ELPECAST®
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TR TECHNICAL REPORT

Casting compounds of the series Wepuran VU 4453

The casting compounds of the series **Wepuran VU 4453** protect and insulate electronic components and assemblies from extreme climatic influences and aggressive media, as well as from mechanical attack.

- Base: Polyurethane resin (UR) / polybutadiene
- solids content > 99 %
- highly elastic
- particularly suitable for sensitive electronic components since material tensions under thermal shocks are reduced
- low-cost alternative for silicone casting compounds
- temperature range from -65 to at least +90 °C [-85 up to 194 °F]
- very low water absorption
- good adhesion to almost all materials
- excellent protection from shock, impact and vibration
- good resistance to water, moisture, lyes, acids, and numerous chemicals
- **VU 4453/101 WR** and **VU 4443/92 WR-NV**: water-resistant adjustments for underwater applications, temperature range from -65 to at least +130 °C [-85 up to 266 °F]
- **VU 4443/92 WR-NV** fulfils the requirements of IEC 60079-0: 2017-12, section 26.10 “Resistance to UV light” (Xenon weathering test in acc. with ISO 4892-2 and subsequent Charpy impact bending strength test in acc. with ISO 179)
- **VU 4453/71 HE-T**: thixotropic adjustment for dam and fill applications / dispensing
- **VU 4453/71 HE-T** is a polyurethane glue recognised by UL in the category QOQW2 “Polymeric Adhesive Systems, Electrical Equipment – Component” (File E501223)

LP 201603 E-8 / 300703e_000

Characteristics

	Colour/ appear-ance	**Viscosity* at 20 °C [68 °F]** ISO 3219 Component A Hardener (Comp. B) mixture	**Density at 20 °C [68 °F]** ISO 2811-1 Component A Hardener (Comp. B) mixture	**Pot life of mixture** at 19-21 °C [66.2-69.8 °F] in acc. with DIN EN 14022, approx. 200 mL double/tenfold viscosity
VU 4443/41 HE-NV	black	1100 ± 200 mPas 130 ± 30 mPas 1100 ± 200 mPas	0.93 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 0.99 ± 0.05 g/cm³	≈ 25 / 55 min
VU 4443/41 HE-NV-K	black	1100 ± 200 mPas 130 ± 30 mPas 1100 ± 200 mPas	0.93 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 0.99 ± 0.05 g/cm³	— / ≈ 10 min
VU 4443/41 HE-NV-LT	black	1100 ± 200 mPas 130 ± 30 mPas 1000 ± 200 mPas	0.93 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 0.99 ± 0.05 g/cm³	≈ 40 / 110 min
VU 4453/41 HE-NV	blue	1000 ± 100 mPas 130 ± 30 mPas 1100 ± 200 mPas	0.94 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.00 ± 0.05 g/cm³	≈ 15 / 35 min
VU 4453/41 HE-NV-LT	blue	1200 ± 200 mPas 130 ± 30 mPas 1000 ± 200 mPas	0.94 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.00 ± 0.05 g/cm³	≈ 45 / 120 min
VU 4473/41 HE-NV-LT	grey	1200 ± 200 mPas 130 ± 30 mPas 1000 ± 200 mPas	0.96 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.03 ± 0.05 g/cm³	≈ 40 / 100 min
VU 4403/61 HE	grey-beige	2800 ± 300 mPas 130 ± 30 mPas 2600 ± 300 mPas	1.00 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.03 ± 0.05 g/cm³	≈ 25 / 50 min
VU 4443/61 HE	black	2700 ± 300 mPas 130 ± 30 mPas 2600 ± 300 mPas	1.00 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.03 ± 0.05 g/cm³	≈ 20 / 50 min
VU 4453/61 HE	blue	2600 ± 200 mPas 130 ± 30 mPas 2400 ± 200 mPas	1.02 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.05 ± 0.05 g/cm³	≈ 25 / 55 min
VU 4453/71 SHE	blue	2000 ± 200 mPas 130 ± 30 mPas 2000 ± 200 mPas	1.01 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.04 ± 0.05 g/cm³	≈ 30 / 70 min
VU 4443/92 WR-NV	black	5000 ± 500 mPas** 130 ± 30 mPas 4000 ± 400 mPas**	1.04 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.07 ± 0.05 g/cm	≈ 35 / 80 min
VU 4453/101 WR	blue	16000 ± 3000 mPas** 130 ± 30 mPas 12000 ± 3000 mPas**	1.06 ± 0.05 g/cm³ 1.21 ± 0.05 g/cm³ 1.07 ± 0.05 g/cm³	≈ 40 / 90 min
VU 4453/71 HE-T	blue	60000 ± 10000 mPas** 130 ± 30 mPas 60000 ± 10000 mPas**	1.27 ± 005 g/cm³ 1.21 ± 0.05 g/cm³ 1.26 ± 0.05 g/cm³	≈ 25 / min / --

* measured with Haake RS 600, C 35/1°, D = 100 s-1,
viscosity measuring unit supplied by Thermo Fisher Scientific, www.thermofisher.com

** measured with Haake RS 600, C 20/1°, D = 50 s-1

Indices: VU = casting compound, opaque, HE = highly elastic, NV = low viscosity (good flowability), K = catalysed, LT = long pot life, SHE = very highly elastic, T = thixotropic, WR = water resistant

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	VU 4443/41 HE-NV VU 4443/41 HE-NV-K VU 4443/41 HE-NV-LT VU 4453/41 HE-NV VU 4453/41 HE-NV-LT VU 4473/41 HE-NV-LT	VU 4443/41 HE-NV-K	VU 4403/61 HE VU 4443/61 HE VU 4453/61 HE	VU 4453/71 SHE	VU 4443/92 WR-NV	VU 4453/101 WR	VU 4453/71 HE-T
Shore-A hardness	ISO 7619-1 after 28 days	40-60	55-70	50-60	45-55	55-65	55-65	75-85
Water absorption	DIN EN ISO 62 (24 h/23 °C)	≈ 0.17 %		≈ 0.18 %	≈ 0.17 %	0.12 %	**≤ 0.05 %**	≈ 0.11 %
Glass transition temperature Tg	TMA	< -50 °C [-58 °F]						
Coefficient of thermal expansion CTE	TMA	≈ 200 ppm/°C > Tg			≈ 240 ppm/°C > Tg	≈ 200 ppm/°C > Tg	≈ 200 ppm/°C > Tg	≈ 150 ppm/°C > Tg
Thermal shock*	in acc. with IPC-TM-650, 2.6.7.1, -65 to +125 °C	passed						
Thermal class*	Based on DIN IEC 60 085	Y = 90 °C [194 °F]				B = 130 °C [266 °F]	B = 130 °C [266 °F]	Y = 90 °C [194 °F]
Temperature index* (TI) based on DIN EN 60216 (IEC 60216), issue 2001	25 % mass loss after 5000 h	120 °C [248 °F]				160 °C [320 °F]	170 °C [338 °F]	no value determined
	25 % mass loss after 20000 h	100 °C [212 °F]				145 °C [293 °F]	150 °C [302 °F]	no value determined

* can be used in a temperature range of -65 **up to at least +90/130 °C** [-85 up to at least 194/266 °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	VU 4443/41 HE-NV VU 443/41 HE-NV-K VU 4443/41 HE-NV-LT VU 4453/41 HE-NV VU 4453/41 HE-NV-LT VU 4473/41 HE-NV-LT	VU 4403/61 HE VU 4443/61 HE VU 4453/61 HE	VU 4453/71 SHE	VU 4443/92 WR-NV	VU 4453/101 WR	VU 4453/71 HE-T
Dielectric strength	VDE 0303, part 21 DIN EN 60 243-1	≥ 60 kV/mm	≥ 47 kV/mm	≥ 36 kV/mm	≥ 15 kV/mm	≥ 30 kV/mm	≥ 39 kV/mm
Surface resistance	VDE 0303, part 30, DIN IEC 60093	≥ 2×10^{12} Ohm					
Volume resistivity	VDE 0303, part 30 DIN IEC 60093	≥ $3{,}5 \times 10^{14}$ Ohm x cm	≥ $3{,}5 \times 10^{14}$ Ohm x cm	≥ 8×10^{14} Ohm x cm	≥ 2×10^{15} Ohm x cm	≥ 5×10^{15} Ohm x cm	≥ 6×10^{14} Ohm x cm
Tracking resistance*	DIN EN 60 112	CTI > 600*					

* CTI = Comparative Tracking Index

Dielectric properties

Lackwerke Peters largely verifies its own production range with regard to the products' dielectrical properties. Please note that the values may slightly vary depending on the adjustment.

	Frequency	23 °C [73.4 °F]	60 °C [140 °F]	90 °C [194 °F]
Loss factor tan δ acc. to VDE 0303 part 4	50 Hz 1 kHz 1 MHz	≈ 0,0201 ≈ 0,0175 ≈ 0,0201	≈ 0,0265 ≈ 0,0289 ≈ 0,0229	≈ 0,0215 ≈ 0,0211 ≈ 0,0257
Permittivity ε_r acc. to VDE 0303 part 4	50 Hz 1 kHz 1 MHz	≈ 3,14 ≈ 3,03 ≈ 2,85	≈ 3,33 ≈ 3,17 ≈ 2,88	≈ 3,28 ≈ 3,17 ≈ 2,88

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.
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"

The casting compounds of the series **VU 4453** are exceptionally sensitive with regard to processing (inhomogeneity when mixing). After inappropriate processing a film may form on the surface of the casting compound in case of unfavourable application / storage conditions.

➔ Ensure the suitability of the casting compound under its subsequent operating conditions by means of proper processing as well as preliminary trials and tests.

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.

Safety recommendations

➔ When using chemicals, the common precautions should be carefully noted.

➔ Ensure that the equipment used is in compliance with the requirements laid down in the material safety data sheet.

Wear protective gloves and safety goggles!
Avoid skin contact!
Ensure sufficient technical ventilation in the workplace.
Observe standard work hygiene measures (wash hands etc.).

Mixing

Stir before use

CAUTION: The labels on our containers indicate both the volume [L] and weight [kg]. The mixing ratio applies to the weight. Version 07/2021

	**Parts by weight Component A : Hardener (Comp. B)**
VU 4443/41 HE-NV VU 4443/41 HE-NV-K VU 4443/41 HE-NV-LT VU 4453/41 HE-NV VU 4453/41 HE-NV-LT VU 4473/41 HE-NV-LT	4 : 1
VU 4403/61 HE VU 4443/61 HE VU 4453/61 HE	6 : 1
VU 4453/71 SHE VU 4453/71 HE-T	7 : 1
VU 4443/92 WR-NV	9 : 2
VU 4453/101 WR	10 : 1

Auxiliary products recommended

- ELPESPEC® sealing mastic EH 13.271
  solvent-free paste for sealing jobs in electronics and electrical engineering, self-adhesive and permelastic

- 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® 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
- ELPESPEC® accelerator B 4400
  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® 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 [64.4–73.4 °F])	**80°C [176 °F]**	**125°C [257 °F]**
Tack-free	24 h	1 h	20 min
Cured	14 days	6 h	3.5 h

Even after heat application it may take up to 14 days, or 28 days respectively, at room temperature (see shore hardness p. 3), until the casting compounds of the series **Wepuran VU 4453** have reached the final hardness.

The casting compound **Wepuran VU 4443 HE-NV-K** cures much faster due to the catalyst, with the actual curing period depending to a large extent on the quantity of casting compound applied. Large quantities cure with strong heat and thus faster as small quantities.

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 9 months, or 6 months for **VU 4443/92 WR-NV** respectively

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


Protect against humidity


Protect hardener (component B) 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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