

## Epoxy-Systems HP-E29L, HP-E56L, HP-E111L

- High Performance Epoxy Laminating Resin Systems -

The Epoxy-Systems HP-E29L, HP-E56L and HP-E111L are unfilled, low viscous, 2-component combinations of resin and hardeners with various processing times of approx. 25 - 110 minutes. **Compared to standard resins, our high performance resins show faster curing processes. The laminates have better static and dynamic strengths as well as a higher temperature resistance.**

### Properties:

- Very good wetting properties of the reinforcing fibres
- Cold setting, de-mouldable at room temperature
- Free of solvents and fillers
- Improved physiological compatibility (no R62 labelling)
- Practically shrink-free curing
- heat resistance (Tg Max) **up to 93°C** (HP-E29L)
- **Thermofunctional hardener** supports faster curing and increased strength, especially at higher temperatures
- Individual colouring is available upon request (can be delivered coloured)
- **Excellent adhesion to In-Mould Coatings** from HP-Textiles
- **In total approx.10% better characteristics (Tg MAX, tensile strength etc.) than those of standard systems!**

### Field of application:

- As impregnating and laminating resins in the areas of
- Mould-making and fixture constructions, industrial parts
  - Construction of sports equipment, model making
  - Orthopaedic
  - Vehicle substructures / motorsport
  - Boat construction
  - Aircraft construction (ultralight aviation)

HP-E29L, HP-E56L und HP-E111L are free of nonylphenol and DETA.

**Note:** The resin components of HP-E29L, HP-E56L and HP-E111L are identical. Furthermore, the hardeners are mixable among themselves.

### Processing Data:

		HP-E29L	HP-E56L	HP-E111L
Colouring ( <i>mixture</i> )		Slightly bluish / green		
Mixing ratio ( <i>resin : hardener</i> )	[weight]	<b>100:40</b>		
	[volume]	100:44		
Mixing viscosity ( <i>at 20°</i> )	[mPa s]	(low viscous)		
<b>Mixing viscosity (<i>at 25°</i>)</b>	<b>[mPa s]</b>	<b>(low viscous)</b>		
<b>Pot life time (<i>at 20°C</i>)</b>	<b>[minutes]</b>	<b>25</b>	<b>55</b>	<b>110</b>
Demouldable ( <i>at 20°C</i> )	[h]	24	30	48
Demouldable ( <i>at 40°C</i> )	[h]	6	7	9
Processing temperature (optimal)	[°C]	15-25	20-25	20 - 30
<b>Processing temperature (minimum)</b>	<b>[°C]</b>	<b>15</b>	<b>18</b>	<b>20</b>

### Raw Material Data:

		HARDENER				
		RESIN	HP-E29L	HP-E56L	HP-E111L	
Viscosity (at 25°C)	[mPa s]	600 - 900	100 - 200	100 - 200	100 - 200	HP.07.0003
Density (at 20°C)	[g/cm <sup>3</sup> ]	1.1 - 1.15	0.96 - 1.04	0.96 - 1.04	0.96 - 1.04	HM.07.0002
(NH)-equivalent	[g/EQ]		66	66	66	HM.07.0014
Epoxy-equivalent	[g/EQ]	160 - 176				HM.07.0013

### Moulding properties -without reinforcing material-:

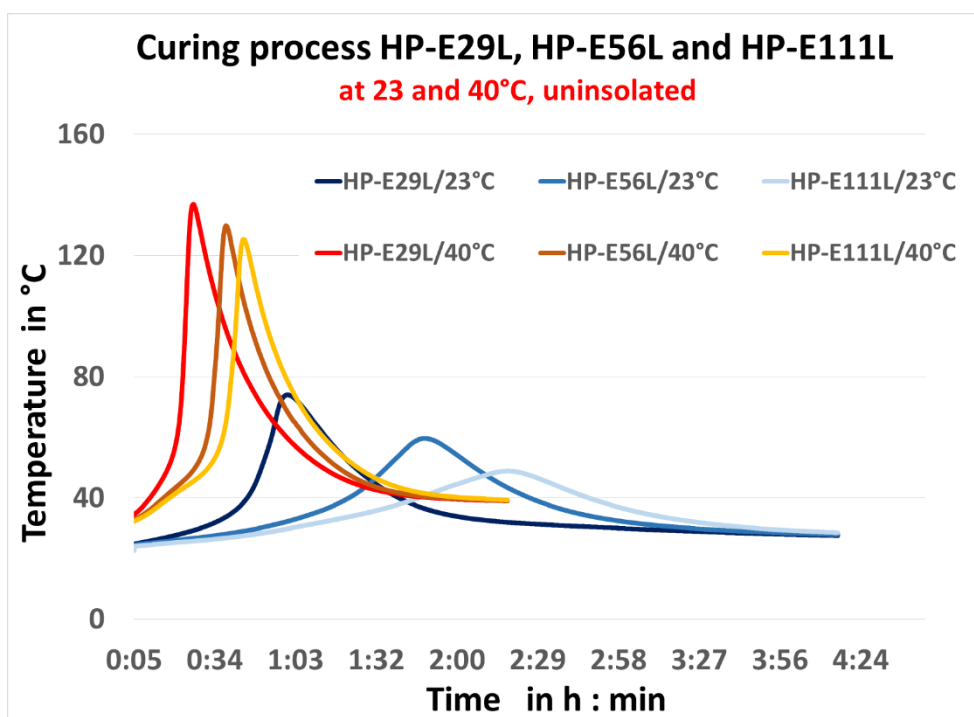
		HP-E29L	HP-E56L	HP-E111L	
Tensile strength	[N/mm <sup>2</sup> ]	70 - 75	70	68	HM.07.0004
Elongation	[%]	3 - 5	3 - 5	3 - 5	HM.07.0004
Flexural strength	[MPa]	100 - 110	100 - 110	n. s.	HM.07.0005
Elastic modulus (bending test)	[GPa]	>3	>3	>3	HM.07.0004
Hardness (after tempering 2h/120°C)	[Shore D]	86	87	87	HP04.07
Glass transition temperature Tg MAX	[°C]	93	91	79	HP04.08

The physical data was found out on an unfilled test specimen.  
The hardening occurred (unless otherwise stated) 24h at 23°C + 6h at 80°C.

### Curing and Exothermic Reactions:

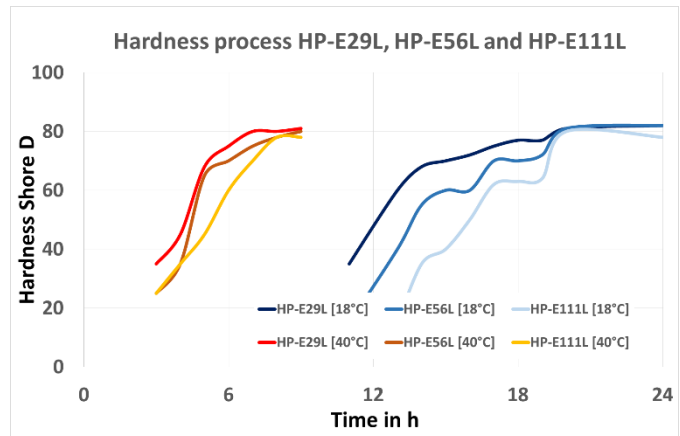
Investigative results are based on method HP04.051.  
Here, resin and hardener are brought to 23°C and mixed stoichiometrically (100:40 by weight).  
The measuring was made on the bottom of a cup at a 100g mixture (internal method).

Higher temperatures or larger mixtures reduce the pot life time!



### Hardening over Shore Hardness:

Results are based on method HP04.04. Here, resin and hardener are mixed (100:40 by weight). After that, 10g are filled in an aluminum measuring bowl and the hardness (Shore D) is measured periodically under isothermal conditions.



### Temperature Peaks:

	at 23°C			at 40°C		
	HP-E29L	HP-E56L	HP-E111L	HP-E29L	HP-E56L	HP-E111L
up to T <sub>max</sub> [h:mm]	approx. 1:00	approx. 1:48	approx. 2:18	approx. 0:26	approx. 0:38	approx. 0:44
T <sub>max</sub> [°C]	74	60	49	137	130	125

### Gel Time / Demouldability:

		HP-E29L	HP-E56L	HP-E111L
Gel time after	[h/20°C]	3 - 5	3 - 5,5	3,5 - 6
Gel time after	[h/40°C]	2 - 2,5	2 - 2,5	2 - 3,5
Demouldable at 20°C	[h]	24	30	48
Demouldable at 40°C	[h]	6	7	9

### Tempering:

For epoxy resin systems apply a final strength after 7 days at 20°C (literature values). This period can be reduced by increased temperatures or a specific tempering.

**Possible tempering cycles: 24h/23°C + 5h at 60°C + 6h at 80°C**

We generally recommend to temper to achieve optimal component properties. By tempering the composite components, the strength properties can be improved. Furthermore, the heat stability will be increased. But first, all components need to cure non-adhesively

### Safety Instructions:

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The safety instructions can be found on the respective container.

Do not allow children to handle. Prevent inhalation of fumes and contact with bare skin. Wear suitable protective gloves and safety goggles. During use, do not eat, drink or smoke. For detailed information, please refer to the corresponding safety data sheets.

During the hardening process, energy can be released in the form of heat, hence a cooling/heat exchanging should be provided in order to prevent hot spots. Only mix the components in the recommended proportions in accordance with the instructions. The epoxy system has a high resistance against crystallization.

However, at very low temperatures, a crystallization of the hardener may occur. The process is reversible e.g. by heating it to 40°C in a water bath. A complete melting is important. Storage and processing with air admission may lead to carbamate formation (white coloration).

### Application Instructions:

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We recommend tests be performed for trials and suitability for the particular type of application. The system should only be used in the mentioned temperature conditions. The relative air humidity should not be above 70%. In respect of the safety instructions the epoxy and hardener should be mixed in a suitable mixing vessel in accordance with characteristics given in the data sheet. Deviating from the mixing recommendations can lead to incomplete hardening and through that to a loss of performance.

Ensure that the edges are well mixed using a stirring stick or a propeller type mixer. Streaks indicate insufficient stirring and mixing of the components. Larger amounts (more than 100g) and higher temperatures (higher than 20°C) reduce the pot life time. Mixtures which rise to over 40°C in the mixing vessel should not be used any further since processing is associated with property losses.

### Cleaning Work Tools:

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Unhardened product remains can be removed from tools by means of acetone or Thinner XB. Tools should be given a good airing after being cleaned with these solvents, in order to prevent the solvent from being retained until the tool is used again. Hardened remains can only be removed by mechanical means.

### Storage:

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Threaded container tops should be kept free of material remains. Do not exchange tops/lids. Close opened containers tightly. Store cool and dry. With optimal storage conditions, shelf-life should be beyond 12 months.

### Deliverable Quantities:

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Plastic containers with safety fastening in different quantities.  
Larger containers (barrels etc.) can be obtained upon request.

### Disposal:

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Do not allow to enter drains, waterways or soil. Uncured product residues are hazardous waste. The cured system is construction site waste / household waste.

### Further Information:

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Further application information can be obtained from our website, by selecting Product Info on the homepage. Please do not hesitate to contact us by telephone if you have further queries.

Information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. It is the user's responsibility to determine for himself the suitability of any material for a specific purpose and to adopt such safety precautions as may be necessary. We make no warranty as to the results to be obtained in using any material and, since conditions of use are not under our control, we must necessarily disclaim all liability with respect to the use of any material supplied by us. We recommend tests be performed for trials and suitability for the particular type of application.

With the newest printing of this data sheet the previous version loose validity!