195
Tracking Resistance (IEC - 112)		V	475
Electrolytic Corrosion (DIN 53489)		GRADE	A - 1





ELECTRICAL PROPERTIES OF CURED CASTINGS

Loss Factor $\tan \delta$ (DIN 53483)	23 °C	%	2 - 3
	60 °C	%	3 – 4
	100 °C	%	8 – 10
	120 °C	%	--
Dielectric Constant ϵ_r (DIN 53483)	23 °C		3.9 - 4.3
	60 °C		4.3 - 4.7
	100 °C		5.4 - 5.8
	120 °C		--
Volume Receptivity ϵ'' (DIN 53482)	23 °C	ϵ''/cm	10^{16}
	60 °C	ϵ''	10^{15}
	100 °C	ϵ''	10^{14}
	120 °C	ϵ''	--

Shelf Life

CH 517 & KH517 will have a minimum shelf life of 3 months when stored in the original container & not exposed to undue heat & humidity. The accelerator **KA13** will have a shelf life of 1 year under similar storage conditions

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