DARON® 45

CHEMICAL/PHYSICAL NATURE

Daron® 45 is the A component of a high performance resin system supplied by Aliancys. This resin has a unique proprietary chemistry, combining during the curing stage the chemistry of radical polymerization with polyurethane polymerization.

This 2-component resin system combines two interesting features. The curing reaction can be controlled from very fast to slow. Therefore, processing conditions are easy to adjust for a specific application. In addition, the property profile of the cured resin system is similar to the profile of top range high performance thermosetting resins like Epoxies.

MAJOR APPLICATIONS

The high performance system based on Daron® 45 resin consists of 2 components, i.e. Daron® 45 resin and Lupranate® M20R. Lupranate® M20R is a polymeric methylene phenylisocyanate resin supplied by Elastogran GmbH. Mixing the two components together, in the presence of the right catalysts, sets off the two curing reactions as described above.

As a result, the Daron® 45 resin can be used for making fiber reinforced composite with excellent chemical resistance and thermal resistance, combined with good mechanical properties.

Composite constructions produced from Daron® 45 resin show outstanding long-term heat resistance and very good resistance to long-term mechanical loading. Resin systems based on Daron® 45 are suitable for most open and closed mold techniques, e.g. hand lay-up, filament winding, pultrusion.

PRODUCT SPECIFICATIONS UPON DELIVERY

Property	Range	Unit	TM
Viscosity, 23°C	175 - 225	mPa.s	2013
Solids content	66.5 – 69.5	%	2033
Appearance	Clear	-	2265
Water content	0.01 - 0.07	-	2350
Acid value, as such	0 - 4	mg KOH/g	2401
Gel time, 25°C, min	20 - 25	Minute	2625
Peak time, min	24 - 30	Minute	2625
Peak temperature	150 - 180	°C	2625

REMARKS

TM 2013: Z2/100 s-1, 23°C
TM 2625: 100g + 2.0 g Perkadox®. CH50L + 2.0 g Pergaquick® A3 X
TM 2999: Cond: Acc. Pergaquick® A3 X

PROPERTIES OF THE LIQUID RESIN (TYPICAL VALUES)

Property	Value	Unit	TM
Density, 23°C	appr. 1,080	kg/m³	2160
Solids content	appr. 68	%	2024
Flash point	appr. 33	°C	2800
Stability, no init., dark, 25°C	3	Month	-

PROPERTIES OF CAST UNFILLED RESIN SYSTEM

Property	Value	Unit	TM/ISO
Density, 23°C	1,180	kg/m³	2160
Volume shrinkage	6.0	%	-
Heat deflection temp. (HDT)	210	°C	ISO 75-A
Glass transition temp (Tg) (Offset G')	200	°C	ISO 6721
Tensile strength	70	MPa	ISO 527-2
Mod. of elasticity in tension	3.2	GPa	ISO 527-2
Elongation at break	2.5	%	ISO 527-2
Flexural strength	140	MPa	ISO 178
Mod. of elasticity in bending	3.4	GPa	ISO 178
Impact res. – unnotched sp.	15	kJ/m²	ISO 179
Fracture toughness, K_{1c}	0.5	MPa√m	ISO 13586
Hardness	45	Barcol	2604
Water absorption, 80°C	1.2	Wt%	ISO 175

REMARKS

Cure system: 38 phr Lupranate M20R, 2 phr Perkadox CH50L and 2 phr NL 64-10P.
Cure time: 24 hrs. at room temperature
Post cure: 4 hrs. 200°C

PULTRUSION PROCESSING DETAILS

	Undirectional pultrudate
Daron® 45	100
Lupranate® M20R	38
Trigonox® 21S	0.5
Trigonox® C	1
Internal release agent	0.5
Die temperature	
Zone 1, °C	135
Zone 2, °C	150
Speed of pulling , cm/min	100

PROPERTIES OF GLASS FIBER REINFORCED LAMINATES

Property	Unit	Value
Product thickness	mm	3
Glass content	Wt%	80
Flexural strength	MPa	1900
Flexural modules	GPa	51
Outer fiber strain	%	3.5
ILSS	MPa	70

PROCESSING DARON® RESIN SYSTEMS

Resin system based on Daron® 45 are suitable for open and closed mold processing. Standard reinforcement materials for UP resins can be used. The processing properties of Daron® resins are similar to standard UP resins, with respect to impregnation and wetting of glass fibers. Preparation of the Daron® resin system however differs from that of a standard UP resin. In the following section you can find some typical starting formulations.

HAND LAY-UP/FILAMENT WINDINGPROCESSING

First, a premix of Daron® 45, peroxide and moisture scavenger is prepared. This premix is stable for appr. 8 hours. The moisture scavenger is necessary to absorb the water in the system before it reacts with the isocyanate component (Lupranate® M20R). Secondly, to 100 parts of premix 35 parts of Lupranate® M20R and 2 parts diethyl aniline-10% (NL 64-10P) accelerator are added. After mixing, this gives a pot life of approximately 40 minutes at 20°C.

Premix:		
Daron® 45	100	
Perkadox® CH 50L	2	
Moisture scavenger	5	
	Premix:	100
Lupranate M20R		35
NL 64-10P		2

FILAMENT WINDING

The starting formulation for filament winding is the same as for Hand lay-up.

PULTRUSION

Processing speeds of systems based on Daron® 45 resin are substantially higher than for unsaturated polyesters and vinyl ester resins. The formulation as described in the table has a pot-life of approximately 1 hour. Cooling of the resin bath may increase the pot-life by a factor 2. Two-stream injection systems enable significant pot-life extension up to a minimum of 8 hours.

Premix:		
Daron® 45	100	
Trigonox C	1	
Perkadox 16	1.5	
Zelec UN	2	
	Premix:	100
Lupranate M20R		36

Please contact your Aliancys Technical Service representative for addition information on Daron® 45 resin systems.

STORAGE GUIDELINES

The resin should be stored indoors in the original, unopened and undamaged packaging, in a dry place at temperatures between 5°C and 30°C and the properties might change during storage. Shelf life is reduced at higher temperatures and the properties of the resin might change during storage. The shelf life of styrene containing unsaturated polyesters will be significantly reduced when exposed to light. Store in dark and in 100%light tight containers only.

MATERIAL SAFETY

A Material Safety Data Sheet of this product is available on request.

TEST METHODS

Test methods (TM) referred to in the table(s) are available on request.

Aliancys is a leading global company active in the sales of Quality Resins for composite applications. Together with its customers, Aliancys is pushing the limits of both composite part manufacturing and performance. Taking an integral approach to new product development, Aliancys is using its full expertise in resin chemistry, material science, and component manufacturing for shaping new applications in composites. So let's talk and increase our mutual business success, both today and tomorrow. More information on www.aliancys.com

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