

Epoxy-System HP-E3000RI

- Hardener HP-E3RI / HP-E30RI / HP-E120RI / HP-E300RI -

Base of the **series HP-E3000RI** is an unfilled epoxy-resin, which is individually mixable with different hardeners for several applications.

A special feature of this series is a high initial glass transition temperature (T_g) when hardening at room temperature.

The special hardener **HP-E120RI** provides a higher maximum initial glass transition temperature (T_g Max) up to 98°C. This hardener has a highly transparent and therefore is well suitable for visible carbon components.

The hardeners **HP-E3RI**, **HP-E30RI** and **HP-E300RI** allow a pot life between 3 and 300 minutes.

The injection / infusion systems are characterized by a particularly low viscosity. This results in optimal impregnation and flow properties. A use in hand lamination is also possible.

Properties:

- very low viscosities, therefore excellent fibre wet-out
- pot-life adjustable between 30 (hardener **HP-E30RI**) and 300 minutes (hardener **HP-E300RI**)
- fast hardener **HP-E3RI** for very short curing cycles available
- glass transition temperature (T_g Max) up to 98 °C (hardener **HP-E120RI**)
- high dynamic and static strength

Field of Application:

- Vacuum-infusion methods (IMC/MTI, RI, VARI, SCRIMP®...)
- Pressure injection methods (RTM, RIM...)
- filament winding
- hand laminating
- optical application such as visible carbon parts (hardener **HP-E120RI**)

Similar epoxy-system with statement of approval of the Germanischer Lloyd for building of boats and wind-driven power stations available: HP-E3000GL

Processing Data -Resin-

		RESIN
<i>Name of article</i>		HP-E3000RI
colouring		colourless
colour index	[Gardner]	< 1
mixing ratio (weight)	[parts]	100 : 30 (hardener see next page)
pot life¹ (at 20°C)	[minutes]	15 - 300

Processing -Hardener- :

HARDENER

		<i>very fast</i>	<i>fast</i>	<i>temp</i>	<i>slow</i>
main features		- very short pot life - for short cycles (RTM)	- short pot life - for low working temperatures	- higher Tg - colourless (visible carbon parts)	- long pot life - for infusions/injections
Name of article		HP-3RI	HP-E30RI	HP-E120RI	HP-E300RI
colouring		colourless with a slight yellow			
colour index	[Gardner]	< 5	< 5	< 1	< 1
colouring		slightly yellow		colourless, clear	
mixing ratio (weight)	[parts]	100 : 30			
mixing ratio (volume)	[parts]	100 : 37			
pot life ¹ (at 20°C)	[minutes]	3	35	200	300
pot life ¹ (at 25°C)	[minutes]	3	30	120	180
processing temperature (optimal)	[°C]	15-20	20-25	20-30	20-30
processing temperature (minimum)	[°C]	0	10	15	15

Specifications:

		Resin	Hardener				
			E3RI	E30RI	E120RI	E300RI	<i>method</i>
density (20°C)	[g/cm ³]	1.14 - 1.16	0.93 - 0.97	0.92 - 0.96	0.92 - 0.96	0.94 - 0.98	PM.01.002
viscosity (25°C)	[mPa s]	600 - 900	20 - 50	30 - 50	40 - 60	8 - 13	PM.01.003
(NH)-equivalent	[g/EQ]		50 - 55	50 - 55	50 - 55	50 - 55	calc.
epoxy-equivalent	[g/EQ]	170 - 180					calc.

All mentioned hardener can be mixed among themselves, so that the pot-life or the heat resistance can be flexibly adjusted. Defined and quantified features underlie persistent controls.

Mechanical data / standard climate:

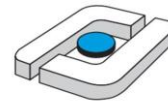
		HP-E3RI	HP-E30RI	HP-E120RI	HP-E300RI	<i>method</i>
density	[g/cm ³]	1.1	1.1	1.1	1.1	PM.01.002
tensile strength	[MPa]	65	72	71	72	PM.01.004
elongation at break	[%]	3 - 4	4 - 5	4 - 5	5 - 6	PM.01.004
flexural strength	[MPa]	105	110	110	110	PM.01.005
E-modulus	[kN/mm ²]	2.8	3	2.9	3	PM.01.004
glass transition temperature	[°C]	80	90	98	83	PM.01.011
hardness	[Shore D]	81	82	83	83	PM.01.009

Physical data are found out at an unfilled sample specimen at 20°C. Tempering depends on the hardener.
 HP-E3RI, HPE30RI, HP-E300RI: curing took 24h at 20°C + 5h at 60°C + 6h at 80°C
 HP-E120RI: curing took 24h at 20°C + 2h at 100°C

References:

Infusion resin HP-E3000RI was developed in close collaboration with the University Osnabrück / Lower Saxony, Germany.

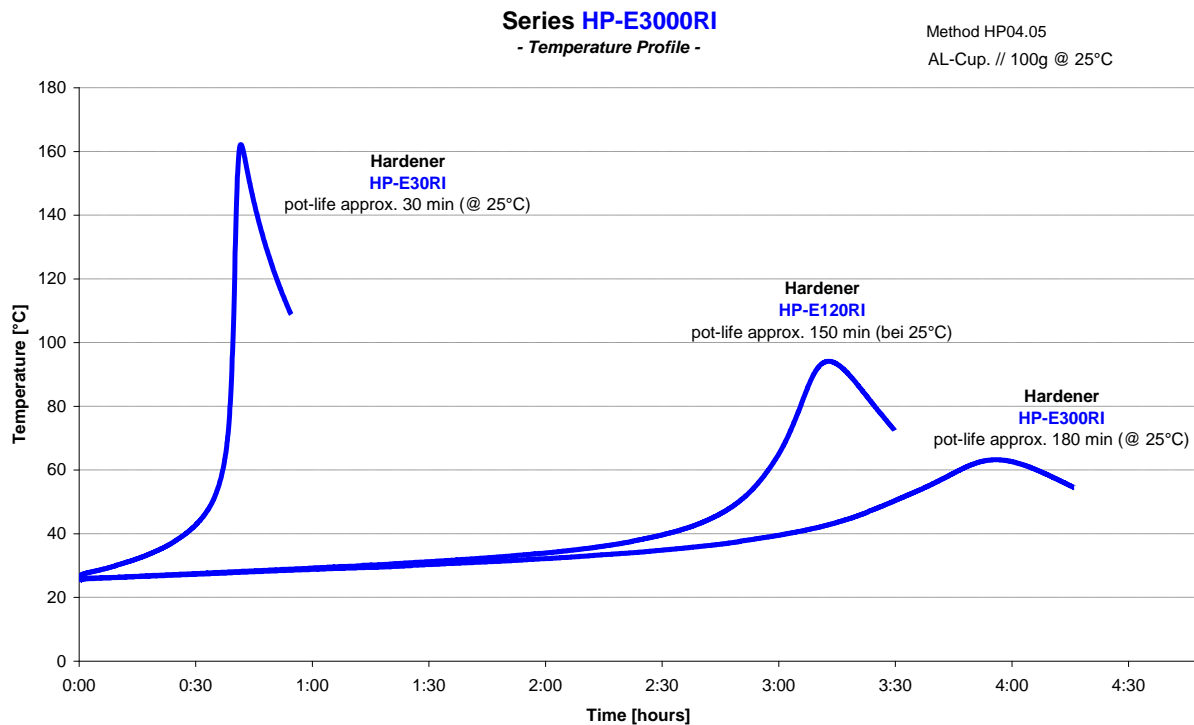
The ignition racing team uses this infusion resin e.g. for constructing their monocoque "Formular Student" racing cars.



Hochschule Osnabrück
University of Applied Sciences

Pot life:

¹ The pot life was found out by internal method (HP04.06) in which 100g mixed resin is weighed-in an aluminium bowl. The pot life time is the temporal value at reaching 40°C on the base of the bowl.



Note: higher temperatures or larger amounts reduce the pot life!

Safety Instructions:

The safety instructions are to be taken from the respective containers. Do not allow children to handle. Prevent inhalation of fumes and contact with bare skin. Wear suitable protective gloves and safety goggles. Do not eat, drink or smoke while using. 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 does generally not crystallize. However, at low temperatures, the hardener may lead to crystallisation. This process is reversible, e.g. by heating it to 40°C in a water bath. All components should be liquid after that. Storage and processing at air may cause building of carbamates.

Application Instructions:

We recommend tests be performed for trials and suitability for the particular type of application.

Prior to processing, the mixed system should rest and then deaerated in a desiccator under vacuum and gentle stirring for a sufficient time at a maximum of 20 ° C.

Tempering is recommended to achieve the optimal component properties.

Optimal tempering cycles: 5h at 60°C + 6h at 80°C

For higher temperature stability ("T_{g Max}" HP-E120RI) further 2h at 120°C.

Cleaning of work tools:

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 e.g. by grinding.

Storage:

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

Deliverable quantities:

Plastic containers with safety fastening in different quantities.

Larger containers (e.g. barrels) can be obtained upon request.

Disposal:

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:

Further information can be obtained from our website, by selecting *Product Info*. Please do not hesitate to contact us by telephone or via mail 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!