



STRUKTOL EPOXY PREPOLYMERS

POLYDIS[®] 36.. Products *Elastomer-modified epoxy prepolymers*

Epoxy end-capped rubber molecules:

- Prepolymers to be combined with standard resins
- Ready-for-use resins as raw materials
- Formulated A-components

Advantages:

- Improved impact resistance at all temperatures
- Increased toughness
- Improved adhesion on oily steel
- Compatible with all resins and hardeners
- Long-term tack for prepregs

Additives for all epoxy applications:

- Adhesives
- Prepregs
- Composites
- Coatings
- Casts, etc.

Polydis PD 36xx - product range

Development Steps

1. Generation **"standard"** elastomer-modified epoxy prepolymers

Elastomer -Types:	NBR	or	Polyether
Resin base:	DGEBA	or	cycloaliphatic epoxy resin

2. Generation **"Higher Functional"** elastomer-modified epoxy prepolymers

Elastomer-Types:	NBR
Resin base:	Epoxy-Novolac

3. Generation **"Advanced Types"** - block-copolymer

Elastomer-Types:	NBR		
Resin base:	DGEBA	or	DGEBF

4. Generation **"Hybrids / Blends "** elastomer-modified epoxy prepolymers

Elastomer-Types:	different types
Resin base:	DGEBA

Polydis PD 36xx - product range
Development Steps - Effects - Properties

1. Generation of "standard" elastomer-modified epoxy prepolymers / NBR-Types

Prepolymers (additives): DGEBA reactive - synthesized by the reaction with NBR- elastomers.

Developed for: Toughening up - best adhesion (e.g. on oily metal) - good wetting of fiber - good low temperature behaviors.
 Improved (-40°C - 100°C) impact and vibration resistance - flexural strength - shear strength - peel strength.

Formulation: Polydis can be used with any conventional epoxy resin, hardeners and rheological additives
 (general information) to create new property profiles. Mixtures of Polydis products are possible.
 Normal addition rates are 10 - 50 % by weight of Polydis (optimum normally at approx. 37.5 %)
 With Polydis, less hardener is necessary which saves money --> final product of superior quality.

Product	PD 3604	PD 3605	VP 3603 R	PD 3614	PD 3615	VP 3613 R
Resin base (%)	60 % DGEBA	60 % DGEBA	DGEBA	60 % DGEBA	60 % DGEBA	DGEBA
Elastomer base (%)	40 % NBR	< 40 % NBR	~ 5 % NBR	40 % NBR	40 % NBR	~ 5 % NBR
Solvent (%)	---	---	---	---	---	---
Character	standard	low viscos	<i>ready to use</i>	standard	low viscos	<i>ready to use</i>
Main effects	good low temp. behaviors	version of PD 3604	<i>blend of PD 3604</i>	high lap shear strength/adhesion	version of PD 3614	<i>blend of PD 3614</i>
Main application	adhesives composites potting	E-casting composites coatings	composites coatings potting	adhesives composites prepregs	E-casting composites	composites coatings potting
Physical form	yellowish resin	yellowish transp. resin	yellowish transp. resin	yellowish resin	yellowish transp. resin	yellowish transp. resin
EEW (g/val)	330	300	210	330	300	230
Viscosity (Pa s)	190	50	30	470	250	60

Polydis PD 36xx - product range
Development Steps - Effects - Properties

1. Generation of low viscosity elastomer-modified epoxy prepolymers (Polyether- and NBR-Types)

Prepolymers (additives): *Resin base:* DGEBA or cycloaliphatic epoxy resin (for high Tg and thermal stability).
 Synthesized by the reaction with Polyether-elastomers (UV curable; can form transparent products)
 or synthesized with NBR for a better adhesion (with CY 179, anhydride cured also transparent).

Developed for: Toughening up - **low viscosity application - easy to handle** - good low temperature behaviors.
 Improved impact strength - flexural strength.

**DGEBA-based for RT- and HT-Curing
 Polyether-elastomer for UV-Curing**

**Based on cycloaliphatics for HT-curing
 potting applications for high Tg's**

Product
<i>Resin base (%)</i>
<i>Elastomer base (%)</i>
<i>Solvent (%)</i>
<i>Character</i>
<i>Main effects</i>
<i>Main application</i>
<i>Physical form</i>
<i>EEW (g/val)</i>
<i>Viscosity (Pa s)</i>

PD 3622
60 % DGEBA
40 % Polyether

toughening
coating casting UV-Curing
yellowish transp. resin
330
9.5

VP 3624
60 % DGEBA
40 % Polyether

hydrophobic, toughening
coating casting UV-Curing
yellowish transp. resin
360
38

VP 3662
60 % cycloaliph. epoxy resin
40 % Polyether

toughening for HT
coating casting UV-Curing
yellowish transp. resin
260
2.1

VP 3664
60 % cycloaliph. epoxy resin
40 % NBR

good toughening for HT
casting composites coatings
yellowish resin
260
65

Polydis PD 36xx - product range
Development Steps - Effects - Properties

2. Generation "higher functional" elastomer-modified epoxy prepolymers / NBR-Types.

Prepolymers (additives): Epoxidized novolac - modified by the reaction with NBR elastomers.

Developed for: Good wetting of fiber - best toughening up - Tg up to 270°C possible.
 Improved (low + high temp.) impact strength - flexural strength - shear strength - peel strength.

Prepregs and composites develop outstanding mechanical, chemical and thermal properties.
 e.g. - No more splitting or damaging at impact - improved processability.
 - Improved pressure resistance of pipes (up to 50%).

Product	PD 3670	VP 3680	VP 3681	PD 3691
Resin base (%)	60 % EP-Novolac	60 % EP-Novolac	75 % EP-Novolac	~ 95 % DGEBA
Elastomer base (%)	20 % NBR	20 % NBR	25 % NBR	~ 5 % NBR
Solvent (%)	20 % MEK	20 % MEK	---	---
Character	high functional solution	high functional solution	high functional solid form of PD 3680	<i>tackyfier for prepregs (1. Generation)</i>
Main effects	toughening	toughening	toughening	
Main application	prepregs composites coatings	prepregs composites coatings	composites solid or powder applications	prepregs contact adhesives
Physical form	yellowish resin solution (F)	yellowish resin solution (F)	yellowish solid resin	yellowish cloudy resin
EEW (g/val)	300	370	300	190
Viscosity (Pa s)	2.1	85	Smp. ~100°C	300

Polydis PD 36xx - product range
Development Steps - Effects - Properties

3. Generation "Advanced Types" elastomer-modified epoxy prepolymers / NBR-Types

Prepolymers (additives):

Block-copolymer - DGEBA or DGEBF synthesized with NBR elastomers.

Developed for:

Best toughening up and adhesion - Tg up to 190°C possible.
 For ultimate impact strength - shear strength - peel strength.
 Adhesives get outstanding mechanical and thermal properties.
 Developed for high performance automotive applications (1-C-adhesives).

Product
<i>Resin base (%)</i>
<i>Elastomer base (%)</i>
<i>Solvent (%)</i>
<i>Character / Main effects</i>
<i>Main application</i>
<i>Physical form</i>
<i>EEW (g/val)</i>
<i>Viscosity (Pa s)</i>

PD 3610	VP 3611
60 % DGEBA	60 % DGEBF
40 % NBR	40 % NBR
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Advanced typ best toughening best adhesion	Advanced typ best toughening best adhesion
adhesives composites	adhesives composites
amber solid resin	amber tacky, nearly solid resin
900	560
200 (80°C)	10 000

Polydis PD 36xx - product range

Development Steps - Effects - Properties

4. Generation "Hybrids / Blends" elastomer-modified epoxy prepolymers.

Prepolymers (additives):

VP 3616: Hybrid prepolymer of NBR and Polyether elastomers based on DGEBA.

VP 3640 R: Blend of different prepolymers based on DGEBA including additives - ready to use.

Developed for:

Excellent flexibilization (toughening up) - improved crack resistance.

For ultimate impact resistance / elongation and best low temperature behaviors.

Coatings and Castings get outstanding mechanical properties at low temperatures.

Product
<i>Resin base (%)</i>
<i>Elastomer base (%)</i>
<i>Solvent (%)</i>
<i>Character / Main effects</i>
<i>Main application</i>
<i>Physical form</i>
<i>EEW (g/val)</i>
<i>Viscosity (Pa s)</i>

VP 3616
60 % DGEBA
40 % (NBR + Polyether)

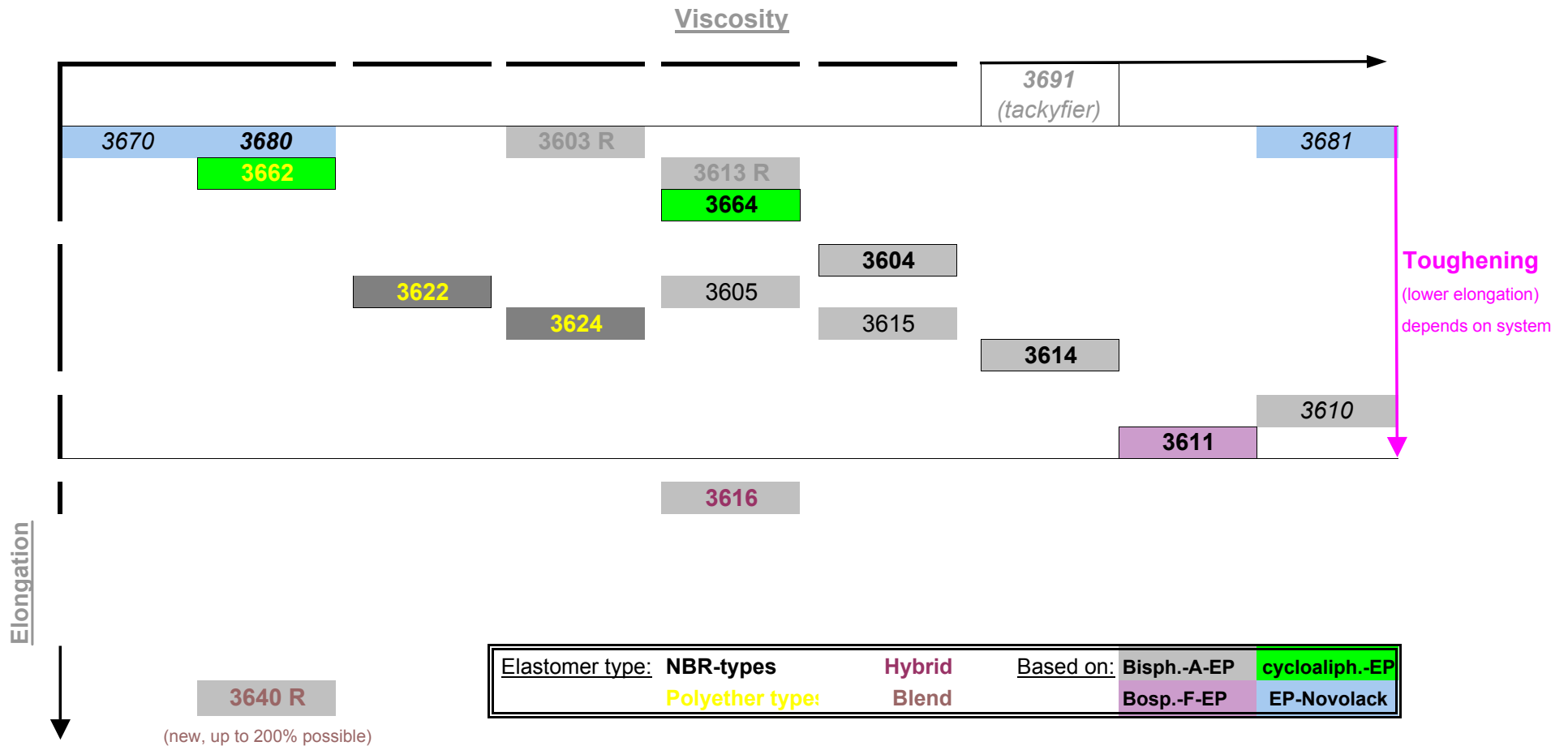
Hybrid combination of elastomer properties
pottings coatings
amber resin
950
70

VP 3640 R
~ 60 % DGEBA
~ 40 % elastomers

Blend ready to use flexibilization up to 200%
coatings pottings composites
amber resin
315
12

PD 36xx are products for increasing adhesion and **toughening up** bridle systems; each specialized on the application.

On the other hand, there is a smaller effect of **flexibilization (elongation)**, which is also needed in some cases.



To lower the viscosity, higher temperatures are helpful; or blends with rheological additives or diluents could be used.

Products:	VP 3603 R	PD 3505	PD 3604	VP 3613 R	PD 3615	PD 3614	VP 3640 R	VP 3616	PD 3622	VP 3624	↑RT ↓HT	VP 3662	VP 3664	PD 3670	VP 3680	VP 3681	PD 3691	PD 3610	VP 3611	
Typical applications for Polydis (additives):	<i>Sometimes mixtures are the best choice</i>																			
1-Comp.-adhesives						X														X
2-Comp.-adhesives						X														
Contact adhesives																				
Composites			X			X														
Prepregs																				
repair mas / putty																				
Potting resins								X					X							
Casting /electrical appl.					X															
Coatings							X													
UV curing, coatings																				

Effects on properties (cured):	<i>depends on system and application</i>																			
Impact resistance						X														X
flexibilization							X													
lap shear strength						X														
T-peel																				X
adhesion to metal																		X	X	
tack (preured)																	X			
chemical resistance																				
thermostability															X					
good low temperature behaviors							X													
ready to use / blends							X													
handling							X													
price			X															X		

improved
 good suited
 best suitability

This is only a short overview (X are favorites), please contact our technical service for details.