

Wepesil silicone-rubber casting compound

VU 4694 E

Base: organo-poly-siloxane

- **white**
- addition cross-linking, thus suitable for application in hermetically encapsulated housings
- good flowability
- high elasticity and tear resistance
- sectile, replacement of components for repair purposes possible
- particularly good thermal conductivity (approx. 0.8 W/mK)
- thermal class 200 = 200 °C [392 °F]

Indices: **VU** = casting compound, opaque
E = elastic

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Please read this technical report, the corresponding material safety data sheet and the Technical Information sheets TI 15/2, TI 15/3 and TI 15/10 (see item 4 and 7) carefully before using the product.

1. General information

The Wepesil silicone-rubber casting compound **VU 4694 E** is a white, solvent-free, addition cross-linking, 2-pack casting compound based on organo-poly-siloxane that already cures at room temperature.

All symbols that are used in this technical data sheet and on our containers, such as , are explained on our website www.peters.de in the section "Service – Technical publications – Label symbols".

2. Application

The Wepesil silicone-rubber casting compound **VU 4694 E** is electrically insulating, protects against corrosion caused by extreme environmental impacts and aggressive media as well as against mechanical attack and is temperature resistant up to 200 °C [392 °F]. It was especially developed for the electronics/electrical engineering industries and is used to encapsulate, embed or cast electronic components, assemblies and electrical equipment in order to increase their reliability and life span.

On account of its high elasticity, extremely high temperature stability up to 200° C [392° F] and very low volume and shrinkage pressure, the Wepesil silicone-rubber casting compound **VU 4694 E** is particularly suitable for high-quality, temperature- and shock-sensitive electronic components (e. g. sensors, glass diodes, ferrite cores, etc.) due to the very low heat development during curing and the fact that its elasticity in operation means that material tension resulting from temperature changes is reduced. Further application fields include:

- Components for sensor technology
- Heat sensors, heating elements, cup capacitors, mini and print transformers, cables and cable-end connections
- Magnet, ignition, induction and transformer coils
- HF parts, e.g. high frequency coils, interference filters
- Hybrid integrated circuits
- Elastic coverings for windings, particularly for the coil ends of electromotors exposed to high thermal stress (bar windings)
- Rubber elastic moulding material for various casting resins (pilot lots, prototypes, sample castings)
- Release agent for plastic foaming.

3. Special notes

The Wepesil silicone-rubber casting compound **VU 4694 E** is an addition cross-linking silicone-rubber casting compound, that can be used in hermetically encapsulated housings (when using condensation cross-linking silicone-casting compounds low molecular separation products may cause a resoftening (reversion) of the casting compound.).

The Wepesil silicone-rubber casting compound **VU 4694 E** can be used in a temperature range of -40 up to +200 °C [-40 up to 392° F], while 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.

Besides the Wepesil silicone-rubber casting compound **VU 4694 E** a whole range of casting compounds based on polyurethane resin, epoxy resin and silicone-rubber in various colour, viscosity and elasticity adjustments as well as with self-extinguishing properties (UL registered) are available. Special technical reports on these products are available on our website for download.

4. Safety recommendations

- Please read the corresponding material safety data sheet where you will find detailed specifications of safety precautions, environmental protection, waste disposal, storage, handling, transport as well as other characteristics.
- When using chemicals, the common precautions should be carefully noted.
- Please read our **Technical Information sheet TI 15/3 "Protective measures when using chemicals including lacquers, casting compounds, thinners, cleaning agents"**. On our website, the technical information sheets can be accessed in the section "Service – Technical publications".

5. Characteristics

Colour/appearance		white
Viscosity* at 20 °C [68 °F] ISO 3219	Component A VN 4694 E mixture	5,200 ± 500 mPas 30 ± 10 mPas 4,500 ± 1,000 mPas
Density at 20 °C [68 °F] ISO 2811-1	Component A VN 4694 E mixture	1.43 ± 0.05 g/cm ³ 0.97 ± 0.05 g/cm ³ 1.41 ± 0.05 g/cm ³
Pot life of mixture at 18 - 23 °C [64.4 – 73.4 °F] (set-up quantity 100 g), viscosity doubled		approx. 2 h

* measured with Haake RS 600, C 20/1°, D = 50 s⁻¹, viscosity measuring unit supplied by:
 Thermo Electron (Karlsruhe) GmbH (formerly Haake-Messtechnik GmbH + Co)
 Dieselstraße 4, 76227 Karlsruhe, Germany
 Phone +49 (0) 721 - 40 94 - 0; Fax +49 (0) 721 - 40 94 - 300
 www.thermo.com

6. Properties

The Wepesil silicone-rubber casting compound **VU 4694 E** is distinguished by the following properties:

6.1 General properties

- does not contain any substances listed in the RoHS directive 2002/95/EC, the end-of-life vehicle directive 2000/53/EC and the WEEE directive 2002/96/EC
- does not contain any substances listed in the United States' EPA 33/50 program [This program by the EPA (Environmental Protection Agency) aims for a reduction in the use of certain substances that are hazardous to the environment and health.]
- solvent-free, therefore practically no nuisance caused by smell and no attack of solvent-sensitive plastics
- good flowability, thus can also be applied to component geometries that are difficult to access
- addition cross-linking, therefore can be used in hermetically encapsulated housings (no low molecular separation products originate, which may cause a reversion)
- excellent tear resistance
- high elasticity, very low heat development and very low volume shrinkage in the curing phase, thus particularly suitable for casting sensitive components (glass diodes, sensors etc.).
- excellent temperature stability (thermal class 200 = 200 °C [392 °F] based on DIN IEC 60085)
- exceptionally good thermal conductivity (approx. 0.8 W/mK)
- extremely low inclination towards embrittlement, even at temperatures far below freezing point (down to approx. -40 °C [-40 °F])

- in case of electrical breakdowns or combustion of silicone-rubber, no conductive carbon remains but non-conductive silicon dioxide
- excellent dielectric properties: The dielectric constant and the dielectric loss factor $\tan \delta$ are virtually independent of the temperature and frequency over a wide temperature range
- good protection from shock, impact and vibration
- sectile, allowing replacement of components for repair purposes. Casting can be repeated after replacement has been completed.

6.2 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	Result
Shore-A hardness	DIN 53 505	42 ± 5
Water absorption	ISO 62 (24 h/23 °C [73.4 °F])	< 0.1 %
Thermal class	based on DIN IEC 60 085	200 = 200 °C [392 °F]
Coefficient of thermal expansion (CTE)	DIN 53752 -40 bis +180 °C [-40 to 356 °F]	approx. 250 ppm/°C

6.3 Electrical properties

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

Property	Test method	Result
Dielectric strength	VDE 0303, part 21 DIN EN 60243-1	44 kV/mm
Surface resistance	VDE 0303, part 30 DIN IEC 60093	2.0 x 10 ¹⁴ Ohm
Specific volume resistivity	VDE 0303, part 30 DIN IEC 60093	2.1 x 10 ¹⁴ Ohm x cm
Moisture and insulation resistance	IPC-TM-650, 2.6.3.4 (65 °C [149 °F]/90 % r. h.)	2.0 x 10 ¹⁰ Ohm
	85/85 test; ramp formed storage at high air moisture and high temperature, amongst others 3 days at 85 °C [185 °F] and 85 % r. h.	3.0 x 10 ⁹ Ohm
Resistance to condensation	based on ISO 6270-2 (BIAS 12 V, 40 °C [104 °F], 100% r. h.)	1.0 x 10 ¹⁰ Ohm
Comparative tracking index (CTI, tracking resistance)	DIN EN 60112	CTI > 600

7. Processing

→ Please read our **Technical Information sheet TI 15/2 "Selection criteria and processing advice for casting compounds/resins"** for more detailed information on processing. On our website, you will find the technical information sheets in the section "Service – Technical publications".



Stir component A before use



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 observing suitable test conditions on processed printed circuit boards.

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

7.1 Mixing

The two components are already packed in the correct mixing ratio. The volume of the container of component A is sufficient to accommodate the total quantity of the cross-linker **VN 4694 E** and to allow perfect mixing with component A.

→ Mix both components in the specified mixing ratio (see also item 7.4 "Manual processing"):



Component A (VU 4694 E): cross-linker (VN 4694 E) = 100 : 4 (parts by weight)

For stirring we recommend mechanical stirring equipment. For more detailed information on correct mixing please read our **Technical Information sheet TI 15/10: "Processing of 2-pack systems"**. On our website, you will find technical information sheets in the section "Service – Technical publications".



In order to avoid penetration of moisture as far as possible seal opened containers carefully after use. Use up opened containers as soon as possible.

7.2 Viscosity adjustment

The Wepesil silicone-rubber casting compound **VU 4694 E** must be processed in the condition supplied.



Do not add solvents or thinners to reduce the viscosity.

7.3 Auxiliary products

- **Grip coating G 4660**

Pre-treatment with grip coating **G 4660**, blue transparent, of the cleaned and degreased base to be potted improves adhesion of addition cross-linking Wepesil silicone-rubber casting compounds. A single application (spreading, spraying, dipping) of the grip coating **G 4660** results in a white, non-adhesive film after drying; in conjunction with the casting compound, this film creates a good adhesive bond.

- **Sealing mastic EH 13.271**

The solvent-free, self-adhesive, permelastical, easily formed and temperature resistant sealing mastic **EH 13.271** is suitable for the sealing of casting moulds and cable outlets.

- **Cleaning agent R 13.780**

For the cleaning of work place and tools we recommend the cleaning agent **R 13.780**. Cleaning should be effected immediately after processing as cleaning becomes increasingly difficult the further the curing process progresses and is impossible after final curing.



Do not use cleaning agent as a thinner or for washing hands since solvents remove the natural grease from skin.

Special technical reports on these products are available on our website for download.

7.4 Manual processing

- Choose compound quantity only as large as can be processed within the pot life (see item 5). The viscosity increases considerably during this time so that afterwards the casting compound can no longer be processed.
- While mixing, ensure that no air is stirred in since air inclusions influence the final properties of the casting compound.
- Mix component A and cross-linker VN 4694 E thoroughly.
- In order to remove any possible air inclusions, if possible evacuate the casting compound before or after potting.

7.5 Mechanical processing

When using mixing and dispensing equipment the pot life is irrelevant.

For volumetric mixing and dispensing equipment:

- Since the mixing ratio is indicated in parts by weight, the corresponding quantities to be dispensed must be converted by means of the densities. Note that the densities indicated in item 5 are valid for a temperature of 20 °C [68 °F].

Reliable manufacturers of such equipment can be named upon request.

8. Drying/Curing

Drying takes place at room temperature. Curing can be accelerated considerably by applying heat. However, when choosing the temperature, the heat-sensitivity of the item in question must be taken into account. The following specifications for a quantity of 25 g serve as a guideline:

	Room temperature (18 - 23°C [64.4 – 73.4 °F])	60 °C [140 °F]	125°C [257 °F]
Final hardness	24 h	approx. 30 min	approx. 10 min

9. Standard packaging

The Wepesil silicone-rubber casting compound **VU 4694 E** is packed for delivery as follows:

Component A	Cross-linker VN 4694 E	Selling unit
1 bucket of 10 kg	1 plastic bottle of 0.4 kg	10.4 kg

Partial lots of the selling unit may be ordered, but will entail surcharges to cover repackaging costs.

10. Shelf life and storage conditions

Labels on containers show shelf life and storage conditions.



Shelf life: In sealed original containers at least 9 months



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



Protect against humidity

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.

11. Further literature/Technical publications

In addition to the recommendations given in this technical report, we can provide technical papers and information sheets written and compiled by members of our staff. Visit our website <http://www.peters.de> and see the section "Service – Technical publications".

We also recommend for further reading:

Dr. Manfred Suppa, Publisher Werner Peters: "Conformal Coatings for Electronics Applications", 1st edition 2012, Lackwerke Peters GmbH + Co KG, ISBN 978-3-00-039856-8

12. Further products for the production of pcbs

We offer a wide range of **etch resists (photoimageable, UV curing, conventional curing), plating resists, solder resists (photoimageable, UV curing, conventional curing) as well as peelable solder masks, marking inks (photoimageable, UV curing, conventional curing), carbon-conductive inks, via hole fillers (purely thermal curing), thick film fillers, plugging pastes, heatsink pastes, special strippers for solder resists and further auxiliary products for screen printing (e. g. cleaning agents, thinners).**

Special technical reports for these products are available on our website for download.

13. Further products for electronics/electrical engineering industries

We boast a wide range of **conformal coatings, thick film lacquers, casting compounds, casting resins, electro pastes, insulating lacquers, impregnating varnishes, adhesive lacquers and auxiliary products for electronics.**

Special technical reports for these products are available on our website for download.

Any questions?

We would be pleased to offer you advice and assistance in solving your problems. Free samples and technical literature are available upon request.

The above information as well as advice given by our Application Technology Department whether in verbal or written form or during product evaluations is provided to the best of our knowledge, but must be regarded as non-binding recommendations, also with respect to possible third-party proprietary rights.

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 of our material safety data sheets and technical information sheets, and of our products 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.

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