Heraeus Kulzer
Mitsui Chemicals Group

Technovit® & Co.

Resins for materials testing

High-quality resins with reliable properties and simple handling

are the prerequisite for precise materials testing. Heraeus Kulzer has been leading in the development and production of resin products on the highest quality level for many decades.

The resins from Heraeus Kulzer meet the highest demands. They are used as embedding agents for materialographic examinations or as aids in production processes and are therefore an integral part of the daily routine in modern laboratories and production processes.

TECHNOVIT – THE RESIN WITH MANY FACES

The umbrella brand name "Technovit" is representative of a large range of resins that are a part of the most diversified technologies. The focus is on the application for material testing.

GAP-FREE EMBEDDING, TRANSPARENCY, TIME SAVING AND SIMPLE HANDLING, AS WELL AS MAXIMUM IMPRESSION ACCURACY AND FORM STABILITY

are the outstanding properties which are demanded especially in "Materialography." Heraeus Kulzer meets these requirements with the comprehensive program "Technovit & Co."

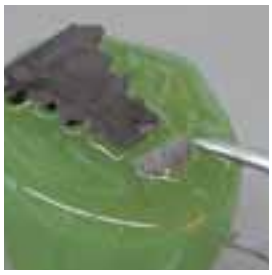
Apart from classic materialographic applications, Technovit products are used in industrial production processes, tool manufacturing, prototype production (casts, fixtures) and the restoration sector.

All Technovit products have been developed in the company's R&D labs.

WE DEVELOP TAILOR-MADE SOLUTIONS FOR YOU

Apart from our standard compounds, we also provide our know-how to develop customised products for our customers.

Technovit – mature resins which set standards in quality and processing.



Contents

Technovit® 4000 and Technovit® 4002 IQ

Opaque embedding materials – high hardness and perfect edge definition

Besides a high degree of hardness, filled cold embedding resins show extremely low shrinkage, thus enabling excellent edge definitions. This makes it the optimum embedding agent for all specimens which need to be examined in the peripheral areas. The opaque appearance allowes that individual levels can be observed under a microscope, misinterpretations through focusing into the depth are avoided.

3-component cold embedding resin

Technovit® 4000 – THE SHRINKLESS

Technovit 4000 is a fast curing, cold polymerising, three-component resin, based on modified polyester with a fine-powder inorganic filler. It is available in the form of powder, syrup I and syrup II.
Mixing ratio: 2:2:1 (powder:syrup I:syrup II).
Colour: white opaque

- For optimized edge protection and definition
- Vacuum embedding possible during pot life
- Also suitable for the embedding of specimens with porous surfaces, small fissures, blind holes or undercuts

PROPERTIES AND APPPLICATION

- Very low polymerization shrinkage and optimum edge definition
- Excellent flow behaviour
- Very good adhesion on metal surfaces. Therefore optimum edge protection and definition
- Excellent grinding and polishing properties
- Short curing time of approx. 6 to 13 minutes

Gap-free embedding resin
high hardness – low shrinkage

ORDER INFORMATION TECHNOVIT 4000

64708458 Technovit® 4000 combipack 1,
750 g powder / 500 ml syrup I / 250 ml syrup II

64708459 Technovit® 4000 Kombipack 2,
1.500 g powder / 1.000 ml syrup I / 500 ml syrup II

66032003 Technovit® 4000 powder, 1 x 1.500 g powder
64711227 Technovit® 4000 powder, 1 x 7.500 g powder

66032002 Technovit® 4000 syrup I, 1 x 1.000 ml
64711228 Technovit® 4000 syrup I, 1 x 5.000 ml

64712092 Technovit® 4000 syrup II, 1 x 500 ml
64711229 Technovit® 4000 syrup II, 1 x 2.500 ml

Technovit 4002® IQ

The absolute gap and shrink-free 2-component resin

2-component cold embedding resin

Technovit® 4002 IQ - THE GAP-FREE

Technovit 4002 IQ is based on a modified polyester consisting selectively of a fast or slow powder component (different curing and pot times) and a liquid.

RESIN ESPECIALLY FOR GAP-FREE EMBEDDING WITHOUT SHRINKAGE

The application areas cover the full material range with the most diverse geometric shapes where top quality as regards margin fit, grinding and polishing are required.

2 POWDER COMPONENTS

For an even larger implementation range

- **Technovit 4002 IQ white (slow powder approx. 12 - 17 min.)** offers adequate pot time, e.g. to infiltrate porous surfaces.
- **Technovit 4002 IQ green (faster powder approx. 9 - 15 min.)** serves more rational specimen preparation and saves time.

SIMPLE APPLICATION

Both powder varieties are easy to moisten, creating a homogenous mass without air pockets.

PROPERTIES AND APPLICATION

- Gap-free embedding
- No polymerization shrinkage
- Excellent edge definition
- Excellent grinding and polishing properties
- Simple handling
- Less thermal stress compared to other customary embedding resins
- Extremely fine powder components – very good mould filling behaviour
- Various curing times selectable

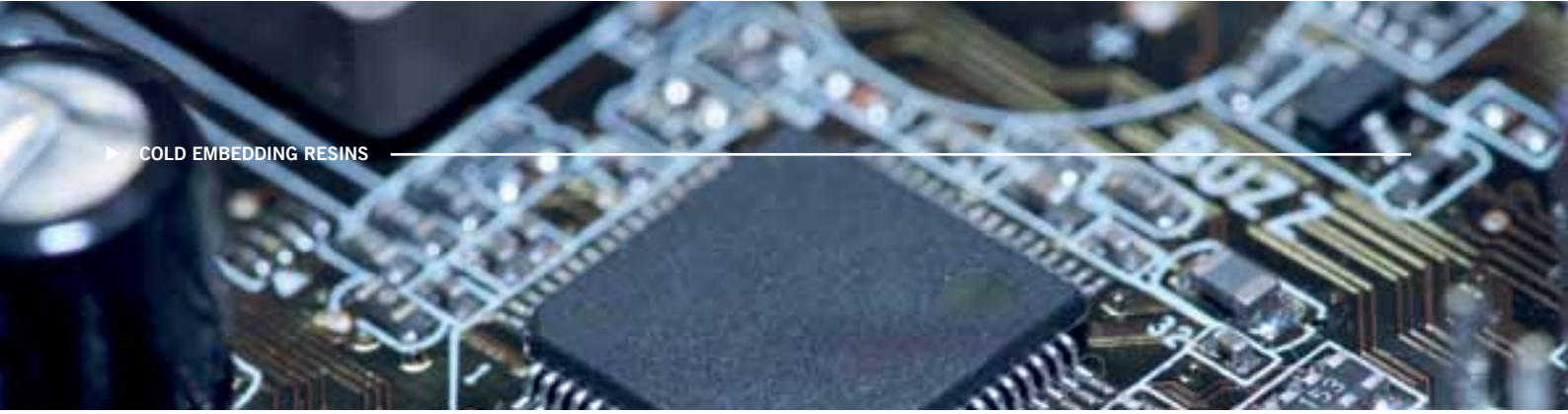
The opaque appearance allows microscoping of individual layers. Misinterpretations through focusing into the depth are avoided.

ORDER INFORMATION TECHNOVIT 4002 IQ

66064414 Technovit® 4002 IQ Powder, white, 1 x 1.300 g
66064415 Technovit® 4002 IQ Powder, white, 1 x 13.000 g

66064416 Technovit® 4002 IQ Powder, green, 1 x 1.300 g
66064417 Technovit® 4002 IQ Powder, green, 1 x 13.000 g

66064411 Technovit® 4002 IQ Liquid, 1 x 500 ml
66064412 Technovit® 4002 IQ Liquid, 1 x 1.000 ml
66064413 Technovit® 4002 IQ Liquid, 1 x 5.000 ml



Technovit® 4004

Transparent embedding resins when visual control is necessary

The transparent Technovit cold embedding resins are matched to the requirements in modern laboratories. They are preferred when a visual control of the specimen through the embedding resin is necessary.

TRANSPARENT FOR ROUTINE-EMBEDDINGS

Technovit® 4004 - THE TRANSPARENT

Transparent 2-component embedding resin based on MMA. This powder/liquid system has been optimised for quick routine examinations which necessitate a visual inspection machen.

PROPERTIES AND APPLICATION

- 2-component powder/liquid system
- Fast curing time of 9 – 12 min.
- Easy application thanks to adjustable mixing ratio

DID YOU KNOW ...

That all Technovit resins are resistant against the most common caustic agents which are used in test laboratories.

Polymerizing specimens easily and uncomplicated in the Technomat®

ⓘ Transparent 2-component embedding resins based on MMA have a low boiling point which leads to bubble formation when curing. By using the Technomat® pressure pot [see pg. 15] the boiling point can be increased. This achieves bubble-free, highly transparent embeddings.

ORDER INFORMATION TECHNOVIT 4004

64708471 Technovit® 4004 Powder, 1 x 1.000 g
64708472 Technovit® 4004 Powder, 2 x 1.000 g
64708473 Technovit® 4004 Powder, 1 x 10.000 g

64708474 Technovit® 4004 Liquid, 1 x 500 ml
64708475 Technovit® 4004 Liquid, 1 x 1.000 ml
64708476 Technovit® 4004 Liquid, 1 x 5.000 ml

Technovit® 4006 and Technovit® 4006 SE

Completely transparent and low temperature

THE TRANSPARENT VERSION FOR SENSITIVE SPECIMENS

Technovit® 4006 - HIGH CLEAR

The completely transparent version. The highly transparent 2-component cold embedding resin enables less temperature stress due to longer curing times. This makes target preparations on sensitive materials simple and uncomplicated!

PROPERTIES AND APPLICATION

- 2-component powder/liquid system
- Simplest application through adjustable mixing ratio
- Low-gap embedding through integrated bonding agents and lower temperature stress
- Good grinding and polishing properties
- New initiator system – less irritating!
- Ideal for routine target preparations with lower thermal stress

FOR POURING VERY THIN LAYERS

Technovit® 4006 SE

This version offers nearly all positive characteristics of the Technovit 4006. Technovit 4006 SE is also suitable for pouring very thin layers and offers the possibility of embedding small specimens with low volume highly transparent in a short time.

Technovit® 4006 highclear for optimum visual control

PROPERTIES AND APPLICATION

- Faster polymerization rate than Technovit 4006
- Higher hardness than Technovit 4006
- Excellent grinding and polishing properties
- Lower bubble formation even when processed without Technomat
- Cures properly even in very thin layers

ORDER INFORMATION TECHNOVIT 4006 / TECHNOVIT 4006 SE

66020676 Technovit® 4006 Powder, 1 x 1.000 g
66020679 Technovit® 4006 Powder, 2 x 1.000 g
66020677 Technovit® 4006 Powder, 1 x 10.000 g

66020680 Technovit® 4006 Liquid, 1 x 500 ml
66020678 Technovit® 4006 Liquid, 1 x 1.000 ml
66020681 Technovit® 4006 Liquid, 1 x 5.000 ml

66030969 Technovit® 4006 SE Powder, 1 x 1.000 g
66030966 Technovit® 4006 SE Powder, 1 x 10.000 g

66030968 Technovit® 4006 SE Liquid, 1 x 1.000 ml
66030967 Technovit® 4002 SE Liquid, 1 x 5.000 ml

Technovit® 4071

Simply uncomplicated – ideal for all routine embeddings

IDEAL FOR ROUTINE EMBEDDING

Technovit® 4071 - THE UNIVERSAL

As Technovit 4071 is particularly easy to use, it is a universally applicable, efficient cold embedding resin. The semi-transparency allows for a rough visual inspection of the specimen. Its good grinding and polishing properties and the adjustable mixing ratio make it the ideal product for routine embedding.
Colour: green-transparent

Embeddings with Technovit 4071 are particularly suitable for the simple efficient routine

PROPERTIES AND APPLICATION

- Simple handling
- Optimised flow characteristic
- Short curing time (5 to 7 min.)
- Particularly suitable for routine examinations
- Excellently grindable and machinable
- Particularly good for aluminium and other soft materials

Technovit® 5000

The electrically conductive resin

IDEAL FOR ROUTINE EMBEDDINGS

Technovit® 5000 - THE ELECTRICALLY CONDUCTIVE

This 2-component cold embedding resin based on copper allows for conductive embedding, which is required for SEM examinations. Technovit 5000 is also a good basis for the electrolytic preparation of metallographic samples.
Technovit 5000 remains viscous for approx. 1 minute and is (through light tapping of the mould) fully cured after 7 minutes.
Colour: copper brown

PROPERTIES AND APPLICATION

- Electrically conductive
- Electrolytic specimen preparation
- SEM suitable

Technovit® 5071

The solution for specimens which have to be removed again

Technovit 5071 allows gentle removal of sensitive specimens and enables all-round view during the SEM examination.

IDEAL FOR SPECIMENS WHICH HAVE TO BE REMOVED AGAIN

Technovit® 5071 - THE DISSOLVABLE

With Technovit 5071 embedded specimens can be removed again. This product is particularly easy to use and suitable for mechanical machining. For example for SEM examinations, micro-probe sampling or electrolytic preparation of the specimens.

Technovit 5071 also has excellent adhesive properties, for example for the application of strain gauges.
Colour: green transparent

Ideal for all specimens which need to be removed again

PROPERTIES AND APPLICATION

- Chemically dissolvable (with acetone, dichloromethane, etc.)
- Thermally dissolvable (softening after 30 minutes at 150 °C)
- Very easy to use (adjustable mixing ratio 1:1 to 3:1)
- Good adhesive properties

ⓘ Dissolving speed for a specimen block (approx. 27 g resin) in 100 ml acetone: at room temperature approx. 11 hours, at 50 °C approx. 4 hours. If the specimens are heat-resistant Technovit 5071 can be softened by heating the specimen block to 150 °C. Simple geometric shapes can thus be removed from the resin at minimum expense.

ORDER INFORMATION TECHNOVIT 4071

64708485 Technovit® 4071 Powder, 1 x 1.000 g
64708486 Technovit® 4071 Powder, 2 x 1.000 g
64708487 Technovit® 4071 Powder, 1 x 10.000 g

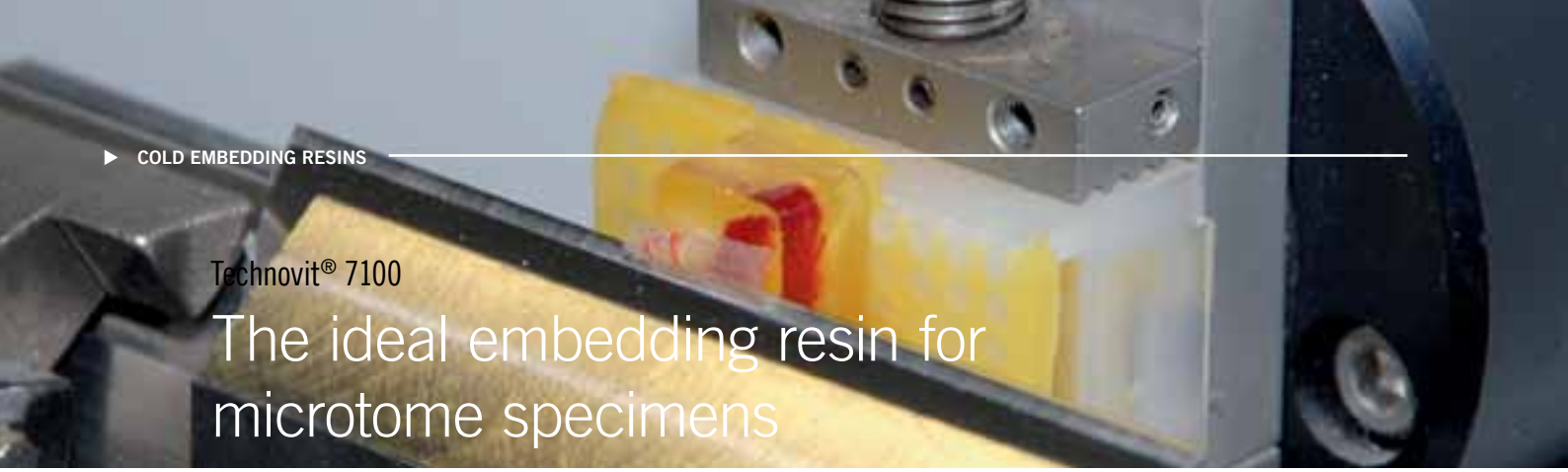
64708488 Technovit® 4071 Liquid, 1 x 500 ml
64708489 Technovit® 4071 Liquid, 1 x 1.000 ml
64708490 Technovit® 4071 Liquid, 4 x 1.000 ml

ORDER INFORMATION TECHNOVIT 5000

64708494 Technovit® 5000 Powder, 1 x 1.000 g
64708495 Technovit® 5000 Liquid, 1 x 500 ml

ORDER INFORMATION TECHNOVIT 5071

64708865 Technovit® 5071 Powder, 1 x 1.000 g
66022478 Technovit® Universal Liquid, 1 x 500 ml



Technovit® 7100

The ideal embedding resin for microtome specimens

Thin sections up to 1 µ and the maintenance of structural details – the application areas of Technovit 7100 are embeddings and sections of resins, films, paper, textiles, organic preparations and fibres.

Resin ideal for microtomy

Technovit® 7100 - THE SLICEABLE

When sections of embedded materials need to be performed, Technovit 7100 always is THE material of your choice. Originally developed to be used in histology, Technovit 7100 also has proven its efficiency in industrial use for many years due to its universal application possibilities.

THIN SECTIONS UP TO 1 µ

This unique, easy-to-use 3-component polymer based on HEMA allows for thin slicing to 1 µm. This property has made Technovit 7100 an indispensable embedding resin for difficult polymer specimens, textiles, paper, fibres, polymers and their combinations.

INFILTRATION – PRESERVATION OF STRUCTURAL DETAILS

Apart from its optimised infiltration properties (preservation of structural details) and good slicing behaviour, the high tolerance towards most polymer materials must be noted.

- Smooth resin specimens can be embedded directly, while porous materials (sponges, textile specimens and others) are infiltrated for stabilization.
- Paper specimens can be imbued with the inviscid embedding resin in a very short time, so that additional infiltration is normally not necessary

ORDER INFORMATION TECHNOVIT 7100

64709003 Technovit® 7100 combipack,
Contains: 500 ml Liquid / 40 g Curing agent II / 5 x 1 g Curing agent I

66045730 Technovit® Histoblade 1 x 50 pcs.
64708996 Blade holder 17 cm, 1 pcs.

64708955 PE-Embedding mould 25 mm, 1 pack (3 pcs.)
66009903 Insert for embedding mould, 1 pack (3 pcs.)

PROPERTIES AND APPLICATION

- Embedding to make sections and thin sections
- Embedding of complex shaped fine plastic parts
- 3-component embedding material on HEMA basis
- Optimum infiltration and therefore stabilisation of fragile materials
- Guarantees optimum infiltration of porous materials
- No thermal stress

ACCESSORIES & SUPPLEMENT

- Technovit® Histoblade and blade holder

Technovit Histoblade is especially suitable for cutting specimens up to a slicing thickness of 1 µ which are embedded in HEMA (2-Hydroxythylmethacrylate).
Histoblade: 60 x 19 x 1 mm
Blade holder: 170 x 34 x 10 mm

- Embedding moulds and insert for mould

Polyethylene embedding mould 25 mm diameter and matching insert (enables reducing the slicing resistance and therefore makes slicing easier).

Technovit® EPOX

Transparent embedding without temperature stress

The system can be used for all types of embedding, especially, however, for porous materials e.g. porous spray coatings or corrosion layers which are embedded under vacuum. The vacuum impregnation causes the epoxy resin to penetrate into the cavities of the specimen body and cure. This stabilises the specimen on the inside as well.

Left:
Gap-free embedding of an SMD jack from the electronics of a mobile phone in the dark field.

Right:
Section of Cu contact pin of this electrical component soldered with Sb-Pb.

Resin for porous materials

Technovit® EPOX

Technovit EPOX is an epoxy resin system consisting of the "Technovit Epox Resin" component and a fast hardener "Technovit Epox Hardener fast" or slower hardener "Technovit Epox Hardener regular". By choosing the right hardener, the curing time, pot life and temperature stress can be influenced. The pot life of approx. 1 hour favours e.g. infiltration of porous materials - especially when applied under vacuum.

For optimum results, adhere to the recommended mixing ratios. The Technovit EPOX components are mixed at a ratio of 2 parts "resin" to 1 part "hardener" and then poured.

They cure within approx. 10 to 18 hours, depending on the applied curing component. The curing times can be influenced by storing the specimen in an incubator or a refrigerator.

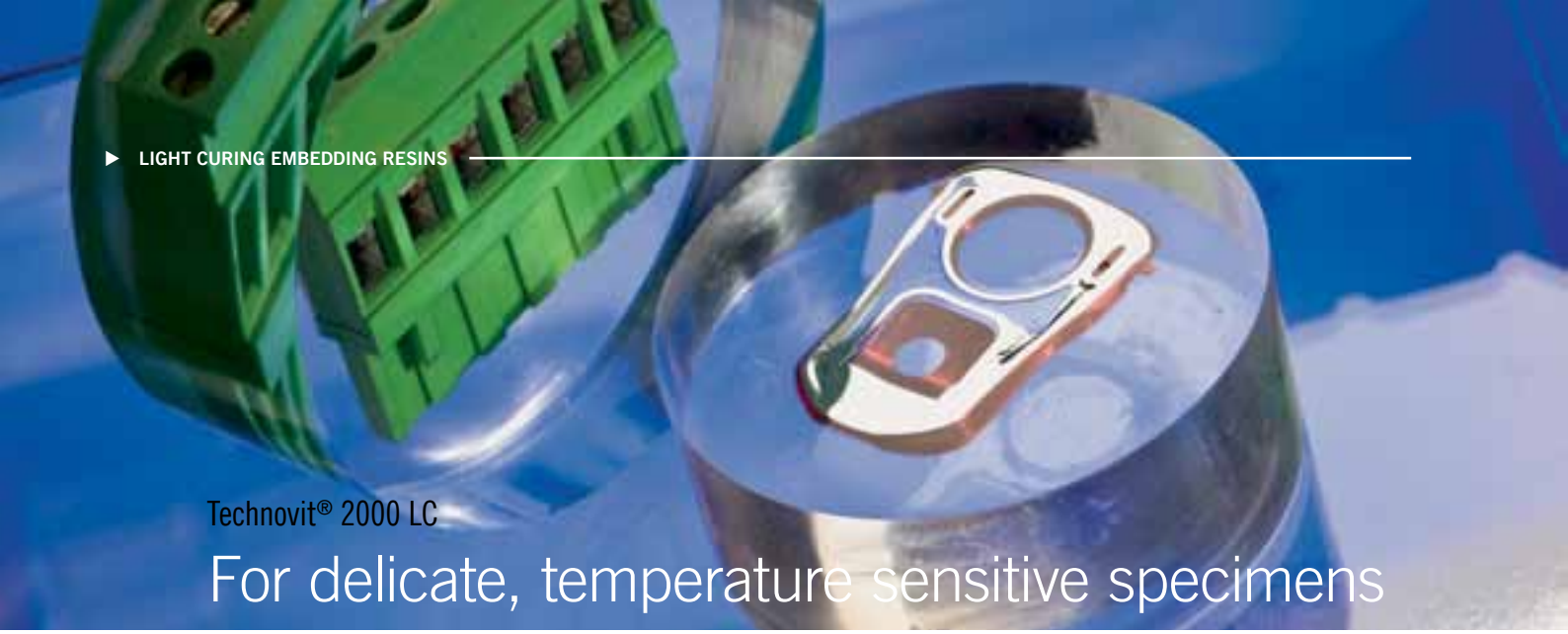
ORDER INFORMATION TECHNOVIT EPOX

64709003 Technovit® EPOX Resin, 1 x 1.000 g
66040438 Technovit® EPOX Hardener Regular, 1 x 500 g
66040439 Technovit® EPOX Hardener Fast, 1 x 500 g

For specimens which are very temperature sensitive we recommend using the "Hardener regular"

PROPERTIES AND APPLICATION

- Suitable for processing under vacuum
- High transparency with good adherence to specimen material
- UV stable
- Variable curing times, individually influencable
- Gap free



Technovit® 2000 LC

For delicate, temperature sensitive specimens

Technovit® 2000 LC is an easy to use 1-component resin. Polymerization takes place under blue light in the Technotray POWER light polymerization unit. Targeted pouring and positioning is no problem. The system is used for the examination, resp. preparation of delicate, temperature sensitive materials and micro components.

Light curing 1-component embedding resin

Technovit® 2000 LC – LIQUID

The liquid allows for high-transparent embedding under blue light. Polymerization (time: 20 min.) is conducted in semi-transparent PE embedding moulds in the Technotray POWER Unit at a maximum temperature of 90 °C. The polymerization temperature can be significantly reduced (to approx. 50 °C) by working with several layers and using a special radiation scheme. The material reaches its final hardness after cooling to room temperature and the specimen can then be mechanically processed.

Technovit® 2000 LC is ideal for target preparations in Microelectronics or cases of damage and embedding of polymers.

SPECIAL PROPERTIES

- Curing under blue light – no need for harmful UV light
- All resin is used up – no mixing residues
- Variable pot life, as polymerization only occurs under blue light
- Low polymerization temperature of approx. 90 °C
- By using a suitable radiation method, the temperature can be reduced to approx. 50 °C
- Resistant to alcohol and acids
- Suitable for SEM examination
- Free of bubbles / highly transparent

Brings “Light into dark”

Technovit® 2000 INSIDE CURE

Technovit 2000 Inside Cure is a special additive which guarantees polymerization of the Technovit 2000 LC in shady places or inside the specimen (porous materials, internal pipe sections, etc.)

By mixing the “Inside Cure” with the light-curing embedding resin Technovit 2000 LC a complete curing is achieved even in areas where no direct exposure is possible.

APPLICATION

Simply admit the complete bottle “Inside Cure” in the original bottle “Technovit 2000 LC”, shake - that‘s it. All usual application parameters remain unchanged.

SPECIAL PROPERTIES

- Wider range of application – usable for all kinds of specimens
- Ideal for infiltration of porous specimens (better penetration because of low viscosity and arbitrary pot time)
- Same procedure as used for the standard product – no change of work processes, documentation, etc.
- No mixing errors

To avoid a dispersion layer

Technovit® 2000 LC - COVERING VARNISH

Technovit 2000 LC covering varnish is applied to prevent the formation of a dispersion layer on the reverse side of the specimen and provides a completely clear, hard and dry surface when polymerization is completed. It is applied in a single layer measuring several millimetres onto the embedded sample halfway through the polymerization time.

To position the sample

Technovit® 2000 LC – FIXING PASTE

The light curing Technovit 2000 LC fixing paste is used to position the sample in the embedding mould. It can be kneaded like modelling clay and has excellent grinding and polishing properties once cured. Thanks to its great hardness, the paste provides excellent protection to edges.

Radiation scheme Technovit 2000 LC for low curing temperatures

TEMPERATURE LIMIT: MAX. 50 °C (30 MM EMBEDDING MOULD)

On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
4	6	1	6	1	6	1	6	1	7	1	7	1	7	1	7	1	7	7

TEMPERATURE LIMIT: MAX. 60 °C (30 MM EMBEDDING MOULD)

On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
4	6	1	6	1	5	1	5	1	5	1	5	1	5	1	5	1	5	7

TEMPERATURE LIMIT: MAX. 70 °C (30 MM EMBEDDING MOULD)

On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
6	5	1	5	1	5	1	5	1	5	1	5	1	5	8

On/Off times in minutes!

Depending on the duration of the radiation scheme, the compound might become slightly opaque

ORDER INFORMATION TECHNOVIT 2000 LC

64708496 Technovit® 2000 LC Liquid, 1 x 1.000 ml
64708496 Technovit® 2000 LC Liquid, 10 x 1.000 ml
66053974 Technovit® 2000 Inside Cure, 1 x 40 ml
64712762 Technovit® 2000 LC Covering varnish, 1 x 4 g
66005103 Technovit® 2000 Fixing paste, 1 x 4 g

Technotray® Power - Light polymerization unit

Strong performance and generous sample chamber

Light Polymerization Unit

Technotray® Power

The Technotray POWER unit is a blue light polymerization device specially developed for the polymerization of light curing Heraeus Kulzer resins (Technovit 2000 LC).

Fitted with high-quality aluminium reflectors and internal dimensions of W x D x H: 170 x 160 x 120 mm the unit has a generous and homogenously illuminated polymerization chamber which has room for up to 9 embedding moulds (embedding mould Ø 30 mm).

THE FOLLOWING NUMBER OF EMBEDDING MOULDS CAN BE CURED SIMULTANEOUSLY:

Ø 50 mm = 4 pieces
Ø 40 mm = 5 pieces
Ø 30 mm = 9 pieces
Ø 25 mm = 9 pieces

THE LIGHT OUTPUT

The blue light lamps guarantee reliable polymerization results with transparent Technovit resins in layers up to 30 mm.

With maximum 6 blue light lamps à 9 watt the Technotray Power is an efficient light polymerization device which guarantees fast, intense and homogenous polymerization.

THE POLYMERIZATION TEMPERATURE

- Ø 40 mm mould without sample fully poured: max. 120 °C
- Ø 40 mm mould poured in layers (2 mm): Radiation 5 min: 70 - 90 °C

SPECIAL PROPERTIES

- Generous and homogenously illuminated sample chamber which has room for up to 9 samples. Internal dimensions: WxDxH: 170 x 160 x 120 mm.
- Strong light output (optional 6 fluorescent lamps à 9 watt)
- High-quality aluminium reflectors
- Automatic timer. Timer with 3 time settings: 5 minutes, 10 minutes as well as continuous operation.
- Autostart when sliding in the drawer

Homogenously illuminated sample chamber with room for up to 9 samples, autostart and Timer

ORDER INFORMATION TECHNOTRAY POWER

66060914 Technotray® Power, 230 V device, as well as included loose: 6 fluorescent lamps, mains cable, information for use

Technomat® Pressure unit

With high pressure to bubble-free sample

The Technomat is a compact pressure unit for pressurisation with up to 2.0 bar. The Technomat has been specially designed for the processing of fast curing polymers. Polymerization in the Technomat produces bubble-free, high-quality test samples. The device is particularly recommended for the embedding of specimens in clear, fast curing Technovit products such as Technovit 4004, 4006 and 4006 SE, as bubble-free curing guarantees optimum transparency of the polymer.

ORDER INFORMATION TECHNOMAT

64709046 Technomat pressure unit, 1 piece

The little “Helpers” – Accessories Embedding

- Spoon, spatula and mixing cup

Tools for the clean and easy mixing of all components of powder/liquid systems. The coating of the cup and wood spatula are resistant against all liquid components used in embedding resins and do not react with the polymer material.

- Embedding moulds

Polyethylene moulds in various sizes for the embedding of materialographic samples have become well-established in practical applications. Thanks to their smooth surface and great strength, samples can be easily removed while the moulds can be used again and again. The standardised sizes of 15, 25, 30, 40 and 50 mm enable efficient processing of samples in automated or manual grinding and polishing units.

- Cover LAM

Protective foil to cover the prepared specimen. The Cover LAM protects your finished specimen against contamination and tarnishing.

- Embedding aids

For materialographic embedding, samples must be secured in the correct position in the embedding moulds. Polystyrene embedding aids offer a simple and cost-effective method to position and align material samples of any shape in the moulds. Available with different support widths (1, 2 and 3 mm), they are suitable for many different applications.

APPLICATION

- Effective embedding of e.g. sheet metal sections, PCBs or similar shaped parts
- Fixation of irregular shaped parts (especially longitudinal sections) such as e.g. screws, rivets, welded joints

DID YOU KNOW ...

that small, irregularly shaped samples can be easily secured with the light curing products of the Technovit 2200 series.

ORDER INFORMATION ACCESSORIES

66021107 Dosing spoon for powder components, 2 pcs.
66021102 Mixing cup, 10 pcs.
66032206 Spartula, 10 pcs.
66064604 Cover LAM protective film, 100 pcs.

64713126 PE embedding mould Ø 15 mm, 3 pcs.
64708955 PE embedding mould Ø 25 mm, 3 pcs.
64708956 PE embedding mould Ø 30 mm, 3 pcs.
64708957 PE embedding mould Ø 40 mm, 3 pcs.
64713127 PE embedding mould Ø 50 mm, 3 pcs.

64708952 Embedding aid narrow 1 mm, 100 pcs.
64708953 Embedding aid middle, 2 mm, 100 pcs.
64708954 Embadding aid wide, 3 mm, 100 pcs.

Technotherm®

Hot mounting resins – simply safe

For the production of metallographic samples according to standardised methods. Can be used for all materials which are not pressure or heat sensitive.

Technotherm hot mounting resins can be used in all conventional embedding presses.

Universal, filled glass-fibre reinforced hot mounting resin

Technotherm® 2000

Technotherm 2000 is a filled glass-fibre-reinforced hot mounting resin with optimised filling properties and minimal gap formation. Thanks to its light grey colour, it ensures good contrast to most specimen surfaces.
Color: creme

SETTING PARAMETERS
Curing takes place at:
160 - 180 °C and
80 - 90 bar
in 11 - 15 min.

DID YOU KNOW ...
Technotherm are no „Dangerous Goods“ and is thus safe to handle, process, store and transport.

Electrically conductive hot mounting resin

Technotherm® 3000

Technotherm 3000 with graphite filler is the electrically conductive product of the Technotherm range. Technotherm 3000 is used where high electrical conductivity is indispensable (e.g. for scanning electron microscopy). Voltage losses are almost excluded (less than 0.5%) when examining samples in the SEM with Technotherm 3000
Colour: black

SETTING PARAMETERS
Curing takes place at:
160 - 180 °C and
80 - 90 bar
in 11 - 15 min.

Transparent, quick melting hot mounting resin

Technotherm® 4000

Technotherm 4000 is a high-clear hot mounting resin. Supplied in fine powder form, the product melts quickly, giving Technotherm 4000 an excellent fluidity.
Color: clear

SETTING PARAMETERS
Curing takes place at:
160 - 180 °C and
50 - 60 bar
in 20 min.

ORDER INFORMATION TECHNOTHERM

66003628	Technotherm 2000, 1 x 1.000 g
66003629	Technotherm 2000, 1 x 10.000 g
66003630	Technotherm 3000, 1 x 1.000 g
66003631	Technotherm 3000, 1 x 10.000 g
66009411	Technotherm 4000, 1 x 1.300 g
66040390	Technotherm 4000, 1 x 10.000 g

Precision impressions with Technovit® 3040
and the Provil novo series impression silicones.

Each sample as detailed as the original

Impression taking is an important method for the inspection of surfaces. To achieve a high quality result, auxiliary materials are necessary which represent the surface structure to be examined with high precision. Depending on the processing method and the level of accuracy required, we recommend using the 2-component resin Technovit 3040, the Provil novo silicones or the light curing resins of the Technovit 2200 series. With an impression accuracy of < 0.1 µm, each impression is as detailed as the original!

Precision impressions are used in many fields and application situation such as, e.g.:

- Wear assessment
- In-situ metallography
- Mould taking for restoration and mineralogical examination
- Reconstruction of damage incidents
- Forensic examinations
- Optimisation of processing technologies

Designated use is the taking of impressions for the inspection and measurement of surface structures where high precision is required.

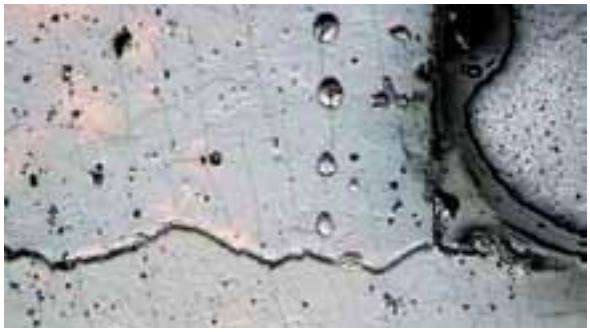
REASONS WHY IMPRESSIONS ARE TAKEN

- Sample is too large or too heavy for lab inspection
- Testing must be non-destructive
- Area to be examined is hard to access with measuring instruments
- Wear documentation
- Measuring of initial samples and prototypes

Surface inspection – the suitable product for every impression technique. This makes precision impressions simple, easy and safe!

DID YOU KNOW ...

The liquid, light curing Technovit 2200 products are the preferred option for high-accuracy impressions
(see pages 21 - 23, light curing resins for impressions).



Identification of micro-fissures with in-situ metallography

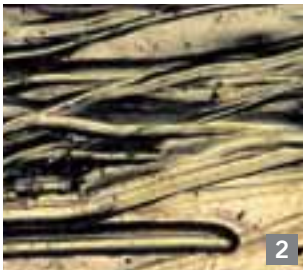


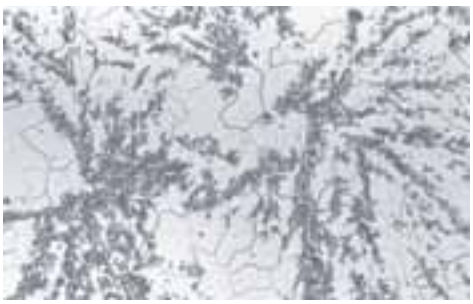
Image 1 analysis of scratches on a key

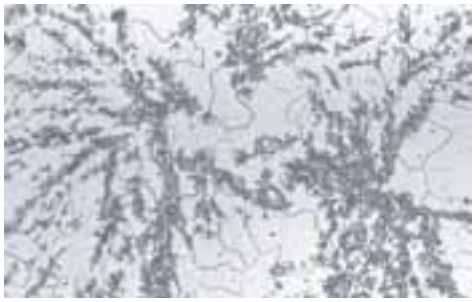
Image 2 shows a magnification of 200 x

Image 3 shows a magnification of 200 x of the impression with Provil novo

Provil® novo impression silicones

Surface impressions – easy to use and safe!





Original and impression of a mould. Ferritic grey cast iron with rosette-shaped arrangement of the graphite.
Etched with 3% nitric acid.

Self-mixing 2-component silicone

Provil® novo light regular

Provil novo light is a low-viscosity silicone particularly suitable for the casting of complex geometric shapes. The application system consists of a dispensing gun, double cartridge and mixing cannulas and guarantees uniform mixing ratios and thus safe and error-free use.

With the dispensing gun, the silicone is pressed uniformly from the two chambers of the double cartridge through the mixing cannula and is then directly applied to the specimen. To fill small cavities (bore holes, etc.), the system includes special mixing cannula attachments.

PROPERTIES AND APPLICATION

The advantages are used, e.g. to measure and document the wear on tools or machine parts that are difficult to access - without the need of having to purchase costly equipment.

- Excellent impression accuracy (< 0.1 µm) – suitable for structures of etched surfaces (max. 500:1).
- Provil novo produces exact 3D reproductions of the treated surface
- Optimum recovery behaviour allows for the accurate representation of objects with complicated geometries including undercuts
- No errors during processing with easy-to-use self-mixing cartridge system
- Cost-efficient method – no investment in equipment, low time requirement
- Non-hazardous substance without any health or safety risks – easy to use and suitable for a wide range of areas, no transport problems
- Curing without temperature increase, preventing any negative impact on the surface structure of the objects
- Wide range of application and examination options

ORDER INFORMATION PROVIL NOVO LIGHT REGULAR

66009333 Provil® novo light regular, 2 x 50 ml
66009334 Mixing cannulas, 1 x 48 pcs.
66009335 Mixing cannula attachments, 1 x 96 pcs.
66009337 Mixing gun, 1 x 1 pcs.

Provil® novo putty und putty soft

The Kneadable

The addition-crosslinking silicones consist of a base and a catalytic component and can be kneaded by hand at a mixing ratio of 1:1. To produce an impression, simply apply the compound by hand on the surface to be examined. After about 4.5 to 5 minutes, the silicone is sufficiently cured to be removed. The main difference between the two products is their final hardness (see technical data). A typical application is the impression taking for measuring in the mould and toolmaking industry. There is no need for special prior knowledge for the application.

PROVIL NOVO PUTTY AND PROVIL NOVO PUTTY SOFT ARE USED FOR IMPRESSIONS

- Where large surfaces must be casted
- At hard to access places or when working overhead
- To stabilise making impressions with the flexible Provil novo Light (double impression technique)

PROPERTIES AND APPLICATION

- Easy application procedures preventing errors
- Colour-coded putties and scoops eliminate mixing errors
- Ready in seconds after mixing
- Impressions can be evaluated with measuring probes or non-contact measuring methods
- Provil novo can be removed without leaving any residue on the specimen

DID YOU KNOW ...

that perfect results can be achieved using a combination of Provil novo light and putty. Minimum shrinkage, great accuracy to detail.

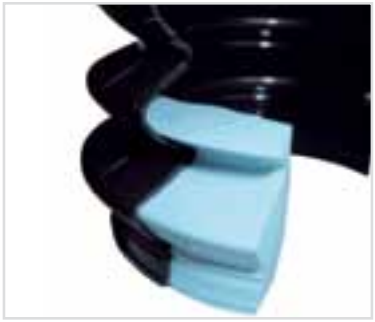
ORDER INFORMATION PROVIL NOVO PUTTY REGULAR & PUTTY SOFT

66003628 Provil® novo putty regular
450 ml base, 450 ml cat.

66004372 Provil® novo putty soft
450 ml base, 450 ml cat.

Provil novo light regular

Provil novo putty regular



Provil novo putty soft

Technovit® 3040

Indirect surface inspection

The flexibility when mixing the components guarantees both the pouring in a mould and the impression at hard to access places, verticals, as well as working overhead.

2-component polymer

Technovit® 3040

The two-component polymer consists of a powder and a liquid component. Depending on the requirements, the resin can be mixed at ratios between 1:1 and 3:1 (powder : liquid). At a standard mixing ratio of 2:1, the resin can be poured for approx. 2 minutes and remains subsequently kneadable for about 30 seconds. The curing time is approx. 5 minutes. Available in black and yellow

PROPERTIES AND APPLICATION

- Impression accuracy 1 µm
- Excellent dimensional stability and easy to remove
- Variable mixing ratio is possible
- Stabilisation for the Separating process
- Impressions can be examined with feeler gauges or non-contact measuring methods.

FROM PRACTICE

- To ensure best possible dimensional accuracy, keep the surface of the impression as small as possible (work in several layers for larger volumes)
- Modelling a “handle” makes it easy to remove the resin from the original
- Impressions should be at least 5 mm thick to prevent inadvertent distortion during removal from the surface
- This product is not suitable to capture undercuts!
- For the production of impressions on vertical or exposed overhead surfaces, pour Technovit 3040 onto a PE foil and press the resin against the area to be captured.

DID YOU KNOW ...

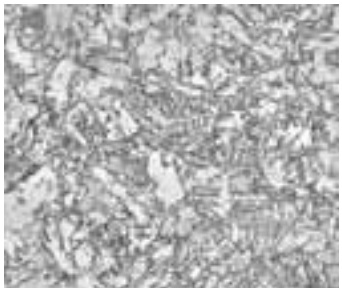
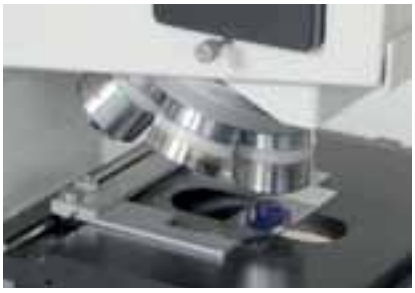
As supplement for the impression method with Technovit 3040, the Heraeus Kulzer delivery range includes various silicones for making impressions.

ORDER INFORMATION TECHNOVIT 3040

64708806 Technovit® 3040 powder yellow, 1 x 1.000 g
64708807 Technovit® 3040 powder yellow, 2 x 1.000 g
64708808 Technovit® 3040 powder yellow, 1 x 10.000 g

64708813 Technovit® 3040 powder black, 1 x 1.000 g
64708814 Technovit® 3040 powder black, 2 x 1.000 g
64708815 Technovit® 3040 powder black, 1 x 10.000 g

66022678 Technovit® Universal Liquid, 1 x 500 ml
66022679 Technovit® Universal Liquid, 1 x 5.000 ml

In-situ metallography: with the Technovit 2200-Series non-destructive structural impressions can be made directly from the component which are then processed in the laboratory and evaluated in the light microscope or scanning electron microscope.

Technovit® 2200 Series

Non-destructive structural impressions for surface analyses

The Technovit 2200 series represents a product line of light curing products for quality assurance tasks and materials testing that go far beyond classical methods. With these products, special “problem cases” in the field of materialography can be solved simply.

The simple application method guarantees perfect results. The light curing compound are applied directly to the relevant part (spatula, brush or syringe) and harden within 20 to 60 seconds under a special blue light. The application method is highly reliable and works also at very low and very high temperatures without any loss in quality.

TECHNOVIT® 2200 SERIES- LIGHT CURING POLYMERS FOR SURFACE IMPRESSIONS

- Structural impressions
- Roughness measurements
- Shaping
- Documentation – The impression serves as a document, as it gives a much clearer picture than a photograph
- Not affected by temperature influences

APPLICATION AREAS

Due to the material properties, the application area of the products covers:

- Filling of micro-fissures and boreholes
- Fixation of smallest (electronic) components
- Coating of small parts
- Stabilisation of corrosion layers
- Stabilisation for separating process
- Applying protective layers prior to embedding and preparation

For covering small delicate samples before embedding

Technovit® 2200

Low-viscous transparent liquid (bottle)

- For subsequent infiltration of minute cavities (fissures, gaps, etc.)
- Stabilisation of porous layers or delicate assemblies prior to separation

Light curing polymer for fixation

Technovit® 2210

Medium-viscous paste, cream-coloured

- Embedding aid for fragile samples
- As edge protection of delicate surface prior to embedding – also in combination with hot mounting resins

Light curing polymers for surface impressions

Technovit® 2220

Highly viscous liquid (thick), died blue or colourless (tin)

- No folding
- Excellent representation of tiny details even at 1000:1 magnification
- Easy to use
- Not affected by temperature – consistent impression quality and curing times even at low temperatures (0 °C) resp. high (40 - 50 °C) temperatures
- No need for vapour treatment or sputter coating for examination in the light microscope!

DID YOU KNOW ...

that all products of the Technovit 2200 series can be cured with the Pekalux POWER LED or a Technovit Blue LED. If thicker layers (> 4 mm) are required, cure the specimen in individual layers. In such cases, the dispersion layer of the polymerized surface is used as a "bonding interface". Each layer must be cured separately. All products are fully compatible with each other. The sample can then be further processed mechanically as usual by grinding and polishing.

FROM PRACTICE: SURFACE IMPRESSIONS WITH TECHNOVIT 2220 - STEP BY STEP

1. Grind, polish, etch, apply Technovit 2220, distribute it in a thin layer using a foil, cover and polymerize.

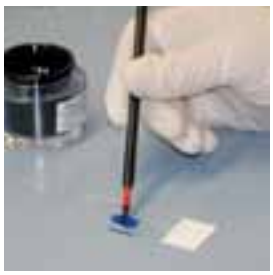
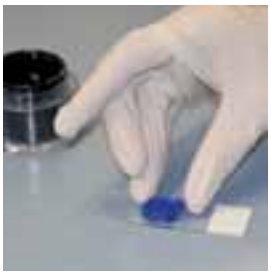
2. Carefully remove cured Technovit 2220

3. To fix the sample on the slide, apply a little Technovit 2220 on the slide, position the impression (CAUTION: impression must face up) and produce a "sandwich" by placing a second slide firmly on the sample, pressing it down. Then cure the sample under blue light.







Light polymerization lamp

Technovit® BLUE LED

In many cases, the products of the Technovit 2200 series are not used in the lab but on site. Technovit Blue LED is an ideal alternative to stationary light units, especially for tasks where you need to work away from a power socket.

This hand-held, portable LED polymerization lamp is powered by conventional batteries and can be used anywhere. The focussing device allows for both point polymerization and the treatment of larger surfaces.

The lamp housing is made of anodized aluminium.
A high-output LED with a wave length of approx. 460 nm (blue light) is used for irradiation.

APPLICATION

Position the Technovit Blue LED at a distance of max. 1 cm above the applied products and switch the lamp on. Depending on the product, the polymerization time can be 40 – 60 sec. Keep the light cone as small as possible to avoid irradiation loss.

Light polymerization unit

Pekalux® POWER LED

The Pekalux POWER LED is a powerful and very handy, easy to use, light polymerization unit. Blue light is used for the polymerization.

The Pekalux POWER LED is matched to the light curing products of the Technovit 2200-series.

Surface impressions can be taken in no time and without great effort in a non-destructive manner directly on the component. Fixed micro-components or those covered with light curing Technovit are cured quickly and safely with the Pekalux POWER LED.

APPLICATION

Polymerization is set directly on the handpiece of the Pekalux POWER LED. There are 4 irradiation modes available. After expiry of the set time, the unit switches of automatically.

Cordless light polymerization unit with Li-Ion battery and a light output of up to 3.000 mW/cm²

THE ADVANTAGES

- High light output
- User-friendly LED display
- Simple handling
- 4 different irradiation modes
- Use of exchangeable rechargeable batteries
- Integrated light output meter
- Mobile, cordless system (lithium-ion battery)

ORDER INFORMATION TECHNOVIT 2200 SERIES

66020775 Technovit 2200 Liquid, 4 x 15 ml
66020779 Technovit 2210 Liquid, 2 x 1 ml
66020780 Technovit 2220, blue, 1 x 15 g
66043721 Technovit 2220, transparent, 1 x 15 g

66014385 Plasmacoat Instrument, 1 x 1 pcs.
66008672 Brush attachments, 1 x 100 pcs.
66008673 Brush holder, 1 x 5 pcs.
66022679 Cannula attachments, 1 x 5 pcs. (for Technovit 2210)

66063092 Pekalux POWER LED, 1 pcs.
(incl. handpiece, light conductor, glare shield, power pack, battery pack)

66043553 Technovit Blue LED, 1 pcs.

Application tips – processing of polymers

- Always mix multi-component polymers until a homogenous compound is achieved. Correct mixing is indispensable for optimum embedding.
- During mixing, avoid beating the dough as this introduces air into the resin, which might become trapped forming bubbles in the cured compound.
- If required, mixing ratios may be adjusted slightly. This might however result in deviating temperature and curing time curve.
- The greater the amount of powder/liquid mixture, the higher the temperature produced during the polymerization process.
- To embed large samples or cover and fill large areas, it is necessary to apply multiple layers. This is the only way to prevent excessive heat and keep shrinkage in the optimum range. (Polymerization = exothermal reaction).
- Between work steps, allow the layer to cool to room temperature before applying the next one (heat acts as a catalyst → accelerated curing results in bubbles)
- Higher temperatures accelerate the curing process, while low temperature slow it down.
- Ensure that the sample is clean and free of grease. Dirt on samples can cause problems during embedding.
- If possible, fully enclose the specimen in the embedding resin so that it can be properly fixed during preparation.
- To prevent air bubbles in the lower area of the specimen, we recommend pouring a base layer before positioning the sample in the embedding mould. This is particularly useful for the embedding of e.g. sheet metal spot welds and similar items.
- With multi-component polymers, remove the specimen before the resin has fully cooled. This makes the sample easier to remove.
- Use the smallest embedding mould that fits the specimen to keep the polymerization temperature low.
- Centre the sample in the mould to ensure that it is fully encapsulated by the embedding compound.

Thorough mixing is the basis for optimum embedding results! Stir for 45 seconds, leave to stand (swell) for a short while, stir again and then pour!

Resistance of resins compared to conventional substances

Test-Medium	Technovit 3040/ 4004/4006/5071	Technovit 4000/4002 IQ	Technovit 4071
Acetone	×	○	○
Formic acid – 10%	○	○	✓
Benzene	✓	○	✓
Butyl acetate	×	×	○
Cyclohexane	✓	✓	✓
Decalin	✓	✓	✓
Diesel	✓	✓	✓
Dimethylformamide – DMF	○	○	○
1.4-Dioxane	○	○	○
Acetic acid conc.	○	○	○
Acetic acid 10%	○	○	○
Acetic acid 50%	○	○	○
Ethanol	✓	✓	✓
Ethyl acetate	×	×	○
Hydrofluoric acid 40%	○	○	○
Fruit juice	✓	✓	✓
Glycerine	✓	✓	✓
Glycol	✓	✓	✓
Heating oil	✓	✓	✓
Heptane	✓	✓	✓
Hexane	✓	✓	✓
Potassium hydroxide 50%	✓	✓	✓
Potassium hydroxide 10%	✓	✓	✓
Methanol	✓	✓	✓
Methyl ethyl ketone – MEK	×	×	○
Methylene chloride	×	×	○
Methyl methacrylate – MMA	×	×	○
Paraffin oil	✓	✓	✓
Perchlorethylene – PER	×	×	○
Petroleum	✓	✓	✓
Phosphoric acid (conc.)	✓	✓	✓
Phosphoric acid 10%	✓	✓	✓
Isopropanol	○	○	○
Propanol	○	○	○
Hydrochloric acid conc.	✓	✓	✓
Hydrochloric acid 5%	✓	✓	✓
Sulphuric acid conc.	○	○	○
Silicone oil	✓	✓	✓
Cooking oil/fat	✓	✓	✓
Styrene	×	×	○
Tetrahydrofuran – THF	×	×	○
Toluene	✓	○	✓
Tetralin	✓	✓	✓
Trichloroethylene – TRI	×	×	○
Hydrogen peroxide 30%	✓	✓	✓
Brandy	✓	✓	✓
Tartaric acid	○	○	○
Citric acid 10%	✓	✓	✓

✓ stable/ long-term stability
○ limited stability/ short-term stability
× Not stable

Quantities and mixing ratios Technovit embedding resins (without sample)

Technovit 3040

Surface		Quantity	Powder	Liquid	Comment
10 x 10 cm	100 cm^2	60 g	37.5 g	22.5 g	Approx. 0.6 g material is required for one square centimetre
5 x 10 cm	50 cm^2	30 g	18.8 g	11.8 g	
8 x 5 cm	40 cm^2	24 g	15 g	9 g	

Technovit 4000

25 mm*	30 mm*	40 mm*	50 mm*	Mixing ratio	POWDER	LIQUID
16.4 g	23.3 g	40.5 g	61.0 g	20 g powder with 30 g liquid	40 %	60 %
6.5 g Powder	9.3 g Powder	16.2 g Powder	24.4 g Powder	20g powder with 27.5 ml liquid		
6.6 g Syrup 1	9.3 g Syrup 1	16.2 g Syrup 1	24.4 g Syrup 1	First mix Syrup 1 and 2!		
3.3 g Syrup 2	4.7 g Syrup 2	8.1 g Syrup 2	12.2 g Syrup 2			

Technovit 4002 IQ

25 mm*	30 mm*	40 mm*	50 mm*	Mixing ratio	POWDER	LIQUID
16.8 g	24.5 g	43.7 g	71.0 g	25 g powder with 20 g liquid	55.50 %	44.50 %
9.3 g Powder	13.6 g Powder	34.3 g Powder	39.4 g Powder	25 g powder with 19 ml liquid		
7.5 g Liquid	10.9 g Liquid	19.4 g Liquid	31.6 g Liquid			

Technovit 4004

25 mm*	30 mm*	40 mm*	50 mm*	Mixing ratio	POWDER	LIQUID
12.7 g	17.8 g	32.4 g	48.2 g	25 g powder with 15 g liquid	62.50 %	37.50 %
8.0 g Powder	11.0 g Powder	20.1 g Powder	30.1 g Powder	25 g powder with 15.8 ml liquid		
4.7 g Liquid	6.8 g Liquid	12.3 g Liquid	18.1 g Liquid			

Technovit 4006/ 4006 SE

25 mm*	30 mm*	40 mm*	50 mm*	Mixing ratio	POWDER	LIQUID
12.9 g	17.9 g	32.6 g	48.4 g	25 g powder with 15 g liquid	62.50 %	37.50 %
8.1 g Powder	11.2 g Powder	20.4 g Powder	30.3 g Powder	25 g powder with 14.25 ml liquid		
4.8 g Liquid	6.7 g Liquid	12.2 g Liquid	18.1 g Liquid			

Technovit 4071/ 5071

25 mm*	30 mm*	40 mm*	50 mm*	Mixing ratio	POWDER	LIQUID
12.7 g	17.8 g	32.4 g	48.2 g	25 g powder with 15 g liquid	62.50 %	37.50 %
8.0 g Powder	11.0 g Powder	20.1 g Powder	30.1 g Powder	25 g powder with 15.8 ml liquid		
4.7 g Liquid	6.8 g Liquid	12.3 g Liquid	18.1 g Liquid			

Technovit 5000

Mixing ratio
20 g powder with 13 ml liquid

* Heraeus Kulzer embedding moulds

Quantities and mixing ratios Technovit EPOX (without sample)

Techovit EPOX Resin & Technovit EPOX Hardener regular

Embedding mould	Quantity without sample	Ambient temperature	max. curing temperature	Time to max. temperature	Time to end of measurable temp.
25 mm*	12 g (8 g Resin / 4 g Hardener)	20 °C	30 °C	120 min.	approx. 18 hours
30 mm*	18 g (12 g Resin / 6 g Hardener)	20 °C	35 °C	110 min.	approx. 18 hours
40 mm*	30 g (20 g Resin / 10 g Hardener)	20 °C	45 °C	105 min.	approx. 18 hours
50 mm*	45 g (30 g Resin / 15 g Hardener)	20 °C	65 °C	100 min.	approx. 18 hours
40 mm*	30 g (20 g Resin / 10 g Hardener)	23 °C	48 °C	105 min.	approx. 18 hours
40 mm*	30 g (20 g Resin / 10 g Hardener)	50 °C	100 °C	40 min.	

Techovit EPOX Resin & Technovit EPOX Hardener fast

Embedding mould	Quantity without sample	Ambient temperature	max. curing temperature	Time to max. temperature	Time to end of measurable temp.
25 mm*	12 g (8 g Resin / 4 g Hardener)	20 °C	37 °C	90 min.	approx. 10 hours
30 mm*	18 g (12 g Resin / 6 g Hardener)	20 °C	57 °C	80 min.	approx. 10 hours
40 mm*	30 g (20 g Resin / 10 g Hardener)	20 °C	110 °C	70 min.	approx. 10 hours
50 mm	45 g (30 g Resin / 15 g Hardener)	20 °C	144 °C	60 min.	approx. 10 hours
40 mm*	30 g (20 g Resin / 10 g Hardener)	23 °C	120 °C	60 min.	approx. 9 hours
40 mm*	30 g (20 g Resin /10 g Hardener)	50 °C	140 °C	40 min.	

* Heraeus Kulzer embedding moulds

Shore D Hardness Technovit EPOX

Mixing ratio: 100 g Resin / 50 g Hardener

Product	Curing at	Technovit EPOX Regular	Technovit EPOX Fast
Shore D (20 h)	Room temperature	71	73
Shore D (2 d)	Room temperature	78	79
Shore D (7 d)	Room temperature	79	80
Shore D (14 d)	Room temperature	80	81
Shore D (21 d)	Room temperature	80	81
Shore D (20 h)	50 °C	79	80

Technical data cold embedding resins

	Technovit 2000 LC	Technovit 3040	Technovit 4000	Technovit 4002 IQ	Technovit 4004	Technovit 4006
Colour	Transparent	Yellow or black	White	White or green	Transparent	Highly transparent
Intended purpose	Specimen. embedding bubble-free	Impression taking for surface inspection	Specimen embedding. low-gap	Specimen embedding. gap-free	Specimen embedding in pressure unit. bubble-free	Specimen embedding in pressure unit. bubble-free
Components	Liquid	Powder/Liquid	Powder/Syrup I + II	Powder/Liquid	Powder/Liquid	Powder/Liquid
Mixing ratio	---	---	2:2:1	5:4	2:1	2:1
Processing width (min.)	Unlimited	2	4	3 (green) 5 (white)	2 - 3	4
Curing time at 22 °C (min.)	6 - 10	8 - 10	6 - 13	9 - 15 (green) 12 - 17 (white)	9 - 12	9 - 13
Max. temperature for curing in block	20 g = 95 °C	110 °C 30 g = 101 °C	122 °C	99 °C	110 °C	99 °C
Ball indentation hardness N/mm²(DIN 53456)	110 MPA	135	103	169	137	155
Temperature stability	max. 80 °C	95 °C	130 °C	130 °C	100 °C	125 °C
Solubility	Not soluble	Swellable only	Not soluble	Not soluble	Swellable only	Swellable only
Density = spec weight g/cm³ DIN53479	1.19	1.18	1.565	1.63	1.14	1.14
Impact strength DIN 13907 KJ/m²	---	7.1	1.5	---	6.4	5.8
Bending strength in N/mm²	---	96	50	---	95	105
Compression strength N/mm²	---	110	280	---	100 - 120	120 - 140
Water absorption in vol-% DIN 53495	---	0.43	2.7	---	0.38	0.3
Linear shrinkage (%)	2.2	1.9	2.7	---	2.25/2.08/1.80	2.25/2.08/1.80
Volumetric shrinkage (%)	6.5	5.7	6.2	0.46	1:1=6.75 1.8:1=5.8 2.3:1=5.4	1:1=6.75 1.8:1=5.8 2.3:1=5.4
Refraction index (Monomer. Polymer)	M = 1,4828 P= 1,5270	1,419	--- ---	--- ---	M = 1,420 P = 1,434	M = 1,422 P = 1,436
Storage temperature	25 °C	25 °C	25 °C	25 °C	25 °C	25 °C
Shelf life (in years)	3	3	3	3	3	3
Linear thermal expansion coefficient	65 - 95 [ppm]	111 x 10^{-6}	37 - 62 x 10^{-6}	---	111 x 10^{-6}	108 x 10^{-7}
Modulus of elasticity Mega pascal (MPa)	ca. 2000 - 3000	2000 - 2300	2000 - 2200	---	2000 - 2300	2200 - 2500

Technovit 4006 SE	Technovit 4071	Technovit 5000	Technovit 5071	Technovit 7100	Technovit EPOX	
Highly transparent	Green-transparent	Brown	Green-transparent	Yellowish	Highly transparent	
Specimen embedding. bubble-free	Specimen embedding	Specimen embedding. electrically conductive	Removable embedding	Microtome cuts for electron microscopy	Specimen embedding for porous materials	
Powder/Liquid	Powder/Liquid	Powder/Liquid	Powder/Liquid	Base solution/ Hardener 2	Base solution/ Hardener regular	Base solution/ Hardener fast
2:1	2:1	20 g powder / 13 ml liquid	2:1		2:1 According to weight	2:1 According to weight
4	1 - 2	1	2	5 - 7	ca. 20 min.	ca. 20 min.
11 - 15	5 - 7	7 - 12	8 - 10	60 - 75	18 h	10 h
99 °C	108 °C	125 °C	112 °C	38 °C Form S 45 °C Form Q	144 °C	65 °C
160	144	--	138		79	80
125 °C	105 °C	100 °C	100 °C			
Swellable only	Swellable only	Swellable only	in Acetone			
1.14	1.19	2.85	1.19	1.07	1.00	1.01
4.2	6.1	5.0 N/mm²	6.3			
120	94	85	93	50 - 60		
120 - 150	100 - 120	280	100	90		
0.3	0.47	ca. 2	0.33	0.6		
1.8	1.93	2.3	2.3	2.8	0.90	0.80
5.4	5.8	7.1	7	8.4	1.3 1.1	
M = 1,425 P = 1,441	1,439	M = 1,458 P = 1,434	M = 1,420			
25 °C	25 °C	25 °C	25 °C	25 °C	25 °C	25 °C
3	3	3	3 Powder 2 Liquid	3	2	2
108 x 10^{-7}	119 x 10^{-6}	---	141 x 10^{-6}			
2400 - 2500	2500 - 2600	---	2000 - 2300			

Technical data silicone impression materials

Product	Provil novo putty	Provil novo putty soft	Provil novo light
Mixing time	45 sec.	45 sec.	- - - -
Total processing time measured from start of mixing	2 min.	2 min.	2 min.
Setting time measured from start of mixing	4:45 min.	4:45 min.	4:30 min.
Deformation under pressure	0.8 - 5.0 %	0.8 - 5.0 %	2.0 - 5.0 %
Recovery from deformation	99.70 %	99.70 %	99.80 %
Hardness test Shore-A (measured from start of mixing)	After 10 min. : 70 1 hour: 71 24 hour: 71	After 10 min. : 57 1 hour: 57 24 hour: 60	After 10 min. : 52 1 min. : 52 24 min. : 52

Technical data light curing impression materials

Product	Technovit 2200	Technovit 2210	Technovit 2220
Colour	Opaque-transparent	Cream-coloured	Blue or transparent
Container	Glass bottle	Syringe	Jar
Viscosity	Low	Medium	Medium
Polymerization type	Light curing (blue light)	Light curing (blue light)	Light curing (blue light)
Bending strength	90-100 N/mm²	>100 N/mm²	104.00 Mpa
Bending module hardness HZ	3.500 - 4.500 N/mm² 180 - 200 N/mm²	5.000 - 6.000 N/mm² 180 - 200 N/mm²	2.321 Mpa 120 - 150 N/mm²
Curing depth	4 mm (Pekalux POWER LED. 20 sec.) 7 mm (Technovit Blue LED. 40 sec.)	4 mm (Pekalux POWER LED. 20 sec.) 5 mm (Technovit Blue LED. 40 sec.)	7 mm (Pekalux POWER LED. 40 sec.) 7 mm (Technovit Blue LED. 60 sec.)

Technical data

TECHNOTRAY® POWER
Technical data

- Mains voltage: 230 Volt, 50 Hz
- Output: max. ca. 60 watt
- 6 fluorescent lamps à 9 watt
- Lamp type: blue light fluorescent lamp
- Timer with 3 time settings: 5 minutes, 10 minutes as well as continuous operation
- Interior dimensions: WxDxH 170 x 160 x 120 mm
- Autostart when sliding in the drawer
- High-quality aluminium reflectors
- Lifetime of lamps: approx. 1,000 operating hours, resp. approx. 20,000 switchings
- Housing colour: white/grey
- Dimensions: LxWxH 270 x 240 x 170 mm
- Weight: approx. 3 kg

(Technical changes reserved)

TECHNOMAT®
Technical data

- Pressurisation 2.0 bar
- Safety valve 2.8 – 3.3 bar
- Pressure connection 3 - 10 bar
- Dimensions: Width 340 mm, Depth 340 mm, Height 255 mm
- Weight 4.0 kg

(Technical changes reserved)

ⓘ You will find further information about our products as well as safety data sheets in the Internet at www.kulzer-technik.de

TECHNOVIT® BLUE LED
Technical data

- Voltage supply: 2 AA batteries (each 1.5 V), recommended LR6 (alkaline)
- LED-voltage / LED-power: approx. 3.3 V / 350 mA
- Light output / Wavelength: approx. 300 mW / 460 nm, +- 20 nm
- Lifetime of the LED: approx. 1000 h
- Dimensions housing / weight: ø 26 x 170 mm / approx. 70 g
- Operating temperature range: + 10 °C to + 35 °C
- Temperature range for storage / transport: - 10 °C to + 40 °C
- Humidity / Barometric pressure: 35 - 95 % rel. humidity (no condensation) / 500 - 1060 hPa

(Technical changes reserved)

PEKALUX® POWER LED
Technical data

- Light source: Power LED
- Wavelength range: 430 ~ 490 nm
- Light output: max. 3.000 mW/cm^2 (+/- 10%)
- Battery: 3.7 V Lithium-Ion
- Dimensions:
  Handpiece: 225 x 115 x 41,5 cm
  Charger: 155 x 82 x 125 cm
- Weight:
  Handpiece: 136 g
  Charger: 144 g
- Operating voltage: 5 V / 1.5 A
- Mains voltage: 100 - 240 V / 50 - 60 Hz / 400mA

(Technical changes reserved)

LIGHT OUTPUT AND POLYMERIZATION

- With Technovit 2210 a maximum curing depth of 8.48 mm can be reached after 20 sec. and 8 mm after 40 sec.
- With Technovit 2220 a maximum curing depth of 7 mm can be reached after 20 sec. and 8 mm after 40 sec.

ⓘ We recommend, however, to work in several layers when the layer thicknesses are above 4 mm.

Technovit® & Co.

Heraeus Kulzer has been leading in the development and production of resin products on the highest quality level for many decades. High quality resins with reliable properties and simple handling are the prerequisite for precise material testing.

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