APPLICATION METHOD

Letoxit® PR 220
Letoxit® EM 315, 316, 317

Version: 11/2011

Description

The lamination systems with enhanced toughness without filling mediums, intended to be used for laminating of materials from glass, carbon, or Kevlar fibres. Letoxit PR 220 resin is produced on the basis of modified epoxy resin of Bisphenol A type.
The resin is considered to be physiologically well compatible. Hardeners are of amin type and do not contain nonylphenol. Due to the resin´s low viscosity and thereby also lower interfacial tension it shows good wetting abbility of lamination textiles and materials when combined in mixture with the Letoxit EM 315, EM 316, EM 317 hardenig agents.

Application

Lamination compounds are intended to be used for production of components stressed in extreme conditions, e.g. aircraft and sail plane components, components for construction of models, gliders, construction of sporting boats, transport vehicle bodies, forms etc. Lamination compounds are suitable for all types of manufacturing, such as manual laminating, winding as well as when using pressure or vacuum.

The optimum processing temperature of mixture lies in temperature range between 20 – 25°C. A higher processing temperature is also possible, but it shortens the pot-life of the compounds. The mixture pot-life lies between 45 minutes till 5 hours. Each hardener has got the same mixing ratio, therefore the hardeners can be combined by any way. This possibility enables to find optimal laminating system for various processing method. There is possible to take laminated part out of a mould after initiative curing for following working. Non-tacky, high-gloss surfaces are obtained even with unfavorable curing conditions such as lower temperatures or high relative humidity.

The mixture ratio must be followed as precisely as possible. Higher or lower dosage of the hardener does not result in acceleration or deceleration of the reaction, but leads to imperfect hardening and thereby also deterioration of mechanical properties. The immixture must be carried out properly. Mix it so long until the compound has no uniform transparent color and until there are no unstirred hardener „clouds“. Laminating systems can be combined together with suitable gel coats, various lacquers and paints (for example based on PUR).

Resin specification

	Norm	Resin Letoxit® PR 220
Density at 25°C (g/cm^3)	PN-5M-11	1,15-1,23
Viscosity at 25°C (mPa.s)	PN-5M-01	600-900
Epoxy equivalent	PN-5M-20	0,59-0,65
Epoxy value	-	155-170
Colour		yellowish

Hardener specification

	Norm	Hardener Letoxit® EM 315	Hardener Letoxit® EM 316	Hardener Letoxit® EM 317
Density at 25°C (g/cm^3)	PN-5M-11	0,94-0,97	0,94-0,97	0,93-0,96

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Viscosity at 25°C (mPa.s)	PN-5M-01	50-100	60-120	100-140
Hydrogen equivalent	-	64	64	64
Amine value (mg KOH/g)	PN-5M-06	480-600	480-530	400-500
Colour	-	transparent blue	transparent blue	transparent blue

Processing details

	Letoxit® PR 220 + Letoxit® EM 315, 316, or 317
Processing temperature	20 – 30 °C
Viscosity of mixture at 25°C	300-700
Storage at 15 – 25 °C	minimally 6 months in their carefully sealed original containers
Curing	24 hours at temperature 20-25 °C
Post curing	15 hours at 50-60°C….up to…..15 minutes at 150°C

Mixture ratio

	Resin Letoxit® PR 220 : hardener Letoxit® EM 315, 316, 317
Parts by weight	100 : 40 ± 1
Parts by volume	100 : 50 ± 1

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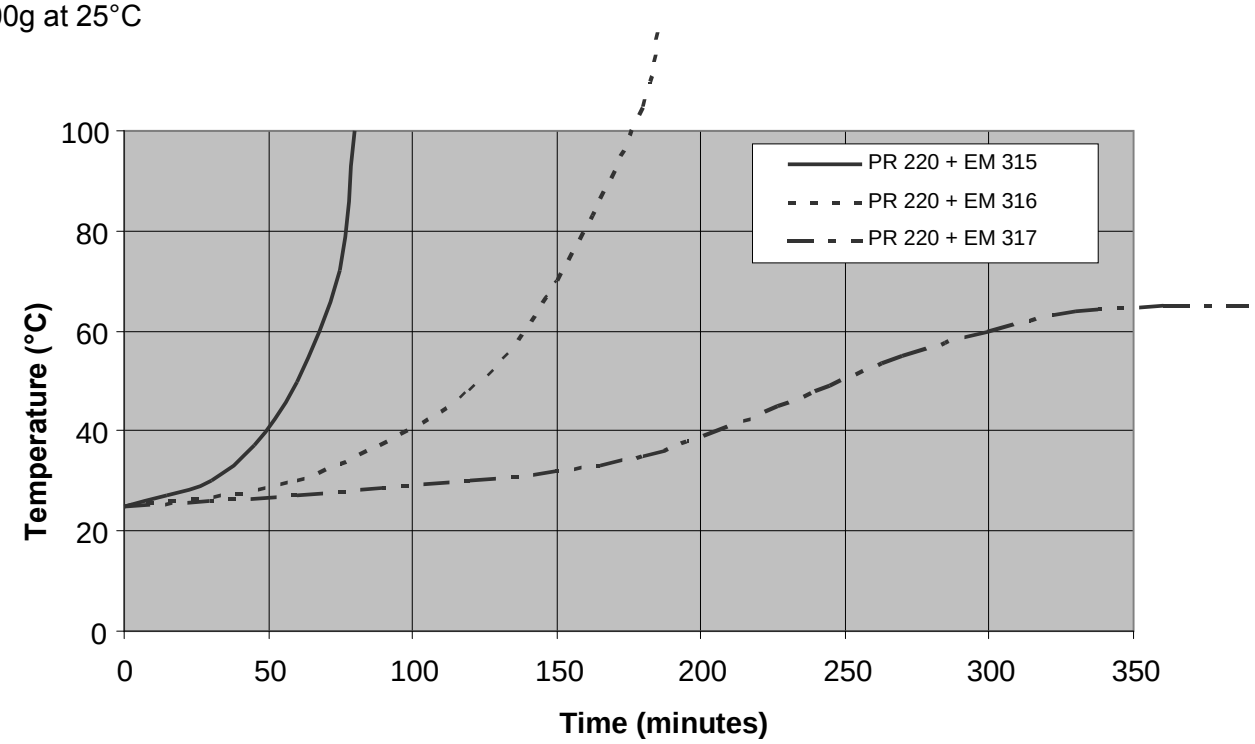
Temperature rise

100g at 25°C



Gel time

1 mm thick film at temperature 25°C

Letoxit PR 220 + Letoxit EM 315	Letoxit PR 220 + Letoxit EM 316	Letoxit PR 220 + Letoxit EM 317
2-3 hours	3-4 hours	5-6 hours

Glass transition temperature (Tg)

Curing	Letoxit® PR 220 Letoxit® EM 315	Letoxit® PR 220 Letoxit® EM 316	Letoxit® PR 220 Letoxit® EM 317
24 h 25°C + 15 h 60°C	75-80°C	85-90°C	90-95°C
24 h 25°C + 2 h 70°C + 10 h 120°C	-	-	105°C
24 h 25°C + 2 h 70°C + 10 h 120°C + 4 h 150°C	-	-	110°C

Glass transition temperature rise (Tg)

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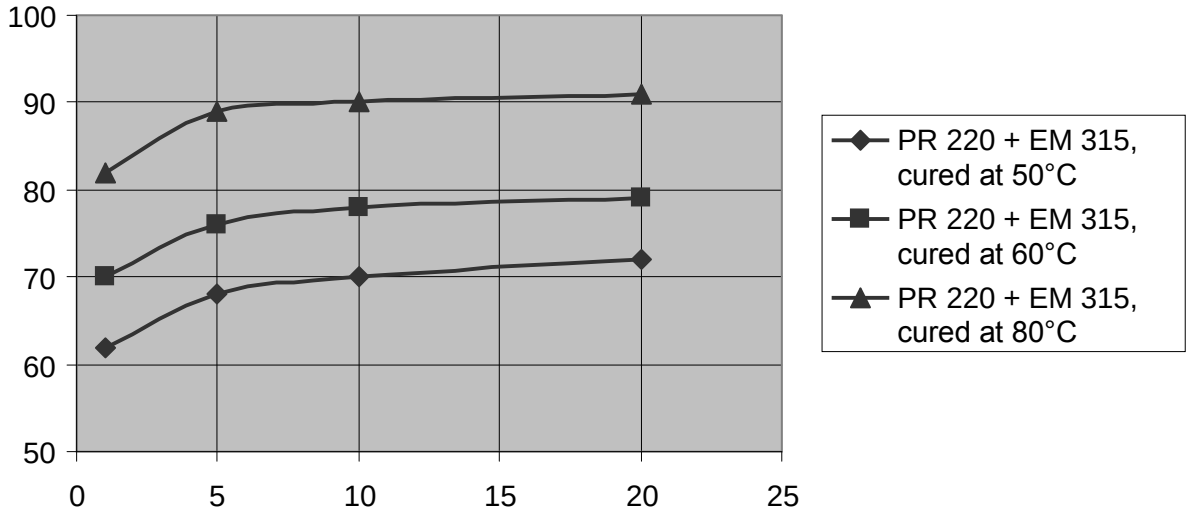
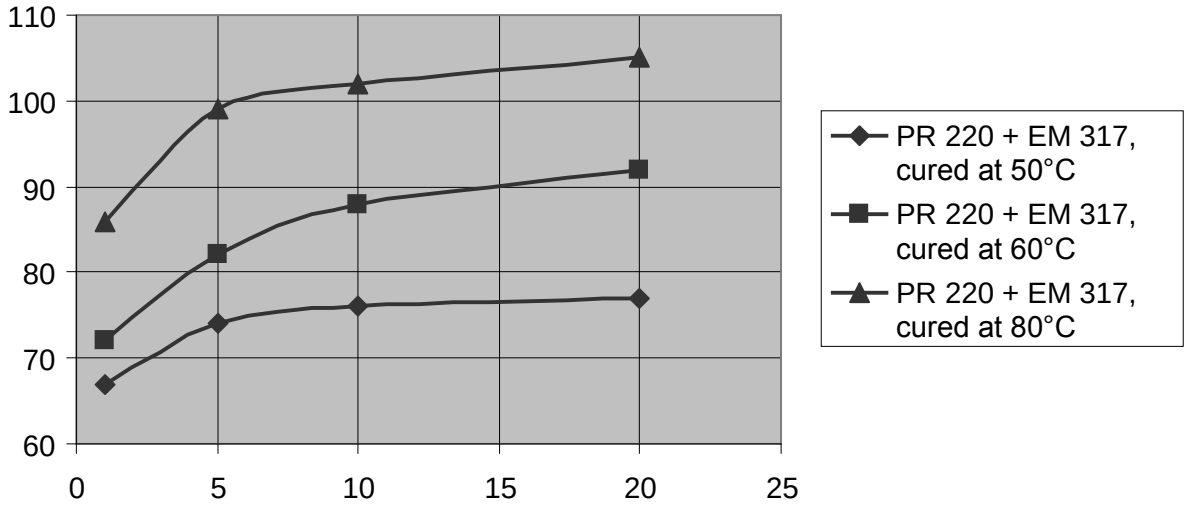
Resin Letoxit PR 220 + hardener Letoxit EM 315



Resin Letoxit PR 220 + hardener Letoxit EM 317



Mechanical properties of unreinforced resin

Curing: 24 h 25°C 2 h 70°C 6 h 120°C	Norm	Resin Letoxit PR 220 + hardener Letoxit EM 315, EM 316, EM 317
Density at 25 °C (g/cm3)	PN-5M-11	1,18-1,20
Flexural strength (MPa)	CSN EN ISO 178	110-120
Modulus of elasticity (GPa)	CSN EN ISO 178	3,0-3,3
Tensile strength (MPa)	CSN EN ISO 572	70-80
Compressive strength (MPa)	CSN EN ISO 604	120-140

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Impact strength (kJ/m2)	CSN EN ISO 179	45-55
Hardness Barcol (°Bc)	PN-5M-13	29

Packing

Resins and hardeners as well are suplied in PE containers in volume 2, 5, 10 or 20 kg and also in 200 kg drums.

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