

Product Data Sheet

Daron 45

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Daron 45 is the A component of a new group of thermosetting resins called turane resins. Turane stands for thermosetting urethane and combines during curing the chemistry of radical polymerization with polyurethanes. It is a 2-component resin system that delivers two interesting properties: (1) the curing reaction can be controlled from very fast to slow reacting systems and (2) the cured turane products have properties to keep with top range of high performance thermosetting resins.

Turane resin system based on Daron 45 consists of 2 components, i.e. Daron 45 and Lupranate M20R. Lupranate M20R is a polymeric methylene phenylisocyanate resin supplied by Elastogran GmbH. Mixing both components, in the presence of the right catalysts, results in two curing reactions. Fully cured turane resin system based on Daron 45 results in fiber reinforced composite with excellent chemical- and thermal resistance combined with good mechanical properties. Composite construction produced with turane resin system based on Daron 45 turane show outstanding long-term heat resistance and very good resistance to long-term mechanical loading.

Turane resin system based on Daron 45 is suitable for most open and closed mould techniques, e.g. hand lay-up, filament winding, pultrusion.

Product specifications Daron 45

Property	Range	Unit	TM
Viscosity, 23°C	175 - 225	mPa.s	2013
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	minutes	2625
Peak time, min	24 - 30	minutes	2625
Peak temperature	150 - 180	°C	2625

Remarks

TM 2013: Z2/100 s-1, 23°C

TM 2253: 100g resin + 2wt% NL 64-10P + 2% Perkadox CH 50L

Properties of the liquid resin (typical values) Daron 45

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

Properties of cast unfilled turane resin system based on Daron 45

Property	Value	Unit	TM
Density, 23°C	1,180	kg/m ³	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/m ²	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

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

Test methods

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

Storage guidelines

Daron 45 may be stored in the dark for 3 months in the original containers at temperatures not exceeding 25°C. 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.

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Properties of glass fiber reinforced laminates

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

Processing turane resin system based on Daron 45
Turane resin system based on Daron 45 is suitable for open and closed mould processing. Standard reinforcement materials for UP resins can be used. The processing properties of turanes are similar to standard UP resins, with respect to impregnation and wetting of glass fibres. Preparation of the turane resin system however differs from that of a standard UP resin. Here are some typical starting formulations:

Hand lay-up/Filament winding

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.

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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 turane resin system based on Daron 45 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 DSM Composite Resins representative for addition information on turane resin system based on Daron 45.

Material Safety

A Material Safety Data Sheet of Daron 45 is available on request.