ELPECAST®
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TR TECHNICAL REPORT

Casting compounds of the series Wepuran VT 3402 KK

Owing to their extremely high transparency the casting compounds of the series **Wepuran VT 3402 KK** are used in lighting electronics/LED technology and sensor technology, especially in applications where highest demands are placed on optical properties, for example for the potting/encapsulating of LEDs or optical sensors.

The casting compounds of the series **Wepuran VT 3402 KK** protect and insulate electronic components against extreme climatic influence and aggressive media as well as against mechanical attacks.

- Base: Polyurethane resin (UR)
- colourless, highly transparent and crystal-clear
- mercury-free
- very good weather resistance, outstanding UV light stability, good thermal resistance
- operating temperature range **-65 to at least +90 °C [-85 to at least 194 °F]**
- very high optical transparency with low optical damping
- very good adhesion to almost all materials
- high mechanical stability, thus very good protection against shock, impact and vibration
- resistant against water, moisture, condensate and numerous chemicals, bases, acids and oils
- UL approval according to UL 94 for VT 3402 KK-NV, VT 3402 KK-NV-UVP, VT 3402 KK-NV-SV-HB and VT 3402 OPAL: flame class HB (UL File No.E99285)
- additional UL approval for VT 3402 KK-NV and VT 3402 OPAL according to UL 746C with f1 (material is resistant to UV radiation, moisture, underwater conditions and extreme temperatures)
- VT 3402 OPAL creates homogeneous light thanks to its light-diffusing properties, so that individual LED light points are no longer visible
- VT 3402 OPAL significantly reduces the colour temperature shift of LEDs that occurs with transparent casting compounds
- with the help of the hazing paste **TP 3492** an even light diffusion can be achieved in the potting of light sources. The degree of haziness depends on the mixing ratio

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Selection chart: Casting compounds of the series Wepuran VT 3402 KK

	VT 3402 KK-NV	VT 3402 KK-NV-LT	VT 3402 KK-NV-SV-HB	VT 3402 KK-NV-UVP	VT 3402 OPAL
low viscosity, easy flow	●	●	●	●	●
easy processing	●	●	●	●	●
processing time	●	●	●	●	●
low heat development when cured	●	●	●	●	●
electric insulation and climatic resistance	●	●	●	●	●
suitable for flex strips	●	●	●	●	●
homogeneous light diffusion	—	—	—	—	●
outdoor use	●	●	●	●	●
underwater use	●	●	●	●	●
adhesion	●	●	●	●	●
adhesion on aluminium	●	●	●	●	●
hardly flammable (horizontal burning – HB)	●	●	●	●	●
flame class UL 94 HB	●	—	●	●	●
UV resistance	●	●	●	●	●
protection of base material against UV loads	—	—	●	●	—
thermal resistance / yellowing resistance under thermal load	●	●	●	●	●

● very well suited, very easy, high
● well suited, easy, average
● moderately suited, low
— not suited, not recommended

Please note that the information above is given as a non-binding recommendation. The suitability of a casting compound for a specific application may depend on different parameters such as the substrate condition, later exposure to loads other than those stated above etc.

Owing to excessive heat generation by power LEDs, the casting compounds of the series **Wepuran VT 3402 KK** are not suitable for coating this type of LEDs. Please follow the recommendations of your LED manufacturer with regard to the compatibility between different media / materials and verify the suitability by performing your own trials.

As with all polymers, temperature > 40 °C [104 °F] and high humidity (RH > 70 %) may cause hydrolytic degradation of polymers which may lead to discolouring, softening and stickiness or even dissolution. For this reason, the casting compounds of the series **Wepuran VT 3402 KK** are not suitable for applications in saunas and steam baths. As an alternative, one can use **Wepesil** casting compounds based on silicone (SR).

Characteristics

	Colour/ appear-ance	**Viscosity* at 20 °C** DIN EN ISO 3219 Component A Hardener (comp. B) Mixture	**Density at 20 °C** DIN EN ISO 2811-1 Component A Hardener (comp. B) Mixture	**Pot life of mixture** at 19-21 °C based on DIN EN 14022 approx. 200 mL double / tenfold viscosity
VT 3402 KK-NV	colourless, clear	1400 ± 500 mPas 400 ± 100 mPas 1100 ± 300 mPas	1.09 ± 0.05 g/cm³ 1.09 ± 0.05 g/cm³ 1.09 ± 0.05 g/cm³	approx. 50 / 55 min
VT 3402 KK-NV-LT	colourless, clear	1500 ± 300 mPas 400 ± 100 mPas 1000 ± 300 mPas	1.09 ± 0.05 g/cm³ 1.09 ± 0.05 g/cm³ 1.09 ± 0.05 g/cm³	approx. 2 h / 5 h
VT 3402 KK-NV-SV-HB	colourless, klar	1100 ± 300 mPas 1200 ± 300 mPas 1300 ± 300 mPas	1.06 ± 0.05 g/cm³ 1.17 ± 0.05 g/cm³ 1.13 ± 0.05 g/cm³	approx. 75 / 110 min
VT 3402 KK-NV-UVP	colourless, clear	1600 ± 300 mPas 400 ± 100 mPas 900 ± 300 mPas	1.09 ± 0.05 g/cm³ 1.09 ± 0.05 g/cm³ 1.09 ± 0.05 g/cm³	approx. 50 / 55 min
VT 3402 OPAL	colourless, milky	1400 ± 500 mPas 400 ± 100 mPas 1100 ± 300 mPas	1,09 ± 0,05 g/ cm³ 1,09 ± 0,05 g/ cm³ 1,09 ± 0,05 g/ cm³	approx. 50 / 55 min
TP 3492 LS	colourless, milky	54000 ± 6000 mPas**	1.48 ± 0.05 g/cm³	pot life corresponds approximately to the pot life of the casting compound used

* Rotational viscometer from Thermo Fisher Scientific, C 35/1°, D = 100 s^{-1}, www.thermofisher.com

** Rotational viscometer from Thermo Fisher Scientific, C 20/1°, D = 50 s^{-1}

Indices:
KK = crystal-clear
LS = light-diffusing
LT = long pot life
NV = low viscosity
OPAL = light-diffusing
SV-HB = self-extinguishing in horizontal burning test (UL 94 HB)
TP = hazing paste
UVP = UV-protection
VT = casting compound, transparent

Physical and mechanical properties

These properties are reached after 14 days storage at room temperature (18–23 °C [64.4–73.4 °F]).

Property	**Test-method**	**VT 3402 KK-NV VT 3402 KK-NV-LT VT 3402 KK-NV-UVP VT 3402 OPAL**	**VT 3402 KK-NV-SV-HB**
Refractive index nTM	Monochromatic light (633 nm)	≈ 1.50	—
Double refraction		< 4 x 10^{-4}	—
Shore-A hardness	ISO 48-4	60-80	60-80

Property	Test-method	VT 3402 KK-NV VT 3402 KK-NV-LT VT 3402 KK-NV-UVP VT 3402 OPAL	VT 3402 KK-NV-SV-HB
Water absorption	DIN EN ISO 62 24 h/23 °C	≈ 1 %	≈ 0.3 %
Hydrolytic resistance	500 h, 85 °C [185 °F], 85 % RH	passed	passed
	500 h, 100 °C [212 °F], 100 % RH	passed	—
Thermal cycling test	150 cycles 15 min/-40 °C [-40 °F] 15 min/+85 °C [185 °F]	passed	passed
Temperature shock*	based on IPC-TM-650, 2.6.71. -65 to +125 °C [-85 to 257 °F]	passed	passed
Glass transition temperature Tg	TMA	≈ -10 °C	≈ 0 °C
Coefficient of thermal expansion CTE	TMA < Tg / > Tg	≈ 120 / 210 ppm/°C	≈ 90 / 220 ppm/°C
Thermal class	in acc. with DIN IEC 60 085	Y = 90 °C	Y = 90 °C
Temperature index* (TI) in acc. with DIN EN 60216 (IEC 60216), as of 2001	Mass loss after 5000 h: 5 % 10% 20 % 50 %	 ≥ 110 °C ≥ 120 °C ≥ 140 °C ≥ 150 °C	 ≥ 110 °C ≥ 120 °C ≥ 135 °C ≥ 155 °C
	Mass loss after 20000 h: 5 % 10% 20 % 50 %	 ≥ 90 °C ≥ 100 °C ≥ 115 °C ≥ 125 °C	 ≥ 80 °C ≥ 95 °C ≥ 110 °C ≥ 125 °C

* can be used in a temperature range of -65 up to at least +90 °C [-85 up to at least 194 °F]. Both at the lower and upper ends of this range the performance and reliability of the material can be negatively affected in some applications. In these cases, additional pre-trials and tests are required.

Electrical properties

These properties are reached after 14 days storage at room temperature (18–23 °C [64.4–73.4 °F]).

Property	Test method	VT 3402 KK-NV VT 3402 KK-NV-LT VT 3402 KK-NV-UVP VT 3402 OPAL	VT 3402 KK-NV-SV-HB
Dielectric strength	IPC-TM-650, 2.5.6.1	≥ 50 kV/mm	≥30 kV/mm
Surface resistance	DIN EN 62631-3-2	≥ 2 x 10^{14} Ohm	≥ 2 x 10^{14} Ohm
Specific volume resistance	DIN EN 62631-3-1	≥ 2.0 x 10^{12} Ohm x cm	≥ 2.0 x 10^{11} Ohm x cm
Comparative tracking index (CTI, tracking resistance)	DIN EN 60 112	CTI ≥ 600	

Optical properties

Extensive data on transmission and colorimetry, as well as photos on the yellowing behaviour of various casting resins at different temperatures and over certain period of times are included in the Technical Information sheet TI 15/19 “Optical properties under long-term high temperature exposure of ELPECAST® casting compounds of the series Wepuran VT 3402 KK and Wepesil VT 3602 KK”.

Additional tests

Please note that adjustments differing from the ones tested here may give slightly different results.

Property	Test method	VT 3402 KK-NV
Water immersion	UNI EN ISO 2812 part 1 method 1 250 h, 25 °C	≈ 0.62 %
Impact test	F350 NF F 19-201 direct impact (1000 g x 20 cm)	passed no cracking
Stone chipping	ASTM D 3160 ASTM D 3170 ≤ 7B	passed
Resistance to liquid chemicals	UNI EN ISO 2812 part 1 method 2 8.5 % HCl 240 h, 20 °C [68 °F] 20 % NaOH 240 h, 20 °C [68 °F]	passed: no adsorption, change or softening
Heat resistance	MS CG-12 500 h, 80 °C [176 °F]	passed: no deforming, colour change or softening
High temperature resistance	GM 6073 1 h, 93 °C [199.4 °F]	passed: no deforming, colour change or softening
Solvents resistance	UNI EN ISO 2812, isopropyl alcohol 48h,20°C [68 °F]	change of mass ≈ 5.12 %
QUV test	ISO 16474, 1000 h	passed

Tests performed on LED strips (PVC and aluminium)

Property	Test method	VT 3402 KK-NV
Neutral salt spray test	ISO 7253, 1500 h; NaCl 50 ± 5 g/l in demineralised water; electrical conductivity < 20 µs/cm	passed: no cracking, blistering or water adsorption
Resistance to humid heat	UNI EN ISO 6270 1500 h at 50 °C/95 % RH	passed: no cracking, blistering, softening, gloss variation or water adsorption
Resistance to liquid chemicals	UNI EN ISO 2812, part 1 method 2 8.5% HCl, 240 h, 20 °C [68 °F] 20% NaOH, 240 h, 20 °C [68 °F]	passed: no deforming, colour change or softening
Resistance to chlorinated water (swimming pool)	swimming pool water (5 ppm NaClO), approx. pH 7	passed: no deforming, colour change or softening (only tested on PVC)

Processing

	Please read this technical report and the publications listed below carefully before using the product. These sheets are enclosed with the first shipment of product or sample.
MSDS	The corresponding material safety data sheet contains detailed information and characteristics on safety precautions, environmental protection, transport, storage, handling and waste disposal.
AI	Application information AI 3/1 “Processing instructions for the casting compounds of the series Wepuran VT 3402 KK“
TI	Technical information TI 15/2 ”Selection criteria and processing instructions for casting compounds”
TI	Technical information TI 15/3 ”Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents”
TI	Technical information TI 15/10 “Processing of 2-pack systems“

Since the many different permutations make it impossible to evaluate the whole spectrum (parameters, reactions with materials used, chemical processes and machines) of processes and subsequent processes in all their variations, the parameters we recommend are to be viewed as guidelines only that were determined in laboratory conditions. We advise you to determine the exact process limitations within your production environment, in particular as regards compatibility with your specific follow-up processes, in order to ensure a stable fabrication process and products of the highest possible quality.

The specified product data is based upon standard processing conditions/test conditions of the mentioned norms and must be verified if necessary while observing suitable test conditions on processed products.

Feel free to contact our application technology department (ATD) if you have any questions or for a consultation.

Mixing

	Parts by weight Comp. A : hardener (comp. B)
VT 3402 KK-NV VT 3402 KK-NV-LT VT 3402 KK-NV-UVP VT 3402 OPAL	1 : 1
VT 3402 KK-NV-SV-HB	4 : 7
TP 3492 LS	see AI 3/1

Auxiliary products recommended

- ELPESPEC® accelerator B 4402
  reduces the curing time and the processing time, thus to be applied preferably with mixing and dosing units; stirred into component A prior to processing the casting compound
- ELPESPEC® sealing mastic EH 13.271
  solvent-free paste for sealing jobs in electronics and electrical engineering, self-adhesive and permelastic
- ELPESPEC® mould release agent EH 13.650
  solvent-, silicone- and grease-free, for pre-treating the surfaces of parts to be potted; after curing, the potting can be easily removed from the mould without residue
- ELPECAST® Adhesion Promoter AP 4 LED
  good wetting performance even on critical base materials, e. g. silicone surfaces of LEDs; available for brushing or spraying
- ELPESPEC® adhesion promoters EH 13.950/EH 13.951
  for improving the adhesion; **EH 13.950** is applied thinly to the parts that will come into contact with the casting compound while **EH 13.951** is mixed thoroughly with the casting compound prior to potting
- ELPESPEC® cleaning agent R 13.780
  for the cleaning of work place and tools; cleaning should be effected immediately after processing as cleaning becomes increasingly difficult the further the curing process progresses and is impossible after final curing

Drying/curing

The following specifications for a quantity of 25 g serve as a guideline:

		Room temperature (18-23 °C)	80 °C [176 °F]
VT 3402 KK-NV VT 3402 KK-NV-SV-HB VT 3402 KK-NV-UVP VT 3402 OPAL	tack-free	24 h	1 h
	cured	14 days	2 h
VT 3402 KK-NV-LT	tack-free	24–48 h	4 h
	cured	14 days	8 h

The accelerator **B 4402** is recommended if a faster curing is required (see item “Auxiliary Products recommended”). Curing at higher temperatures may lead to yellowing of the casting compound.

Packaging

The packing units available are indicated in our offer which we will send you upon request.

Shelf life and storage conditions

Shelf life: In sealed original containers at least:
VT 3402 KK-NV, VT 3402 KK-NV-LT, VT 3402 KK-NV-UVP
and VT 3402 OPAL: 9 months
VT 3402 KK-NV-SV-HB and TP 3492 LS: 6 months

Storage conditions: +5 °C to +25 °C [+41 °F to +77 °F]

Protect against humidity

Protect against frost

For warehousing reasons, isolated cases may occur where the shelf life upon shipment is less than the shelf life indicated in this technical report. However, it is ensured that our products have **at least** two-thirds of their shelf life remaining when they leave our company. Labels on containers show shelf life and storage conditions.

Disclaimer

All descriptions and images of our goods and products contained in our technical literature, catalogues, flyers, circular letters, advertisements, price lists, websites, data sheets and brochures, and in particular the information given in this literature are non-binding unless expressly stated otherwise in the Agreement. This shall also include the property rights of third parties if applicable.

The products are exclusively intended for the applications indicated in the corresponding technical data sheets. The advisory service does not exempt you from performing your own assessments, in particular as regards their suitability for the applications intended. The application, use and processing of our products and of the products manufactured by you based on the advice given by our Application Technology Department are beyond our control and thus entirely your responsibility. The sale of our products is effected in accordance with our current terms of sale and delivery.

Any questions? We would be pleased to offer you advice and assistance in solving your problems. Samples and technical literature are available upon request.

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