HUNTSMAN

Enriching lives through innovation

Advanced Materials

Araldite® CW 229 NPC	**100 pbw**
Aradur® HW 229 NPC	**100 pbw**

Liquid, brown, hot-curing two-component epoxy casting system with excellent crack resistance.
Prefilled with slightly abrasive, mechanically reinforcing fillers
No post-cure required after demolding.

Applications

Indoor electrical insulation material for postinsulators, equipment parts, bushings, instrument and dry type distribution transformers, switchgears, etc.

Processing methods

Automatic pressure gelation process (APG).
Conventional gravity casting process under vacuum.

Properties

No post-curing required after demolding.
Up to 20% shorter cycle time.
Outstanding mechanical and electrical properties combined with very high crack and thermal shock resistance due to the low coefficient of thermal expansion.
Qualified for encapsulation of large metal parts.

	Resin				
ARALDITE®	Viscosity	at 25 °C	ISO 3219	Pa*s	80 - 200
CW 229 NPC		at 40 °C	ISO 3219	Pa*s	8 – 17 *
	Epoxy content		ISO 3001	equiv/kg	2.20 - 2.35 *
	Density	at 25 °C	ISO 1675	g/cm³	1.75 - 1.80
	Filler content			% by weight	55 - 58
	Flash point		ISO 1523	°C	180
	Vapour pressure	at 20 °C	(Knudsen)	Pa	appr. 10^{-3}
		at 60 °C	(Knudsen)	Pa	appr. 5.10^{-2}
	Hardener				
ARADUR®	Viscosity	at 25 °C	ISO 3219	Pa*s	7 - 20
HW 229 NPC		at 40 °C	ISO 3219	Pa*s	3.5 – 7.5 *
	Density	at 25 °C	ISO 1675	g/cm³	1.90 - 2.00
	Filler content			% by weight	62 - 65
	Flash point		ISO 1523	°C	140
	Vapour pressure	at 20 °C	(Knudsen)	Pa	appr. 2.10^{-2}
		at 60 °C	(Knudsen)	Pa	appr. 5

* Specified range

Remark

Prefilled liquid products always show a small filler sedimentation.

Before partial use we recommend to stir up carefully the components or to use each container as complete unit.

Storage

Store the components in a dry place in tightly sealed original containers. Under these conditions, the shelf life will correspond to the expiry date stated on the label. Partly emptied containers should be tightly closed immediately after use.

Because both products contain accelerating additives, avoid storing them for extended periods at elevated temperatures. Incorrect handling of the components can result in undesirable viscosity increases, change in reactivity and substandard cured-state properties

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

Processing (guideline values)

Araldite® CW 229 NPC / Aradur® HW 229 NPC 100 : 100 pbw

System Preparation

General instructions for preparing prefilled resin systems

Long pot life is desirable in the processing of any casting resin system. Prefilled components help to shorten the mixing time considerably.
As this product is optimised for quick curing reaction, the pot-life is shorter than with standard systems. It is therefore recommended to use a continuous static mixer for the final mixture.
The two components will be mixed in the desired quantity under vacuum and at slightly elevated temperature (50 - 60°C). For the mixing of medium- to high viscous casting resin systems and for mixing at lower temperatures, we recommend special thin film degassing mixers that may produce additional self-heating of 10-15 °C as a result of friction. Depending on quantity, mixer device, mixing temperature and application, the mixing time is, under a vacuum of 1 to 8 mbar, 0.5 to 2 h.
The premixed components packed according to their mixing ratio, could be used per container. In case of filler sedimentation, it is recommended to empty the container completely. Before partial use, the content must be carefully homogenized at elevated temperature. We recommend the same preheating temperature to prevent air enclosures when discharging the components.
In automatic mixing and metering installations, both components will be degased and ho-mogenized under a vacuum of about 2 mbar in the holding tanks. When degassed, the prefilled products are stirred up from time to time to avoid any sedimentation. After dosing and mixing with a static mixer, the system is fed directly to the vacuum chamber or, in the automatic pressure gelation process, directly into the hot casting mould. By using circular feeding tubes, several casting stations can be served.

Caution: In case of preparation of the final reactive mixture using a batch-mixer and a pressure pot for casting, the higher reactivity of this system has to be considered and the parameters have to be adjusted accordingly.

The effective pot-life of the mix is about 10 hours at temperatures below 25°C.
Conventional batch mixers should be cleaned once a week or at the end of work. For longer interruptions of work, the pipes of the mixing and metering installations have to be cooled and cleaned with the resin component to prevent sedimentation and/or undesired viscosity increase.

Specific instructions

Viscosity increase and gel time at various temperatures, refer to Figs: 4.2 and 4.3.

Mould temperature

APG process	130 - 160°C

Demoulding times (depending on mould temperature and casting volume)

APG process	10 - 40 min

Cure conditions (minimal postcure)

APG process	No postcure required

To determine whether crosslinking has been carried to completion and the final proper-ties are optimal, it is necessary to carry out relevant measurements on the actual object or to measure the glass transition temperature. Different gel and postcuring cycles in the manufacturing process could influence the crosslinking and the glass transition tempera-ture respectively.

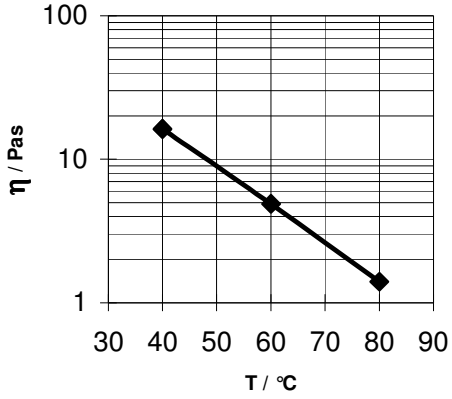

Fig.4.1: **Initial viscosity as a function of temperature**
(measurements with Rheomat 115, D = 10 s^{-1})

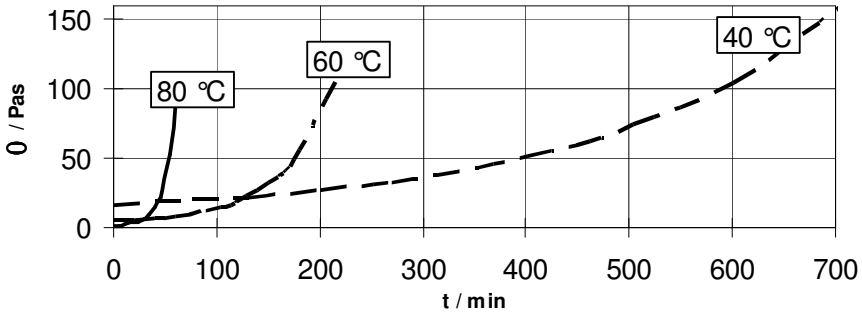

Fig.4.2: **Viscosity increase at 40, 60 and 80°C**
(measurements with Rheomat 260, MS 125, shear rate D = 10 s^{-1})

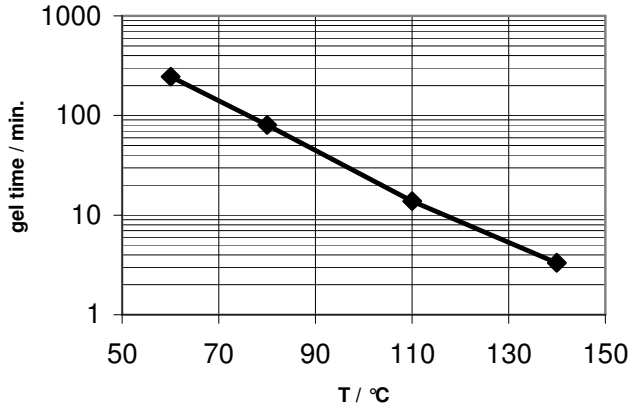

Fig.4.3: **Geltime measured as a function of temperature**
(measurements with Gelnorm Instrument /ISO 9396)

Mechanical and Physical Properties (guideline values)

Determined on standard test specimen at 23°C.

Cured for 30 min at 140°C (no post curing).

Tensile strength	ISO 527	MPa	70 - 80
Elongation at break	ISO 527	%	0.9 - 1.1
E modulus from tensile test	ISO 527	MPa	10'000-11'500
Flexural strength at 23°C	ISO 178	MPa	110 - 125
Surface strain at 23°C	ISO 178	%	1.2 - 1.5
Double Torsion Test	CG 216-0/89		
Critical stress intensity factor (K_{IC})		$MPa \cdot m^{1/2}$	2.8 - 3.0
Specific energy at break (G_{IC})		J/m^2	670 - 770
Glass transition temperature (DSC)	ISO 11357-2	°C	110 – 125 *
Coefficient of linear thermal expansion	ISO 11359-2		Fig. 6.2
Mean value for temperature range: 20-80°C		K^{-1}	$27 – 32.10^{-6}$
Thermal conductivity similar to	ISO 8894-1	W/mK	0.70 - 0.75
Flammability	UL 94		
Thickness of specimen: 4 mm		class	HB
Thickness of specimen: 12 mm		class	HB
Water absorption (specimen: 50x50x4 mm)	ISO 62		
10 days at 23°C		% by wt.	0.05 - 0.15
60 min at 100°C		% by wt.	0.05 - 0.15
Decomposition temperature (heating rate: 10K/min)	TGA	°C	>350
Density (Filler load: 61% by wt.)	ISO 1183	g/cm^3	1.80 - 1.90

* Specified range

Electrical Properties (guideline values)

Determined on standard test specimen at 23°C
cured for 30 min at 140°C (no post curing)

If electrically stressed structural components are to be used under difficult climatic conditions (cf. IEC 60932), the complete installation must be tested climatically under maximum working load.

Breakdown strength (on 3m specimen)	IEC 60243-1	kV/mm	20 - 25
Diffusion breakdown strength Temperature of specimen after test	DIN VDE 0441-1	class °C	HD 2 ≤ 23
HV arc resistance	IEC 61621	s	80 – 134
Electrolytical corrosion effect	IEC 60426	grade	A-1

Special Properties (guideline values)

Crack Test **Crack Resistance**

Temperature shock test conditions:

- Test specimen with embedded sharp edged metal parts (edge radius: 1 mm)
- Molding time: 15 min
- Mold temperature: 145 °C
- No post curing applied

Test result:

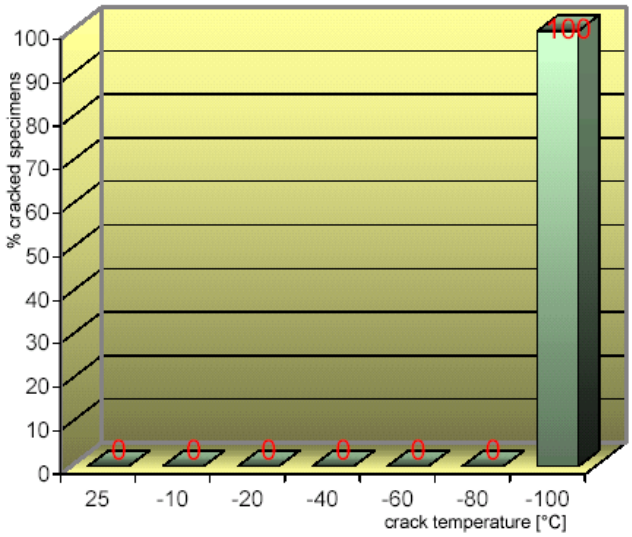

Figure 5: **Temperature shock test**
No crack registered till -80°C
Average crack temperature: -100 °C

Note:

Other physical properties not mentioned in this technical data sheet are comparable to those of Araldite® CW 229-3 / Aradur® HW 229-1 due to similar chemical composition.

Legal Notice

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