## **Technical Datasheet**

## Vitralit® 1600 LV



#### **Product Description**

#### Modified epoxy | 1 K | solvent-free | radiation-curing UV | secondary heat cure

- Electronics
- Electrotechnology
- Glob top
- Semiconductor technology

- ▶ High glass transition temperature
- Low water absorption
- Low ionic content (Na+, K+, Cl- <5ppm)</p>
- Very low shrinkage
- Excellent chemical resistance

#### **Curing Properties**

UV-A	LED 365nm	LED 405nm	Secondary heat cure
✓	<b>✓</b>	-	<b>√</b>

<sup>✓</sup> suitable

- not suitable

If applicable, heat may only be used as a secondary cure for shadowed areas after the product has been cured with UV.

UV-curing (Hoenle Discharge lamp, 320-390nm)			
Intensity [mW/cm²]*	Layer thickness [mm] Time [sec]		
60	0.5	30	

<sup>\*</sup>measured by Hoenle UV-Meter 3.0 / UV-A F0

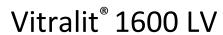
LED-curing (Hoenle LED Spot 100, 365nm)			
Intensity [mW/cm²]**	Layer thickness [mm]	Time [sec]	
400	0.5	20	

<sup>\*\*</sup>measured by Hoenle UV-Meter 3.0 / LED F2

Secondary heat cure	[min]
Time at 105°C	30

To obtain full cure at least one substrate must be transparent to the recommended wavelength. The curing speed depends on the wavelength spectrum of the light source, the intensity of light, the distance to the light source, the component geometry and the amount of adhesive. The final strength is reached after 24 hours.

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Resin         Epoxid           Appearance         Grey           Filler         Quartz           Filler - weight [%]         52           Particle size D95 [µm]         32           Uncured Material           Viscosity [mPas] (Brookfield LVT, 25 °C, Sp. 4/30 rpm)         5,000 − 6,000           Viscosity [mPas] (Kinexus Rheometer, 25 °C, 10s²)         3,000 − 5,000           PE-Norm 064         >1.1           Density [g/cm³]         1.4 − 1.6           PE-Norm 064         >1.1           Density [g/cm³]         1.4 − 1.6           PE-Norm 064         >1.0           Density [g/cm³]         1.4 − 1.6           PE-Norm 064         >1.0           PE-Norm 065         1.0           Refractive index [nD20]         1.4936           PE-Norm 065         83 − 93           PE-Norm 069         83 − 93           PE-Norm 069         40 − 180           PE-Norm 069         150 − 180           PE-Norm 061         <1	Technical Data	
Appearance Filler		
Filler	Resin	Epoxid
Filler - weight [%]   52     Particle size D95 [µm]   322     Uncured Material     Viscosity [mPas] (Brookfield LVT, 25 °C, Sp. 4/30 rpm)   5,000 – 6,000     PE-Norm 001   5,000 – 6,000     Viscosity [mPas] (Kinexus Rheometer, 25 °C, 10s ¹)   3,000 – 5,000     PE-Norm 064   5,11     Density [g/cm³]   14 – 1.6     PE-Norm 064   14 – 1.6     Flash point [°C]   5100     PE-Norm 050   14,936     Working time [h]   8     Proom temperature     PE-Norm 018   3 – 93     Working time [h]   8     Proom temperature resistance [°C]   40 – 180     PE-Norm 035   3 – 40     Water absorption [%]   <1     PE-Norm 016   150 – 180     Glass transition temperature - DSC [°C]   150 – 180     PE-Norm 017   150 – 180     PE-Norm 017   120 – 200     PE-Norm 017   150 – 180     PE-Norm 017   150 – 180     PE-Norm 018   120 – 200     PE-Norm 019   120 – 200     PE-Norm 019   120 – 200     PE-Norm 062   1 – 4     PE-Norm 063   1 – 4     PE-Norm 064   1 – 4     PE-Norm 065   1 – 4     PE-Norm 065   1 – 4     PE-Norm 065   1 – 4     PE-Norm 064   1 – 4     PE-Norm 065   1 – 4     PE-Norm 065   1 – 4     PE-Norm 065   1 – 4     Dielectric strength [kV/mm]   30 – 40     PE-Norm 061   1 – 4     PE-Norm 064   1 – 4     PE-Norm 065   1 – 4     Dielectric strength [kV/mm]   30 – 40     PE-Norm 065   1 – 4     Dielectric strength [kV/mm]   30 – 40     PE-Norm 065   1 – 4     PE-Norm 06	Appearance	Grey
Particle size D95 [µm]         32           Uncured Material         Viscosity [mPas] (Brookfield LVT, 25 °C, Sp. 4/30 rpm)         5,000 − 6,000           Viscosity [mPas] (Kinexus Rheometer, 25 °C, 10s¹)         3,000 − 5,000           PE-Norm 064         3,000 − 5,000           Thixotropic index [1/10]         >1.1           PE-Norm 064         1.4 − 1.6           Density [g/cm³]         1.4 − 1.6           Flash point [°C]         >100           Refractive index [nD20]         1.4936           Working time [h]         8           Ø room temperature         8           Cured Material         8           Hardness shore D         83 − 93           PE-Norm 059         40 − 180           Shrinkage [%]         <1	Filler	Quartz
Uncured Material	Filler - weight [%]	52
Viscosity [mPas] (Brookfield LVT, 25 °C, Sp. 4/30 rpm)         5,000 – 6,000           PE-Norm 001         3,000 – 5,000           Viscosity [mPas] (Kinexus Rheometer, 25 °C, 10s ¹)         3,000 – 5,000           PE-Norm 064         \$1.0           Thixotropic index [1/10]         >1.1           PE-Norm 064         1.4 – 1.6           PENorm 064         1.4 – 1.6           PENorm 064         1.4 – 1.6           Flash point [°C]         >100           PE-Norm 004         1.4936           Refractive index [nD20]         1.4936           Working time [h]         8           @ room temperature         8           Cured Material         83 – 93           Hardness shore D         83 – 93           PE-Norm 006         83 – 93           Shrinkage [%]         <1	Particle size D95 [μm]	32
Viscosity [mPas] (Brookfield LVT, 25 °C, Sp. 4/30 rpm)         5,000 – 6,000           PE-Norm 001         3,000 – 5,000           Viscosity [mPas] (Kinexus Rheometer, 25 °C, 10s ¹)         3,000 – 5,000           PE-Norm 064         \$1.0           Thixotropic index [1/10]         >1.1           PE-Norm 064         1.4 – 1.6           PENorm 064         1.4 – 1.6           PENorm 064         1.4 – 1.6           Flash point [°C]         >100           PE-Norm 004         1.4936           Refractive index [nD20]         1.4936           Working time [h]         8           @ room temperature         8           Cured Material         83 – 93           Hardness shore D         83 – 93           PE-Norm 006         83 – 93           Shrinkage [%]         <1           PE-Norm 019         <1           Water absorption [%]         <1           PE-Norm 016         <1           Glass transition temperature - DSC [°C]         150 – 180           PE-Norm 017         <40           Coefficient of thermal expansion [ppm/K] above Tg         120 – 200           PE-Norm 027         <40           Thermal conductivity [W/m*K]         <1           PE	Lineure d Meterial	
PE-Norm 001         3,000 = 0,000           Viscosity [mPas] (Kinexus Rheometer, 25 °C, 10s¹)         3,000 = 5,000           PE-Norm 064         >1.1           Density [g/cm³]         1.4 = 1.6           PE-Norm 004         1.4 = 1.6           Flash point [°C]         >100           PE-Norm 050         1.4936           Refractive index [nD20]         1.4936           PE-Norm 018         8           Working time [h]         8           Ø room temperature         8           Cured Material         8           Hardness shore D         83 - 93           PE-Norm 006         83 - 93           PE-Norm 009         -40 - 180           Shrinkage [%]         <1		
Viscosity [mPas] (Kinexus Rheometer, 25 °C, 10s¹)         3,000 − 5,000           PE-Norm 064         >1.1           Thixotropic index [1/10]         >1.1           PE-Norm 064         1.4 − 1.6           Density [g/cm³]         1.4 − 1.6           PE-Norm 004         1.40           Flash point [°C]         >100           PE-Norm 050         1.4936           Working time [h]         8           @ room temperature         8           Cured Material         1.4936           Hardness shore D         83 − 93           PE-Norm 006         83 − 93           Temperature resistance [°C]         -40 − 180           PE-Norm 059         3.40 − 180           Shrinkage [%]         <1		5,000 – 6,000
### PE-Norm 064  Thixotropic index [1/10]  ### PE-Norm 064  Density [g/cm³]  ### PE-Norm 064  PE-Norm 064  PE-Norm 064  1.4 – 1.6  ### PE-Norm 064  Refractive index [nD20]  ### PE-Norm 050  Refractive index [nD20]  ### PE-Norm 018  Working time [h]  ### Room temperature    Cured Material   Hardness shore D   ### PE-Norm 056  Temperature resistance [°C]   ### PE-Norm 056  ### PE-Norm 057  ### Shrinkage [%]   ### PE-Norm 051  Water absorption [%]   ### PE-Norm 059  Glass transition temperature - DSC [°C]   ### PE-Norm 069  Coefficient of thermal expansion [ppm/K] below Tg   ### PE-Norm 017  Thermal conductivity [W/m*K]   ### PE-Norm 052  Thermal conductivity [W/m*K]   ### PE-Norm 054  Dielectric constant [10kHz]   ### PE-Norm 054  Dielectric strength [kV/mm]		
Thixotropic index [1/10]		3,000 – 5,000
PE-Norm 064         91.1           Density [g/cm³]         1.4 − 1.6           PE-Norm 004         1.4 − 1.6           Flash point [°C]         >100           PE-Norm 050         1.4936           Working time [n]         8           @ room temperature         8           Cured Material         4           Hardness shore D         83 − 93           PE-Norm 006         40 − 180           Temperature resistance [°C]         40 − 180           PE-Norm 039         <1		
Density [g/cm³]         1.4−1.6           FE-Norm 004         >100           Flash point [°C]         >100           Refractive index [nD20]         1.4936           Working time [h]         8           @ room temperature         8           Cured Material         ***           Hardness shore D         83 − 93           FE-Norm 006         83 − 93           Temperature resistance [°C]         -40 − 180           PE-Norm 059         ****           Shrinkage [%]         <1		>1.1
FE-Norm 004         1.4 - 1.0           Flash point [°C]         >100           PE-Norm 050         1.4936           Refractive index [nD20]         1.4936           PE-Norm 018         8           Working time [h]         8           @ room temperature         8           Cured Material         4           Hardness shore D         83 - 93           PE-Norm 006         -40 - 180           Temperature resistance [°C]         -40 - 180           PE-Norm 059         -40 - 180           Shrinkage [%]         <1		
PE-Norm 050       \$100         Refractive index [nD20]       1.4936         PE-Norm 018       8         Working time [h]       8         © room temperature       8         Langle [M]       83 – 93         PE-Norm 006       83 – 93         Temperature resistance [°C]       -40 – 180         PE-Norm 059          Shrinkage [%]       <1		1.4 – 1.6
### PE-Norm 050  Refractive index [nD20]  ### PE-Norm 018  Working time [h]  ### room temperature    Cured Material   Hardness shore D   PE-Norm 006   Refractive index [nD20]   PE-Norm 006   Refractive index [nD20]   PE-Norm 006   Refractive index [nD20]   Refractive index [nD	Flash point [°C]	>100
Working time [h] @ room temperature  Cured Material  Hardness shore D PE-Norm 006  Temperature resistance [°C] PE-Norm 059  Shrinkage [%] PE-Norm 031  Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] In 4	PE-Norm 050	>100
Working time [h]  @ room temperature    Bardness shore D	Refractive index [nD20]	1 /1036
© room temperature  Cured Material  Hardness shore D PE-Norm 006  Temperature resistance [°C] PE-Norm 059  Shrinkage [%] PE-Norm 031  Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Dielectric constant [10kHz] IEC 63631-2-1  Dielectric strength [kV/mm]		1.4330
Cured Material Hardness shore D PE-Norm 006  Temperature resistance [°C] PE-Norm 059 Shrinkage [%] PE-Norm 031  Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009 Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017 Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062 Thermal conductivity [W/m*K] PE-Norm 054 Dielectric constant [10kHz] IEC 63631-2-1 Dielectric strength [kV/mm]		8
Hardness shore D PE-Norm 006  Temperature resistance [°C] PE-Norm 059  Shrinkage [%] PE-Norm 031  Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] Dielectric strength [kV/mm]	@ room temperature	
Hardness shore D PE-Norm 006  Temperature resistance [°C] PE-Norm 059  Shrinkage [%] PE-Norm 031  Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] Dielectric strength [kV/mm]	Cured Material	
PE-Norm 006  Temperature resistance [°C] PE-Norm 059  Shrinkage [%] PE-Norm 031  Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] IEC 63631-2-1  Dielectric strength [kV/mm]		
Shrinkage [%] PE-Norm 031  Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] IEC 63631-2-1  Dielectric strength [kV/mm]		83 – 93
Shrinkage [%]  PE-Norm 031  Water absorption [%]  PE-Norm 016  Glass transition temperature - DSC [°C]  PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg  PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg  PE-Norm 017  Thermal conductivity [W/m*K]  PE-Norm 062  Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  Dielectric strength [kV/mm]  30 – 40	Temperature resistance [°C]	40 190
Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] Dielectric strength [kV/mm]  30 – 40	PE-Norm 059	-40 – 180
Water absorption [%] PE-Norm 016  Glass transition temperature - DSC [°C] PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] Dielectric strength [kV/mm]	Shrinkage [%]	<1
Glass transition temperature - DSC [°C]  PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg  PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg  PE-Norm 017  Thermal conductivity [W/m*K]  PE-Norm 062  Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  Dielectric strength [kV/mm]	PE-Norm 031	~1
Glass transition temperature - DSC [°C]  PE-Norm 009  Coefficient of thermal expansion [ppm/K] below Tg  PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg  PE-Norm 017  Thermal conductivity [W/m*K]  PE-Norm 062  Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  Dielectric strength [kV/mm]	,	<1
Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] IEC 63631-2-1  Dielectric strength [kV/mm]	PE-Norm 016	1.2
Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] IEC 63631-2-1  Dielectric strength [kV/mm]	Glass transition temperature - DSC [°C]	
Coefficient of thermal expansion [ppm/K] below Tg PE-Norm 017  Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] IEC 63631-2-1  Dielectric strength [kV/mm]	·	150 – 180
Coefficient of thermal expansion [ppm/K] above Tg PE-Norm 017  Thermal conductivity [W/m*K] PE-Norm 062  Thermal conductivity [W/m*K] PE-Norm 054  Dielectric constant [10kHz] IEC 63631-2-1  Dielectric strength [kV/mm]		-10
Thermal conductivity [W/m*K]  PE-Norm 062  Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  IEC 63631-2-1  Dielectric strength [kV/mm]	, .,, .,	<40
Thermal conductivity [W/m*K]  PE-Norm 062  Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  IEC 63631-2-1  Dielectric strength [kV/mm]	Coefficient of thermal expansion [ppm/K] above Tg	120, 200
Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  IEC 63631-2-1  Dielectric strength [kV/mm]	PE-Norm 017	120 – 200
Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  IEC 63631-2-1  Dielectric strength [kV/mm]	Thermal conductivity [W//m*Y]	
Thermal conductivity [W/m*K]  PE-Norm 054  Dielectric constant [10kHz]  IEC 63631-2-1  Dielectric strength [kV/mm]  30 – 40		<1
PE-Norm 054  Dielectric constant [10kHz] 1 - 4  IEC 63631-2-1  Dielectric strength [kV/mm] 30 - 40		
Dielectric constant [10kHz] 1 - 4  Dielectric strength [kV/mm] 30 - 40		<2
IEC 63631-2-1 Dielectric strength [kV/mm]		
Dielectric strength [kV/mm] 30 – 40		1 – 4
30 – 40		20 40
DIT LIT VOLTO	DIN EN 60243	30 – 40

# **Technical Datasheet**

### Vitralit® 1600 LV



Young's modulus – Tensile test [MPa] 60mW/cm², 30sec, Fe spectra + 30min, 105°C PE-Norm 056	7,900 – 8,500
Tensile strength [MPa] 60mW/cm², 30sec, Fe spectra + 30min, 105°C PE-Norm 014	35 – 40
Elongation at break [%] 60mW/cm², 30sec, Fe spectra + 30min, 105°C PE-Norm 014	<1

#### **Transport/Storage/Shelf Life**

Package type	Transport	Storage	Shelf life*
Syringe/Cartridge	-20°C	-20°C	At delivery min. 6 months max. 12 months
Other packages	0°C – 10°C		

<sup>\*</sup>Store in original, unopened containers!

#### **Instructions for use**

#### **Surface preparation**

The surfaces to be bonded should be free of dust, oil, grease, mold release, or other contaminants in order to obtain an optimal and reproducible bond. For cleaning we recommend the cleaner IP® from Panacol, or a solution of Isopropyl Alcohol at 90% or higher concentration. Substrates with low surface energy (e.g. polyethylene, polypropylene) must be pretreated in order to achieve sufficient adhesion.

#### **Application**

Our products are supplied ready to use. Depending on the packaging, our adhesives may be dispensed by hand directly from the package, or they can be applied using dispensing systems and automation that is compatible with light-curable adhesive chemistry. Vitralit adhesives can begin to cure slowly in daylight and with longer term exposure under indoor lighting. We therefore recommend that adhesive exposure to ambient light must be kept to a minimum. Fluid lines and dispense tips must be 100% light blocking. For assistance with dispensing options, please contact our Application Engineering department. Adhesive and substrate should not be cold for proper bonding. They must be allowed to warm to room temperature prior to processing. After dispensing the adhesive, bonding of the parts should be done promptly. It is recommended that curing stations be equipped with air exhaust systems to evacuate vapors and heat generated during the curing process. After curing, the adhesive must be allowed to cool to ambient temperature before testing the product's performance. For safety information refer to our Material Safety Data Sheet (MSDS).

# **Technical Datasheet** Vitralit® 1600 LV



#### **Storage**

This is light sensitive material. Containers must remain covered when not in use. Minimize exposure of uncured material to daylight, artificial light, and UV light during storage and handling. Store uncured product in its original, closed container in a dry location. Any material removed from the original container must not be returned to the container as it could be contaminated. Panacol cannot assume responsibility for products that were improperly stored, contaminated, or repackaged into other containers.

#### Handling and Clean-up

For safe handling information, consult this product's Material Safety Data Sheet (MSDS) prior to use. Uncured material may be wiped away from surfaces with organic solvents. Do not use solvents to remove material from eyes or skin!

#### Disclaimer

The product is free of heavy metals, PFOS and Phthalates and is conform to the current EU-Directive RoHS.

# THE VALUES NOTED IN THIS TECHNICAL DATA SHEET ARE TYPICAL PROPERTIES AND ARE NOT MEANT TO BE USED AS PRODUCT SPECIFICATIONS.

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