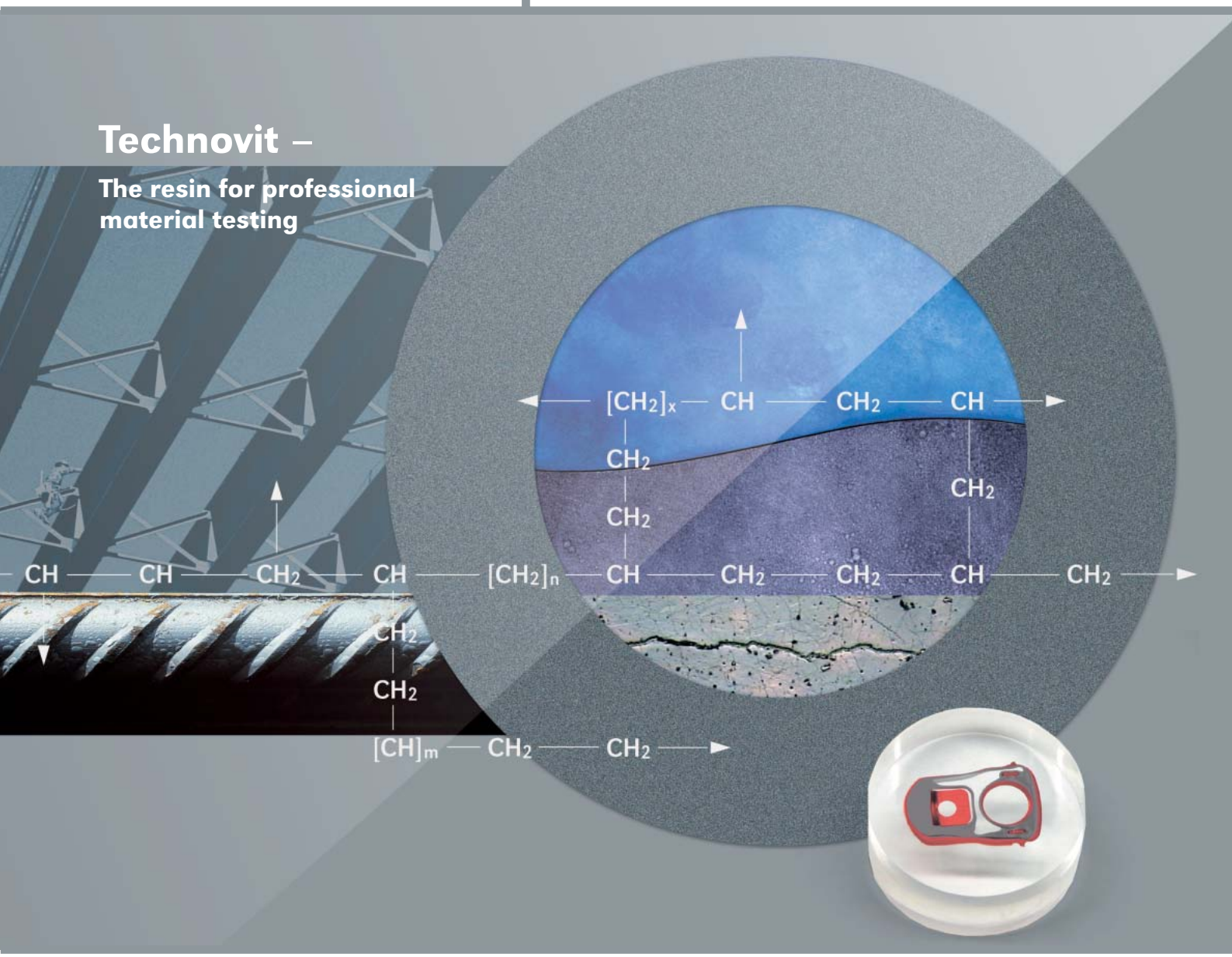
Heraeus

TECHNOVIT



Kulzer:

Choosing perfection ...

HERAEUS KULZER



Resins used in medicine and in technology must be of high quality, easy to use and have dependable properties to ensure their successful employment. Heraeus Kulzer's polymers fulfil the highest requirements and are employed as embedding resins for materials testing or as auxiliary materials in production techniques. They therefore occupy an important place in the everyday activities of modern laboratories and in manufacturing processes. The particular fields in which these polymers are applied determine the specific characteristics required of our products. Heraeus Kulzer's product portfolio, including its range of sophisticated polymers, has been setting standards with regard to quality and the efficient processing methods employed to work with these materials.

Heraeus Kulzer has been a leading developer and manufacturer of high-quality polymer products for both the medical and technology sectors for many decades. By forming part of and being integrated into the structures of a high-tech technology corporation, Heraeus Kulzer profits in innumerable ways from the effects of synergy and networking in research and development. With more than 9000 employees, Heraeus Kulzer is one of the leading technology companies in many of the sectors in which it operates.

The umbrella brand name "Technovit", which was developed many years ago, has come to represent the expertise upon which the development, manufacture and application technologies of a broad range of polymer products employing a variety of technologies is based. The main emphasis of these products is their application in materials testing. The properties that are especially demanded in the various areas of "materialography" are gapless embedding, transparency, time efficiency and easy application, as well as the highest possible degree of impression precision and form stability. Heraeus Kulzer fulfils all these requirements with its comprehensive "Technovit & Co" programme.

Technovit® & Co.

The brand name "Technovit" has been synonymous with innovative polymers for materialography for many decades.

Heraeus Kulzer puts just as much work into continuing to further develop traditional cold embedding resins consisting of two-component technology as it puts into developing new products, such as in the area of light technology or in surface replication. All of our Technovit products have been developed in our own research and development laboratories and naturally are manufactured and monitored in accordance with the strict ISO standards in Germany.

The area of application of these Heraeus Kulzer products, however, far exceeds that of light technology and surface replication. Their use in individual application technologies and in industrial manufacturing processes now represent areas of application that have come to rely on Technovit. We are, of course, also happy to provide you with our expertise for individual developments.

Kulzer:

CONTENTS PAGE

Resin has got a lot of faces.
We develop tailor made solutions.

Cold embedding resins

Technovit 4000
THE LOW-SHRINKAGE

Technovit 4000 is a fast curing, cold polymerising, three-component resin, based on modified polyester, and is available in the form of powder, syrup I and syrup II. It is mixed at a ratio of 2:2:1 (powder: syrup I: syrup II). Syrup I and syrup II are mixed together first and the powder is mixed in last. Colour: white opaque

Material properties
Technovit 4000 is distinguished by its low shrinkage when polymerising and its perfect margin fit. Due to its excellent flow characteristics, Technovit 4000 guarantees that geometrically demanding samples are optimally embedded.
Its excellent adhesion properties with regard to metal are a guarantee of gapless embedding of all metal samples. These properties are of particular importance when working with samples that require good edge definitions.

Application
After mixing, Technovit 4000 can be used for casting for approx. 4 min, and takes approx. 8 minutes to cure.

Special properties
- Excellent margin fit
- Optimum grinding and polishing properties

TIP: For fast and effiency processing of the specimen we recommend the grinding and polishing concept NEW LAM-formula-02.

Technovit 4002
THE GAP FREE

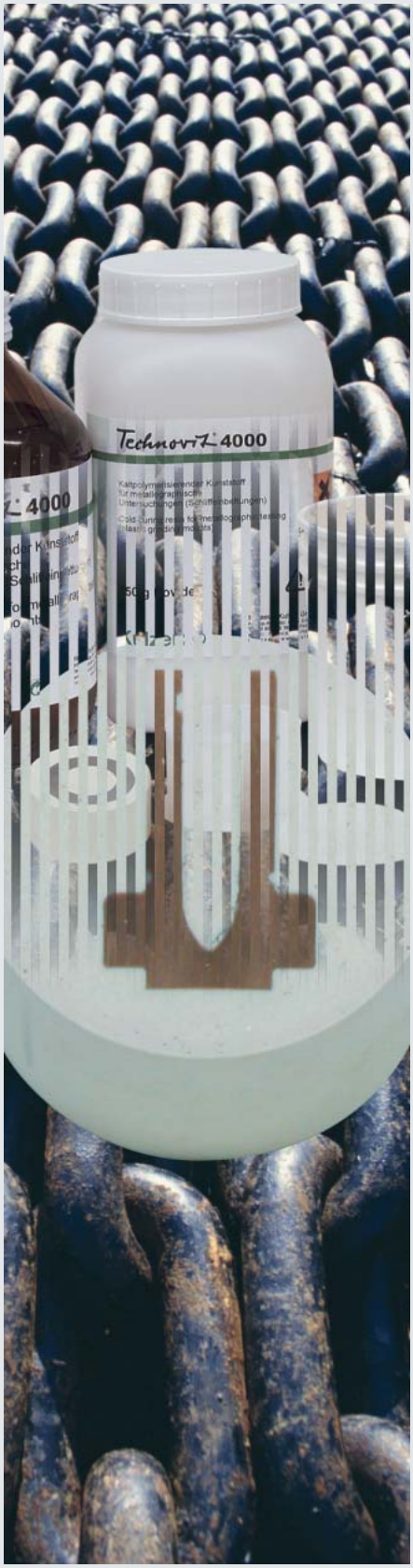
Technovit 4002 – THE cold embedding resin for embedding materialographic samples. Colour: white
Technovit 4002 is based on a modified polyester and consists of a powder and a liquid component. This two-component polymer has been specifically developed for embedding materialographic samples without any shrinkage or leaving gaps. Technovit 4002 can be applied across the entire range of available materials with varied geometric shapes, whose margin fits and grinding and polishing properties must be of the best quality available. A special powder component, which does not release any toxic dust, has been developed for Technovit 4002.

Application
Technovit 4002 can be processed for approx. 4 minutes, and has a curing time of between 10 and 15 minutes depending on the sample size and the ambient temperature. As it does not shrink and fits excellently around margins, Technovit 4002 achieves perfectly sharp edges. Technovit 4002 is mixed by weight in a ratio of 2 : 1, resp. by volume in a ratio of 3 : 1 powder and liquid. The mixing ratios can be slightly changed to suit special requirements.

Special properties
- Does not leave any gaps around margins
- Does not shrink during polymerisation
- Excellently edge definition
- Optimum grinding and polishing properties

TIP: Thorough mixing forms the basis for optimum embedding results

The inorganic filled cold mounting resins Technovit 4000 and Technovit 4002 can be combined. For example powder Technovit 4000 and liquid Technovit 4002!



Technovit 4004
THE TRANSPARENT

Transparent two-component embedding resin based on methyl methacrylate in the form of powder and liquid. Technovit 4004 is used for all samples that require transparent embedding resins, i.e. where users need to be able to inspect the sample through the embedding media during sample preparation. Technovit 4004 is therefore mainly applied in the electronics industry as an aid for target-preparations.

Application
Technovit 4004 can be employed in a variety of ways and is very suitable for routine work procedures due to its fast polymerisation time, which amounts to approx. 4 – 6 minutes. It can be mixed at ratios of 1:1 up to 3:1 of powder/liquid depending on the respective requirements and the required flow properties. We recommend a mixing ratio of 2:1 when used at room temperature.

Special properties
- Highly transparent
- Can be mixed at different ratios

TIP: The best possible transparency can be achieved when Technovit 4004 is used in conjunction with the Technomat pressure unit

Technovit 4006
HIGH CLEAR

With the Technovit 4006 „High Clear" we are going to set a new benchmark in the most important features for materialographic applications by clear cold embedding resins:

More transparency
„High clear" like a view through a window you can examine your specimen by target preparations! By the use of premium raw materials Technovit 4006 is 100 % high clear as well as uv-stable when polymerization will be done in the Technomat (R)

Colder
Heat, caused by polymerization cannot be eliminated. Depending on the special composition we reduce the polymerization heat by 10 %. Take care of your specimen.

Gap-reduced
The integrated adhesion primer allows a very gap reduced bond to the speicmen. A requirement for secure results!

Less harmful
Due to the features of cold curing materials, this products have to be applied according the safety guidelines. With the Technovit 4006 we have decreased harmfuil and irritant components to a minimum by a new initiator system.

Technovit 4006 – The benchmark for transparent cold curing materials!

Application
The material is mixed in a basic ratio of 2 parts of powder and 1 part of liquid. The ratio can be varigate individual. The material polymerizes in round about 11 minutes after mixing. Its very high hardness achieve best results for furhter specimen preparation

Technovit 4071
THE FAST

Technovit 4071 is a fast curing, two-component embedding resin based on highly cross-linked methyl methacrylate in the form of powder and liquid. Colour: green-transparent

Application
Technovit 4071 is the fast universal embedding resin. The obvious advantages of this material are its ease of use and high flexibility regarding mixing ratios, its excellent flowability and its fast polymerisation time, which is less than 5 minutes.
Because of these properties, Technovit 4071 is used in standardised in-process inspections, which have to be performed rapidly during a manufacturing process.

Special properties
- Short polymerisation time
- Easy to use

INFO: All Technovit polymers are resistant to the conventional etching agents that are used in test laboratories

Technovit 5000
THE CONDUCTIVE

Technovit 5000 is a conductive polymer based on modified methyl methacrylate. Its conductive elements consist of dendritic copper particles. Due to the good and homogeneous conductivity of the polymer, electrical contact can be established in all parts on the material. PE or Hostaphan films can be used for insulation.

Application
Technovit 5000 can be poured for approx. 1 min, and has a curing time of 7 minutes. It is particularly suitable for embedding samples
- that are to be examined with scanning electron microscopes, or
- with microprobes
- or samples that are to be processed in the electro-polishing device

Special properties
- Conductive
- Suitable for use in SEM's
- Short curing time

TIP: The contact surfaces must first be slightly grinded to create conductivity

Cold embedding resins

Technovit 5071
THE DISSOLVABLE

Technovit 5071 is a two-component embedding resin based on methyl methacrylate in the form of powder and liquid. Colour: green-transparent

Application

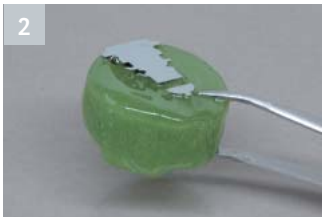
Just like Technovit 4071, Technovit 5071 is a cold embedding resin that can be employed with great efficiency. The underlying structure and type of application of both is largely identical. The special distinguishing feature of Technovit 5071 is that it can be re-dissolved chemically. This dissolvability is the great advantage of this embedding resin and enables the resin to be removed again from valuable, e.g. expensive or unique, samples. Technovit 5071 can be dissolved with acetone, trichloroethylene and dichloromethane. Technovit 5071 can also be used in SEM's.

Due to its excellent surface wettability, Technovit 5071 can be used as an adhesive for metals in the industrial sector. It can also be used in measuring technology for the application of strain gauges.

Special properties

- Dissolvable
- Very adaptive adhesive properties

TIP: If the samples are heat-resistant, Technovit 5071 can be softened by heating up the sample block. By these means, simple geometric shapes can be easily removed again from the embedding material.



Dissolving behaviour of Technovit 5071
Fig. 1-3 Different stages of dissolution achieved by means of Acetone
Fig. 4 Sample that has been removed from the embedding resin

Technovit 2060
THE INDIVIDUAL

Technovit 2060 is a technical polymer based on methacrylate which can be universally applied.

Main areas of application

- Adhesive for use in model and prototype construction
- Moulding compound in tool manufacture and mould making
- Insulation for galvanic applications

Polymers that are suitable for cutting

For application methods in which the quality of the samples is examined by means of cutting methods rather than by grinding or polishing (e.g. fibres, polymer composites, laminates), we recommend special polymers from the Histo range. For more information about this, please ask us for our "Histology" information material.

Technovit 3040

THE AUXILIARY MATERIAL FOR INDIRECT SURFACE TESTING

Technovit 3040 is a two-component resin based on methylmethacrylate and consists of a powder and a liquid component. It can be supplied in yellow and black.
It is used to create high-precision impression that are used to inspect and measure surfaces.

Why use Technovit 3040?

- The sample is too large or heavy for testing by a laboratory
- The sample must be tested without being destroyed
- The area to examined is hard to get to
- For measuring of wear
- To measure initial samples and prototypes

Technovit 3040 enables you

- To take impressions for indirect surface testing
- To preserve and archive the condition of surfaces
- To create negative moulds with silicone or plaster
- To re-create positive moulds by using the double-mould procedure
  (To do so, Technovit 3040 can be ideally used in combination with Provil Novo silicones)

Application

Depending on the required consistency and general requirements, the material can be mixed at a ratio of 1:1 up to 3:1 (powder/liquid). Once it has been mixed, Technovit 3040 can be poured for approx. 2 minutes, and afterwards it is still be kneadable for approx. 30 seconds. Technovit 3040 takes approx. 5 minutes to cure. This allows sufficient time to apply the material in order to make a mould and to make a cast of areas that are difficult to get to on vertical objects and for work that is performed overhead. When taking impressions of vertical or overhead surfaces, it is advisable to pour Technovit 3040 onto a PE or Hostaphan film. As soon as the material has thickened, it is pressed onto the surface from which the impression is to be taken and then fixated.

Practical information

- Impressions of larger areas should be taken by applying several layers to keep the polymerisation temperature low and hence prevent pores from forming within the impression material
- Modelling a handle makes it easier to remove the impression from the original
- Impressions should have a minimum thickness of 5 mm to prevent even marginal distortion when the impression is removed
- Complicated geometric shapes should be pre-treated with a conventional silicone or Teflon spray (please observe the processing instructions of the respective manufacturers)

Advantages

- Impression precision 1 µm
- Dimensionally stable
- Can be mixed at different ratios
- Impressions can be analysed with roughness measurement devices or non-contact measuring methods

TIP: In addition to taking impressions with Technovit 3040, Heraeus Kulzer's product range also includes a variety of other complimentary silicones for impression taking.

Provil novo

Surface impressions with Provil novo
Precision impressions made easy, effortless and safe

Provil novo

E.g. for use in forensic science – in this example, to analyse scratch marks on a key

Figure 2 shows the scratch marks magnified 200 times

Figure 3 shows the impression of the 200 times magnified scratch marks made with Provil novo

SILICONES

Provil novo
A CLASS OF ITS OWN

<0,1 µm

Provil novo silicones – safe and precise surface impression materials suitable for a broad range of applications in a variety of fields, such as
- **ambulant metallography**
- **restoration impressions and mineralogy**
- **reconstruction in the event of damage**
- **forensic science investigations**
- **scientific investigations**
- **building and monument conservation**
- **process technology optimisation**

PROVIL® novo

Analysis of microcracks in ambulant metallography

A class of its own

- **High precision impressions (<0.1 µm)**
  Due to the special material properties of Provil novo, it can be used to replicate surfaces with such precision that deviations are kept lower than 0.1 µm. This means that in metallography, for example, the structures of etched microstructure surfaces can be replicated with the utmost precision. The impression can be used to make a mould by using suitable polymers, such as Technovit 3040, to obtain a second positive, without any loss of quality.

- **Optimum level of resilience for use on complicated geometric objects with undercuts.**
  Due to its excellent resilience, Provil novo makes it possible to take impressions of difficult areas and to measure these after the impression has been taken. These advantages are used, for example, to measure the rate of wear of cavities in tools and machine components, without having to use cost-intensive techniques.
- Perfect results thanks to easy application methods

- **Ready for application within a few seconds due to the easy mixing procedure**
  No special previous knowledge required for application. In comparison to other methods, Provil novo is very advantageous for use in places that are difficult to get to or for work performed overhead. Provil novo can be removed easily from the sample object without leaving any residues.

- **Cost efficient method**
  Users of Provil novo do not need to invest in special training or application devices. The competitive price of the consumables and the short time required for its application make it easy to decide for Provil novo!

- **No hazardous substance/no health or safety risks**
  Provil novo can be applied anywhere without risks, particularly in areas which already pose a high potential of danger (e.g. corrosion surveys in tank farms, gas pipes etc). Transportation of Provil novo is also risk-free, and the products have been approved for all modes of transportation.

- **Does not develop any temperatures when curing**
  Provil novo does not develop any temperatures during the curing process, and hence does not negatively influence the surface structure of objects – which is particularly important for a broad range of scientific applications and when taking impressions for restoration purposes.

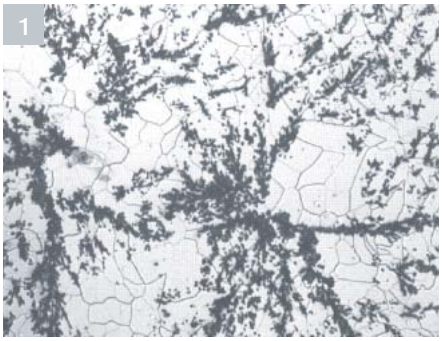
- **Many analysis and application possibilities**
  Provil novo silicones do not react in any way with other substances. This means that impressions of all kinds of surfaces can be taken, irrespective of the material of which those objects are composed. These surface impressions can be analysed by using light microscopes or SEM's (at a low accelerating voltage of max. 5 kV). Provil novo impressions can also be used for roughness measurements.

PROVIL novo putty

PROVIL novo putty soft

Provil novo putty & Provil novo putty soft

DUCTILE



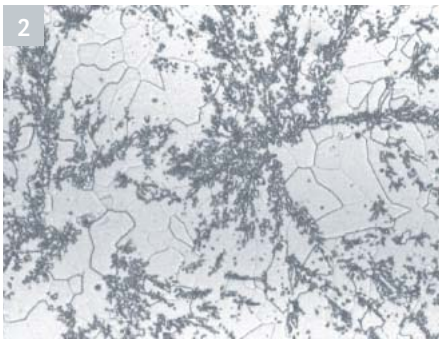


Figure 1.2: Original and impression of a mould. Ferritic cast iron with rosette-shaped arrangement of the graphite. Etched with nitric acid (3%)

The Provil novo putty and Provil novo putty soft silicones consist of a base and a catalyst component and can be kneaded by hand.

Application

The components are provided in their respective dosing spoons at a ratio of 1:1, and are mixed by hand until they form a homogenous mass. To make the replica, the mass is modelled or pressed onto the object surface. The material cures within 4.5 – 5 minutes at room temperature and the material, or the object, can then be removed.

Areas of application

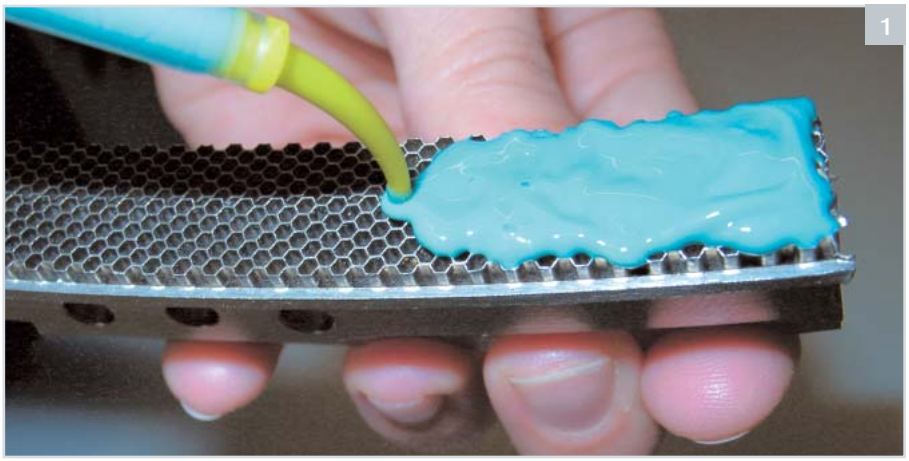
The feature that distinguishes these two products is the final hardness (see technical data) that they attain. Provil novo putty and Provil novo putty soft are employed for taking impressions of objects with simple surface structures, if the object's surface is very hard (metallic or mineral surfaces) or if the final hardness of the impression must be quite high. They are typically employed for taking impressions for measurements in mould making and tool manufacture.

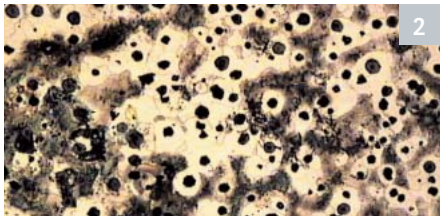
Both products can also be used in combination with the free-flowing Provil novo light CD2, by using Provil novo putty as a "stamp", i.e. to make a rough impression, and by applying Provil novo light CD2 to precision mould and replicate the existing microstructures.

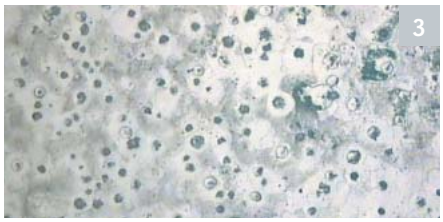
Every impression a

Provil novo light CD2

SELF-MIXING







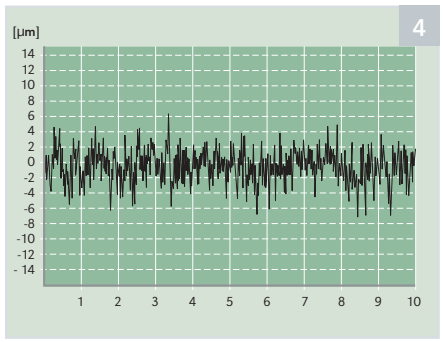


Figure 2-4:
Original and replica of a cast-iron surface. The graph shows the laser roughness-measurements of the replica

Figure 1:
Application of Provil novo light CD2 with mixing cannula attachment

Provil novo light CD2 is a self-mixing silicone with low viscosity and is supplied in double cartridges.

Application

The application system ensures that Provil novo light CD2 is properly and safely applied. The cartridges are inserted into the dispensing gun and a mixing cannula is then attached to the outlet of the cartridge. When the lever of the dispensing gun is pressed, the silicone is evenly forced out of the two chambers of the double cartridge through the mixing cannule. This process ensures that the silicone is mixed automatically and homogenously and can be applied to the object directly. Simultaneously, the mixing cannules serve the purpose of sealing the outlet of the dispensing gun until it is used again. In addition, mixing cannula attachments can be used to fill miniscule pores or cracks. Provil novo light CD2 is a very free-flowing silicone and is therefore perfectly suited for moulding difficult geometric shapes. Provil novo light CD2 cures in approx. 4.5 minutes and can then be removed from the object.

Light curing resins

Technovit 2000 LC
THE LIGHT CURING

The Technovit 2000 LC system consists of a light-curing embedding resin, a covering varnish, a fixing paste and the Technotray CU light curing device. These components and their functions are ideally adapted to one another.

Technovit 2000 LC is a light curing, one-component, highly transparent embedding resin based on methacrylate. The curing takes place by the application of blue light.

Technovit 2000 LC is a very tight-fitting embedding agent and has been specifically developed for testing and preparing sensitive materials and micro-components. Technovit 2000 LC is mainly used for semiconductor technology, microelectronics, medical technology, optoelectronics and microsystems technology. It is also suitable for embedding materials that are very temperature-sensitive.

Application
Technovit 2000 LC is polymerised in special PE embedding moulds in the Technotray CU unit. The maximum temperature amounts to 90°C. The polymerisation temperature can be significantly reduced (up to approx. 50°C) by working with several layers or by using a special radiation program. The specimen can be mechanically processed after the material has cured. The material attains full hardness after having cooled down to room temperature.

Technovit 2000 LC can be combined with all other Technovit polymers and resins (e.g. for blocking and the like).

Special properties
- No loss of material because it is a one-component material
- Can be applied over an indefinite period because polymerisation only starts when blue light is employed
- Low polymerisation temperature of approx. 90°C. Can also be polymerised at approx. 50°C by using the appropriate radiation program
- Does not form bubbles
- Suitable for use in SEM's
- Does not develop odours
- Alcohol and acid resistant
- Cures under blue light – no hazardous UV light required

Technovit 2000 LC – Radiation program
All times are stated in minutes, embedding mould size: 30 mm Ø

Temperature limit: max. 50°C

	on	off	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	7	1	7	1	7	1	7	1	7	1	7	1	7	7

Temperature limit: max. 60°C

	on	off	on	off	on	off	on	off	on	off	on	off	on	off	on	off	on	off	on	off	on
▶	4	5	1	5	1	5	1	5	1	5	1	5	1	5	1	5	1	5	1	5	7

Temperature limit: max. 70°C

	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

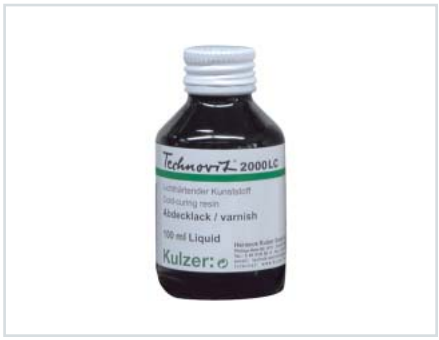
Technotray CU unit

The Technotray CU unit is a blue-light polymerising device that has be specifically adapted to the properties of Technovit 2000 LC. The chamber for the sample has been designed in such a way that the intensity of the light is the same all around the sample, ensuring optimum curing. The sample chamber of the Technotray CU unit is designed to allow several samples to be polymerised at the same time and to accept the following number of embedding moulds:

Ø 40 mm = 4 items
Ø 30 mm = 5 items
Ø 25 mm = 6 items

Application

When using the 20 minute standard polymerisation programme, the polymerisation temperature amounts to approx. 90°C. The temperature can, however, be significantly reduced by using other polymerisation cycles.



Technovit 2000 LC covering varnish

Technovit 2000 LC covering varnish is used to prevent formation of a dispersion layer on the sample surface.

Application

The covering varnish is applied to the cast sample once half of the polymerisation time has elapsed, creating a crystal clear, hard and dry surface. Technovit 2000 LC covering varnish can be sparingly applied, and applying a layer that is a few millimetres thick is perfectly sufficient!

Technovit 2000 LC Fixing paste

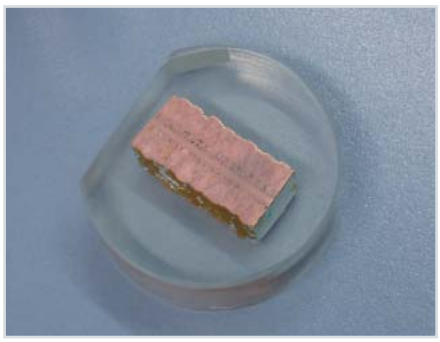
Technovit 2000 LC fixing paste is a very plastic, light-curing paste that enables samples to be fixed in specific positions in the embedding moulds before they are cast with Technovit 2000 LC. Technovit 2000 LC fixing paste cures at the same wavelength range as the embedding liquid.

Casting Technovit 2000 LC

Sample in the Technotray CU unit

Applying the covering varnish to the sample

s made easy



Technovit 2200 series
THE GUARANTORS

The Technovit 2200 series brings out a further product line for quality assurance and materials testings. These products professionally assists to solve difficult materialographic problems which usually are very time consuming.

Areas of application

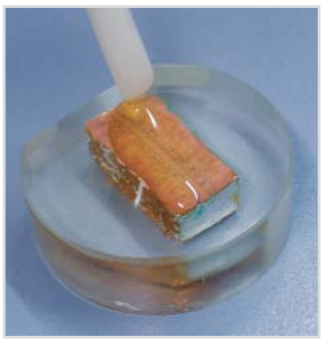
Based on the material properties, this product range can be used for:
- Filling of mirco gaps and drill holes
- Fixation of micro (electronical) parts
- Covering of damageable parts
- Achieving contrast by working with Technovit 2000 LC
- Stabilization of corrosion layers
- Stabilization for cutting processes

Especially for ambulant metallography:
- Surface impressions
- Roughness measuring
- Shape forming

The application of these materials is very uncomplicated. After cleaning the specimen with ethanole , the ready to use products are applied with a brush, spatula or direct from the syringe. Applications has to be done in thin layers to correspond to the curing depth of the materials (refer to the technical datas). For larger specimen, it is neccessary to work in several layers. To achieve a lower viscosity, it is possible to warm up the materials by a heating plate or hair dryer).

Polymerization occurs with the Pekalux (approx. 40 s) or alternatively in the Technotray CU unit (approx 5 min). Is it required to apply the materials thicker as 4 mm, the application and polymerization must be done in several layers. Therefore the dispersion layer on the polymerized surface is needed for bonding the next layer – do not wipe away. Polymerize each layer separately.
All products of the Technovit 2200 series can be combined with the Technovit 2000 LC or the 2-component Technovit products. Further treatment is done in the usual way.

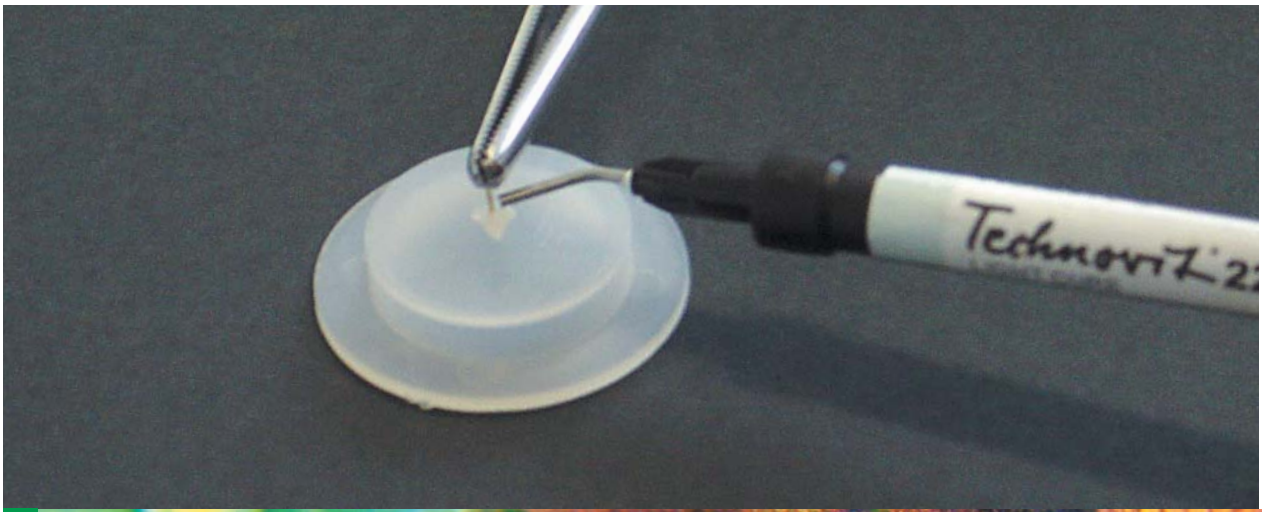
Quality assuran



The following products are avaiable

Product	Technovit 2200	Technovit 2210	Technovit 2220
Item	4 x 15 ml	2 x 1 ml, accessories	1 x 15 g, accessories
Art.-No.	66020775	66020779	66020780
Packaging	Glass bottle	Syringe	Jar
Colour	Milky transparent	Milky transparent	blue
Viscosity	Low	Middle	Middle
Polymerization	Lightcuring (blue light)	Lightcuring (blue light)	Lightcuring (blue light)
Flexural Strenght	90-100 N/mm²	>100 N/mm²	104,00 MPa
Modulus of elasticity	3500-4500 N/mm²	5000-6000 N/mm²	2321 MPa
Hardness HZ	180-200 N/mm²	180-200 N/mm²	120-150 MPa
Curing depth	4 mm (Pekalux, 20 s)	4 mm (Pekalux, 20 s)	7 mm (Pekalux, 40 s)

For polymerization of these lightcuring products, the Pekalux unit is used. Pekalux is available incl. accessories as 120 V version (art.-no. 66005228) as well as 230 V version (art.-no. 66013205).



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Warm embedding resins

Technotherm 1000
THE EFFICIENT

Technotherm 1000 is an inorganic-filled warm embedding material, coloured in yellowish/brown. It is distinguished by its hardness and excellent edge definition. Technotherm 1000 has excellent processing properties and is resistant to all the etching and cleaning agents that are commonly used in laboratories.

Application

Depending on the sample diameter, Technotherm 1000 cures at:

160-180	°C
80-90	bar in
11-15	minutes

in every standard warm embedding machine.

Technotherm 2000
THE UNIVERSAL

Technotherm 2000 is an inorganic-filled, glass-fibre reinforced, warm embedding agent, coloured in light grey. Technotherm 2000 is used in areas where it is imperative that samples are embedded without any gaps being left around them. Due to its excellent melting properties, Technotherm 2000 penetrates deep into porous surfaces or undercuts of samples during the embedding process. Technotherm 2000 is THE universal warm embedding resin. Technotherm 2000 is resistant to all the etching and cleaning agents that are commonly used in laboratories.

Application

Depending on the sample diameter, Technotherm 2000 cures at:

160-180	°C
80-90	bar in
11-15	minutes

in every standard warm embedding machine.

Technotherm 3000
THE CONDUCTIVE

Technotherm 3000 is the conductive resin of the Technotherm resin range. This graphite filled polymer has excellent conductive properties.

Field of application

Technotherm 3000 is employed wherever high conductivity is required (e.g. in Scanning Electron Microscopes). Technotherm 3000 ensures that there is hardly any voltage loss when samples are examined in a SEM (less than 0.5%).

Application

Depending on the sample diameter, Technotherm 3000 cures at:

160-180	°C
80-90	bar in
11-15	minutes

in every standard warm embedding machine.

Professional samples without

Technotherm 4000
THE TRANSPARENT

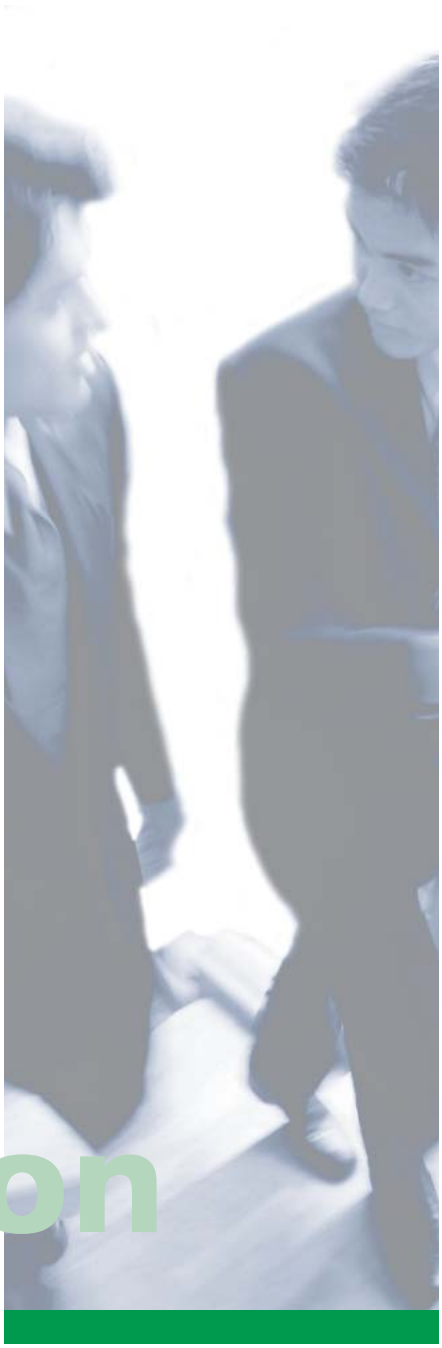
Technotherm 4000 is a highly transparent warm embedding resin and consists of a very fine powder component. The fineness of the powder means that the material melts rapidly, giving Technotherm 4000 excellent flowability. Technotherm 4000 offers outstanding transparency – even if several layers are applied to a sample. In comparison with competitive products from the same price range, Technotherm 4000 has been proved to achieve a tighter fit around the sample by 40%.
Technotherm 4000 enables users to employ a wide range of different settings on the warm embedding machine without affecting the material's properties.

Application
The material cures in all standard embedding machines at the following settings:

150-160	°C
50-60	bar
8-12	minutes

Technotherm 4000 can be used without any previous knowledge of its mode of application.

INFO: Technotherm warm embedding resins are not hazardous substances and their use, processing and storage does not pose any risks.



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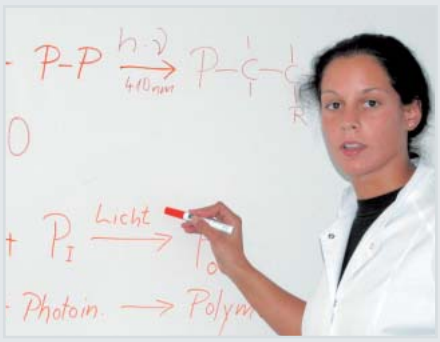


Customised application solutions

Heraeus Kulzer has been a leading technological innovator for many years and already developed the umbrella brand name "Technovit" nearly 50 years ago.

Based on our knowledge and experience in polymer technologies, we are offering a range of technical products that we recommend to our customers according to their requirements and their specific fields of application.
Our research and development division is furthermore able to create tailor-made solutions for customer-specific problems. There is virtually no limit to the range of applications that our products can be used for.
Our product specialists are a competent team of consultants – highly experienced experts with extensive product knowledge. Give us a call!

Accessories

Embedding moulds

Polyethylene moulds in various sizes for casting material samples have proved particularly effective in practice.
Their smooth surfaces and high stability ensure that specimens can be removed easily and guarantee a long service life. The standardised sizes of 15, 25, 30, 40 and 50 mm mean that the samples can efficiently be further processed in automatic or manual grinding and polishing machines.

Embedding aids

When embedding metallographic specimens, it is always necessary to fix samples with precision. The polystyrene embedding aids are an easy to use and cost effective means for aligning and fixing materials of diverse geometric shapes as required. The differently sized support structures (1, 2, 3 mm) enable these aids to be used for a wide range of applications.

Application

- Suitable for all embedding moulds starting with a diameter of 30 mm
- For fixing small parts that do not have smooth surfaces, such as pins, plates, foils
- For fixing round materials with different diameters (in particular for longitudinal samples) such as screws, rivets, welded joints

Mixing cup and spatula

An effective and cost efficient aid for mixing all two and three-component resins. The coating of the cups and wooden spatulas is resistant to all of the embedding resin liquids and does not react with the resin material.

Making things

Technomat

The Technomat is a space-saving, compact pressure unit. The pressurisation amounts to 2.0 bar. The housing is made of Makrolon plastic. The pressure-aging vessel consists of INOX steel. The Technomat has been specifically adapted to fast curing resin techniques and fully preserves the physical and chemical properties of the resins. Technomat ensures that the resins it cures are free from bubbles and hence creates high-quality specimens in the case of all fast curing cold embedding resins, in particular with regard to transparent materials, such as Technovit 4004. Technomat also prevents the ge-neration of odours during curing.

simple!

Application instructions
FOR PROCESSING RESINS

- **Always mix multi-component resins homogenously** – proper mixing forms the basis for perfect embedding
- **Do not use beating movements when mixing components,** because this would cause air to be locked inside the mixture which may be prevented from escaping and hence lead to bubble formation during curing
- Mixing ratios can be slightly changed in accordance with requirements, although it must be borne in mind that this also changes the temperature and time requirements
- The larger the mixed quantity of powder and liquid, the higher the temperature that is generated during polymerisation
- It is advisable to work with several layers when embedding larger samples or creating larger casts (it is important to allow each layer to cool down), this prevents pores from forming due to the heat generated during polymerisation
- The curing process is accelerated by using higher temperatures and slowed down by using lower temperatures
- **Samples must always be clean and free from grease,** impure samples can create problems during embedding
- As far as possible, samples should **always be completely covered with embedding resin** to ensure that the samples are safely fixed during preparation
- When using samples that do not have any smooth surfaces, it is advisable to fill the embedding mould with some Technovit, then to position the sample and finally to completely fill the mould. This prevents any air from being trapped below the sample. If air is trapped it could lead to significantly longer preparation times or make it necessary for the sample to be embedded anew.
- When using multi-component resins, the sample should be removed from the mould while the resin is still warm, removal is easier in this state than when it has become cold

Technical data

Comparison chart of Heraeus Kulzer's metallography resins

It's what's inside that counts!

PRODUCT	Technovit 2000 LC	Technovit 2060	Technovit 3040	Technovit 4000	Technovit 4002	Technovit 4004	Technovit 4006	Technovit 4071
Colour	transparent	transparent	yellow o. black	white	white	transparent	transparent	green-transparent
Intended use	Gapless specimen embedding	Polymer for model construction	Impression taking for surface testing	Gapless specimen embedding	Gapless + non-shrinkage specimen embedding	Bubble-free specimen embedding in pressure device	Sample embedding	Sample embedding
Components	Liquid	Powder/Liquid	Powder/Liquid	Powder/Syrup I+II	Powder/Liquid	Powder/Liquid	Powder/Liquid	Powder/Liquid
Mixing ratio	----	----	----	2:2:1	1:2 acc. to weight	2:1	variable, Basis: 2:1	2:1
Time available for processing (in minutes)	unlimited	2	2	4	5	2-3	3-4	1-2
Curing time at 22°C (min.)	30 minutes under blue light	6 (for 15 g quantity)	5 (for 15 g quantity)	7	12,5	6 (for 15 g quantity)	11	4 (for 15 g quantity)
Max. temperature when cured in the block	20 g = 95°C 30 g = 101°C	115°C 15 g quantity	110°C 15 g quantity	122°C 30 g quantity	99°C	110°C	99 °C	108°C
Ball indentation hardness N/mm² (DIN 53456)	110 MPa	115	135	70	169	137	151	124
Temperature stability	max. 80°C	95°C	95°C	130°C	130°C	100°C		105°C
Solubility	not soluble	only swellable in conc. acetic/ formic acid	only swellable in conc. acetic/ formic acid	not soluble	not soluble	only swellable in conc. acetic/ formic acid	only swellable	only swellable
Density = spec. weight g/cm³, DIN 53479	1.19	1.19	1.18	1.565	----	1.14	1,14	1.19
Bending strength (N/mm²)	----	90	96	50	----	95		94
Compression strength (N/mm²)	----	110	110	280	----	100-120		100-120
Refraction index (Monomer, Polymer)	M = 1.4828 P = 1.5270	---- P = 1.419	---- P = 1.419	---- ----	---- ----	M = 1.420 P = 1.434	M = 1,420 P = 1,434	M = 1.439 ----
Storage temperature (°C)	25°C	20-22°C	20-22°C	20-22°C	20-22°C	20-22°C	20-22 °C	20-22°C
Shelf life (years)	2	3	3	3	3	3	3 Powder 2 Liquid	3 Powder 2 Liquid

PROVIL novo

PRODUCT	Provil novo Putty	Provil novo Putty-soft	Provil novo light CD2
Mixing ratio	1:1 (volume or weight)	1:1 (volume or weight)	1:1 (automatically in mixing cannula)
Mixing time	45 seconds	45 seconds	----
Total working time from start of mixing process	2 min.	2 min.	2 min.
Setting time from start of mixing process	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 %
Shore A hardness (measured from start of mixing process)	after 10 min. : 70 1h :71 24h: 71	after 10 min.: 57 1h :57 24h: 60	after 10 min.: 52 1h :52 24h: 52
Delivery unit	900 ml	900 ml	2 x 50 ml

	Technovit 5000	Technovit 5071
	brown	green/transparent
	Conductive embedding material for specimen	Surface impressions for Scanning Elect. Microscopes
	Powder/Liquid	Powder/Liquid
	2:1 (GEW)	2:1
	1	2
	7	5 (for 15 g quantity)
	125°C	112°C
	----	138
	100°C	100°C
	only swellable	in Acetone
	2.85	1.19
	85	93
	280	100
	M = 1.4580 ----	M = 1.420 ----
	20-22°C	20-22°C
	2 Powder 3 Liquid	3

In addition to the polymers listed in above, Heraeus Kulzer also develops individual solutions for its customers. Solutions without compromises – custom-made and with properties that are precisely adapted to our customers' requirements.

NEW LAM formula-02

The flexible system for professional results

Additional to the product range of the "Technovit resins", Heraeus Kulzer offers a complete program of grinding and polishing articles for material testings.

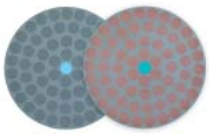
The idea of the NEW LAM formula-02 system is, to combine products for several preparation steps to an "open system", in order to offer our customers all the possibilities of preparation with cost- and time-saving methods.
All the components are developed to support our customer with cost- as well as time saving products from the beginning of embedding until the final a high quality polishing step, certainly on the highest quality level.

Just get in touch to request one of our detailed brochures!

EXCHANGE SYSTEMS

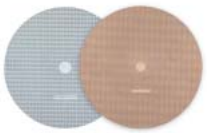
CAMEO PLATINIUM
Pre-grinding discs

NEW LAM CLASSIC
Grinding/lapping film



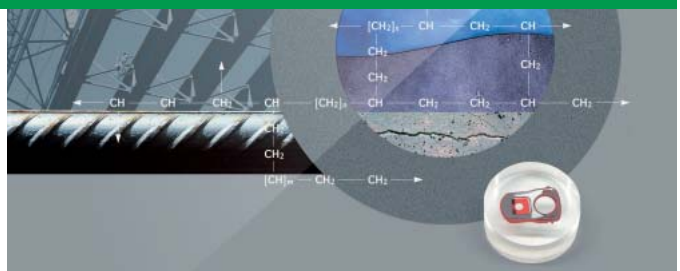
POLISHING CLOTHES
NEW LAM classic

CAMEO DISK
Fine grinding discs



BIO-DIAMANT LIQUIDS
Diamond suspensions

Heraeus



Technovit –
The resin for professional
material testing

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Kulzer: