ICT SUEDWERK
TIM Solutions & Services

ICT 4 TIM

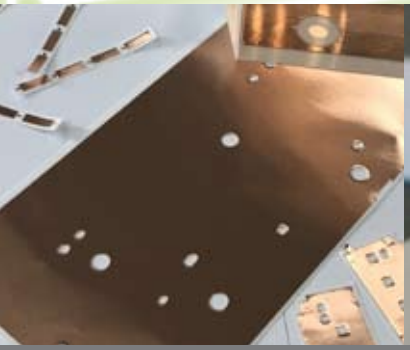
Innovative Competence Team
for Thermal Interface Materials

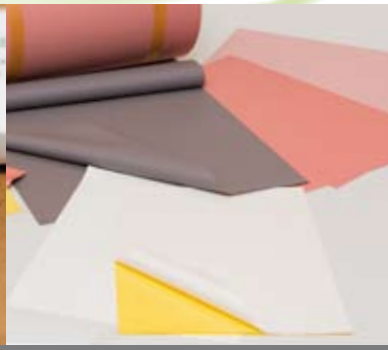
Powered by ICT SUEDWERK ○ We create better TIM´s

KEEP COOL
WHEN THINGS GET HEATED

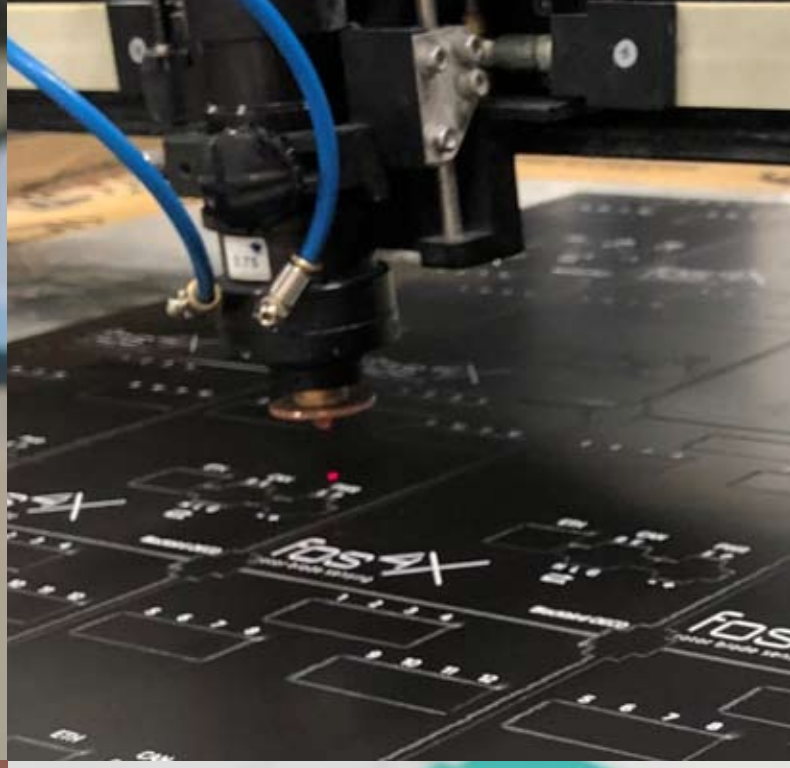
- THERMALLY CONDUCTIVE MATERIALS
- SPECIAL FOILS AND FILMS
- TECHNICAL CERAMICS

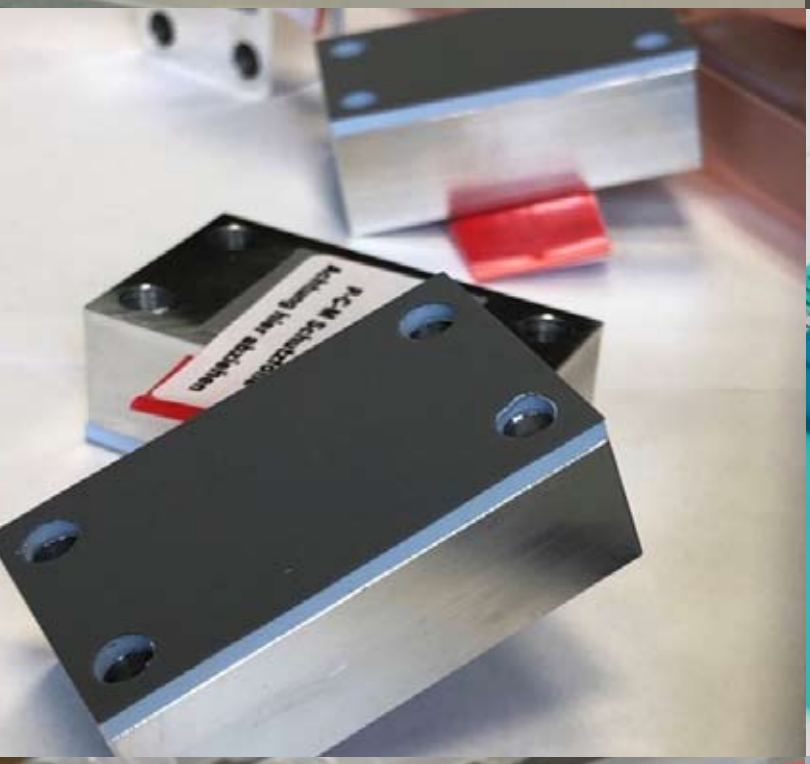
COMPANY PROFILE & PRODUCT OVERVIEW

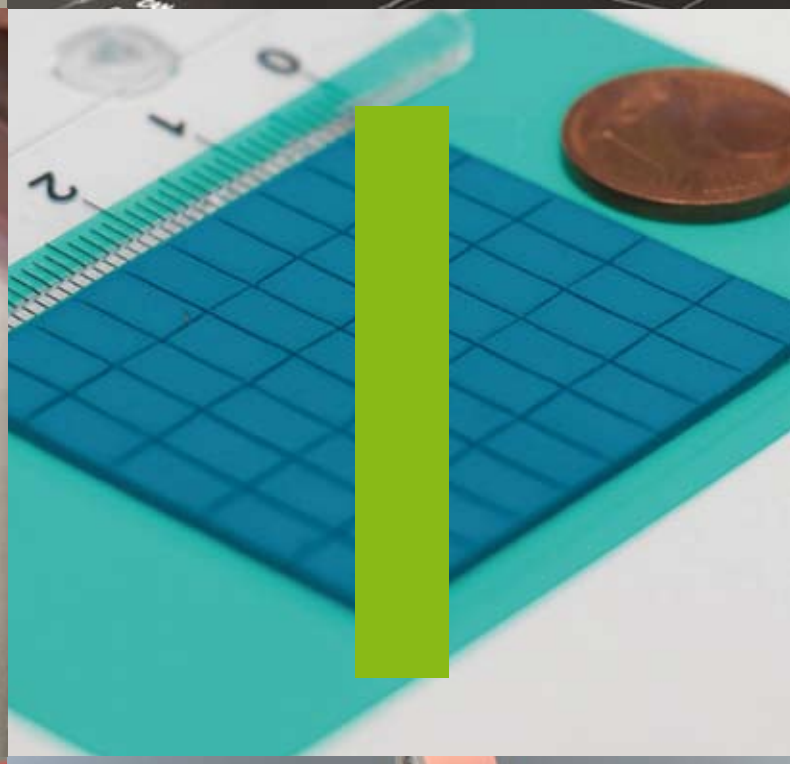


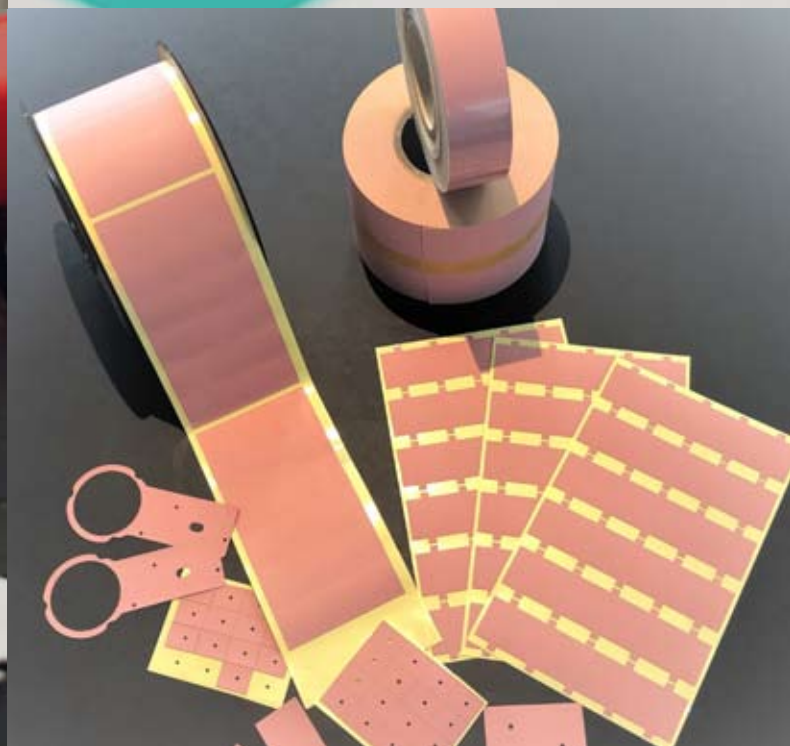



ALL YOU NEED TO MANAGE YOUR HEAT ■ INSPIRED CUSTOMIZED T.I.M. SOLUTIONS









COMPANY PROFILE

EDITORIAL

If Edison had a needle to find in a haystack, he would proceed at once with the diligence of the bee to examine straw after straw until he found the object of his search.

Nikola Tesla (1856-1943),
inventor, physicist and electrical engineer

Dear customer,

In order to help you avoid a search as tedious as Edison's, we have compiled this short overview of our most popular materials and products.

It is full of innovative ideas and information about all things like heat management and thermal transfer technology, as well as products that have stood the test of time and will continue to do so in the future.

On the following pages, you will find both well-tried and brand-new, innovative solutions. Be assured: we offer the adaptive material that is ideally suited to fit your needs!

We offer all-in-one thermal management solutions, especially for power semiconductors and active components in power electronics.

Expert technical advice and state-of-the-art in-house manufacturing (including job order production) at our headquarters in Oberhaching near Munich complete our range of services. Every day, we face up to the challenges of the world of electrical engineering.

Place your trust in us and let's rethink the future of your products together!

Yours,

Wolfgang Reitberger-Kunze

Wolfgang Reitberger-Kunze
CEO of ICT Suedwerk GmbH

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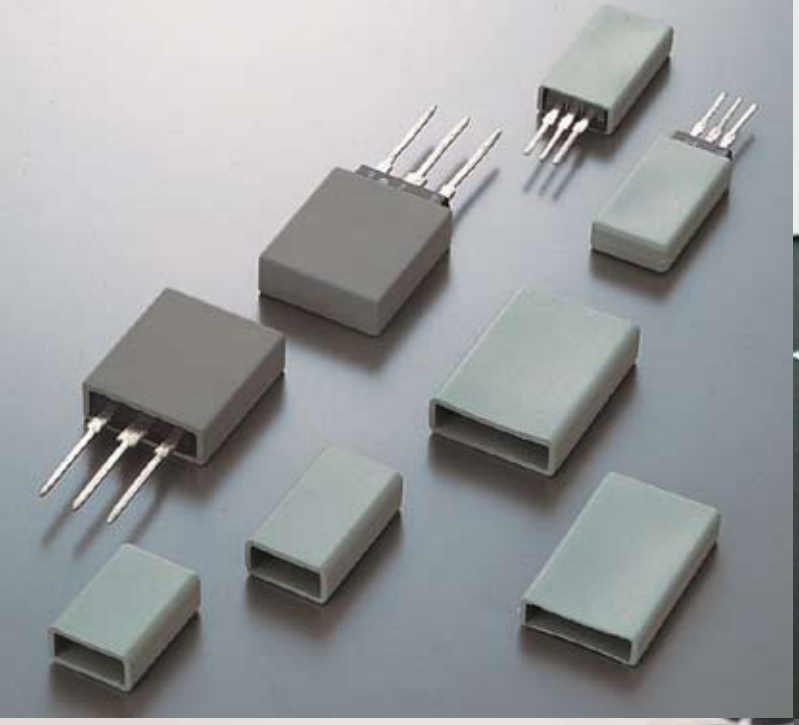
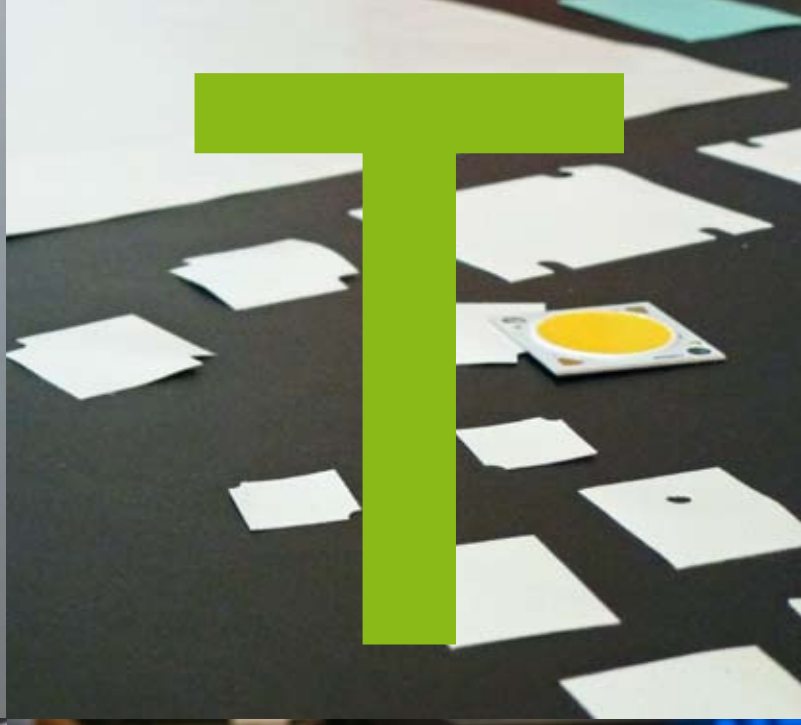
* Other gauges available through lamination!
** Other gauges available!





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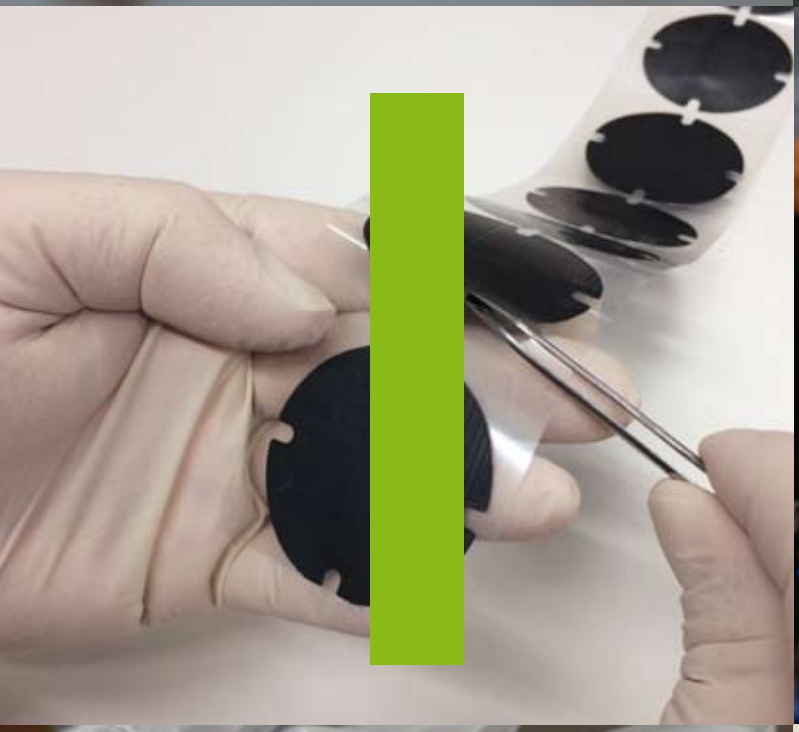


I

M

OUR PHILOSOPHY

CEO

As Owner and CEO of **ICT SUEDWERK GmbH** I would like to briefly introduce myself.

My name is Wolfgang Reitberger-Kunze. I was born in Munich/Germany in 1967 and have been working in the production and processing of thermally conductive materials for the application in power electronics for over 20 years.

In the medium-sized company Kunze Folien GmbH – later to become Aavid Kunze GmbH –, I was able to prove myself and to implement my vision and ideas, first as Head of Production, then as General Manager and finally as CEO.

OUR PROFILE

We are an all-in-one supplier, from product development to serial production. Together, we provide individual and high-quality **T**hermal **I**nterface **M**aterial solutions, always focusing on utmost precision.

Profit from our all-round service at ICT SUEDWERK, your high-performance and cost-effective partner for thermal solutions in power electronics, specializing in heat dissipation and electric insulation.

OUR CLAIM

We are driven by the desire to be the premium professional partner when it comes to heat management solutions. We stand out due to our focus on top-notch quality and sustainability, as well as our commitment to consistent and long-term business partnerships.

RESPONSIBILITY

As sustainability – both with regards to our customers and the environment – is among our highest values, all of our products are in strict conformity with RoHS guidelines. ICT SUEDWERK affords an efficient and sustainable process for your customized serial production.

ICT SUEDWERK shows competence,

MOTIVATION

In early 2017, the vision of a small, innovative enterprise became true that would include efficient product development and expert consultation in the field of polymer and technical ceramics processing.

OUR PHILOSOPY

If you don't know where you are going,
you'll end up someplace else.

Lawrence Peter "Yogi" Berra

Creativity, the flow of ideas, thinking ahead, learning from one another – a company culture of open doors and open minds. As an innovative company, we set new standards in tech know-how and service.

know-how and potential!

Since its foundation, ICT SUEDWERK has continuously proven to rightfully claim to be among the leading providers of heat management solutions.

Our state-of-the-art production facilities, which include CNC plotter-cutters and CO_2 laser cutters, as well as a wide range of other polymer processing machines, semi-automatic flatbed die-cutters, roll cutting machines and other tools in a dust-free manufacturing environment, complete our portfolio.

Our range of services spans planning, concept work and manufacturing, delivery and tech support.

In addition, we offer toll manufacturing as well as diverse services concerning the cutting and processing of plastics, technical ceramics, and many other materials.

OUR PHILOSOPHY

TO KEEP YOUR LITTLE HOT-HEADS COOL

INNOVATIVE HEAT MANAGEMENT FOR POWER ELECTRONICS

Are you looking for heat management solutions and thermally conductive materials for your application? Look no further: Wolfgang Reitberger-Kunze's ICT SUEDWERK GmbH is your reliable supplier from Oberhaching/Germany.

From pre-development to serial production, we offer our customers thermal management solutions, especially for power semiconductors and active components in power electronics.

We provide quality all-in-one customized solutions with thermal interface materials, always striving for perfection.

Technical and institutional consultancy and cutting-edge in-house manufacturing complete our portfolio.

All processes related to the making and machining of our products take place at our headquarters in Oberhaching/Germany.

OUR TARGET MARKET...

...is the electronics industry, especially companies in the area of power electronics, microelectronics and machine building, as well as businesses looking for an optimal solution for the dissipation of waste heat in general.

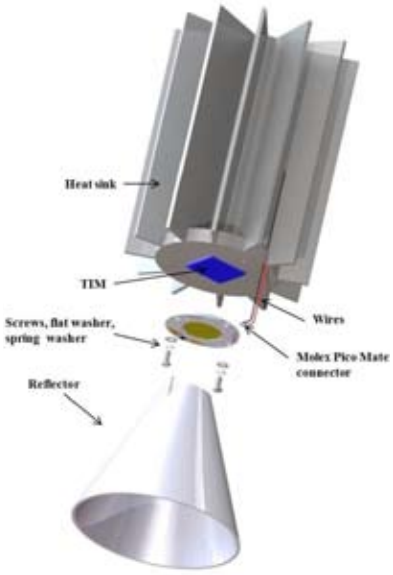
ICT SUEDWERK is a provider of integrated thermal management applications to numerous well-known customers in the automotive, aerospace, IT and controls engineering, medical technology, future mobility and green energy sectors.

OUR PRODUCTION

Our cutting-edge facilities allow us to manufacture our products in perfect synchronicity with our clients' needs and to ensure on-time delivery even when development time is short.

At our site, we produce customized applications through a semi-automated process. To guarantee customer and environmental sustainability, all our products abide by RoHS standards.

ICT SUEDWERK offers a cost-effective and sustainable process for your customized serial production, including a wide range of toll manufacturing services.



Sample image
Illustration of a lighting application, with kind permission from Bridgelux
Image depicts LED COB Vero 29

THE APPLICATION DICTATES THE MOST SUITABLE T.I.M.

Electronic systems consist of many individual components that are linked mechanically, thermically and electrically to one another. For thermal connection, **T**hermal **I**nterface **M**aterials (**T.I.M.**) in the form of foils, films, tapes, sheets, pastes etc. are used.

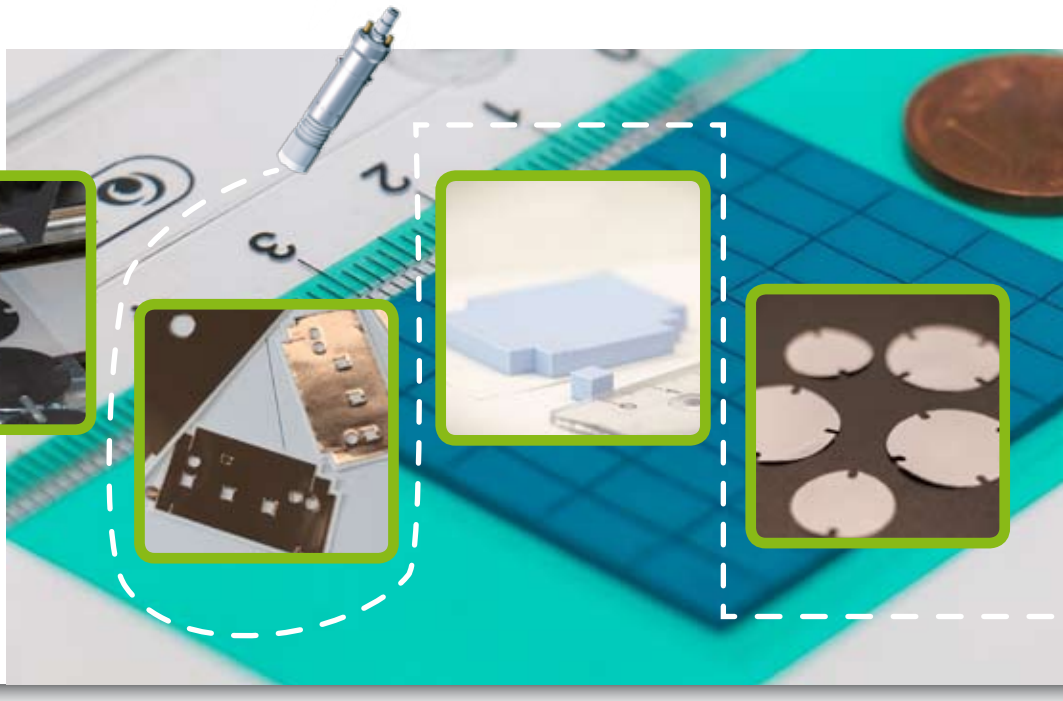
The fast-paced evolution and increasing power densities of power semiconductors these days has many users facing new challenges with regards to effective heat dissipation. In order to avoid irreparable damage to our clients' power semiconductors, we offer our active support in the development of their applications at the earliest possible stage.

Only through this, optimal thermal management can be achieved.
By implementing the ideal interface material, fitted perfectly to the component to be cooled, the thermal performance and lifespan of the entire system is considerably increased.

As a result, for example, COB LEDs could be powered more highly, which in turn results in increased light yield. Or, conversely, the increased light yield could be used to decrease the number of LEDs employed in the build.

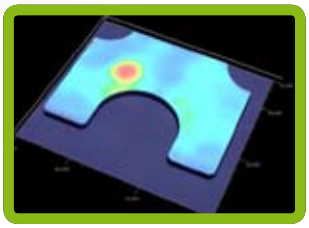
This means that, through efficient heat sink arrangement, better light yield can be achieved at identical load per application. In turn, this helps to significantly reduce production costs, while simultaneously increasing durability.
A true win-win situation!

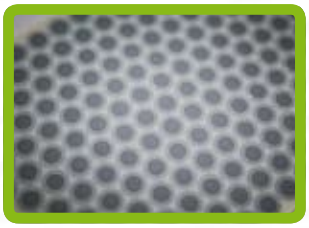
Through thick and thin: Precision cutting "to the µm" is our specialty!



COMMITMENT TO QUALITY

WE ENSURE THE QUALITY AND RELIABILITY OF YOUR POWER ELECTRONICS APPLICATIONS...





...THROUGH A SOPHISTICATED QUALITY AND ENVIRONMENTAL MANAGEMENT SYSTEM, ENSURING THE HIGHEST STANDARDS ALWAYS...


CERTIFICATE

ICT SUEDWERK GmbH

DIN EN ISO 9001:2015
DIN EN ISO 14001:2015

Illustration of contactless optical 3D and CNC coordinate measuring systems

COMMITMENT TO QUALITY...

All sectors of our enterprise undergo regular evaluation of their work and operational procedures. High and constant quality of the workflow and error prevention are our prime QM targets.

Our success at striving for internal process optimization is reflected by ICT SUEDWERK's **DIN EN ISO 9001:2015** and **DIN EN ISO 14001:2015** certifications.

...THROUGH CUTTING-EDGE MEASURING TECHNOLOGY AND INNOVATIVE POWER PAIRED WITH SUPREME QUALITY STANDARDS...

We provide semi-automated and precise customization of a wide array of thermally conductive and other materials, at short notice and always at time required.

- On-site production facilities
- Dust-free plotter manufacturing
- Production of prototypes, individual and serial items
- All products in compliance with RoHS standards
- Efficient processing of supersoft, flexible or rigid T.I.M.s, as well as laser and CNC engraving
- Processing of other soft plastics and elastomers (including foamed plastics up to 15mm)
- Measuring of films and other materials up to 200 x 250 mm
- Automated, precise cutting and grooving
- Manufacturing of complex kiss-cuttings and innovative laser CNC engravings
- Workflow and materials supply chain adapted to on-demand manufacturing
- Just-in-time production
- Reduced delivery period through innovative production process
- Diverse contract manufacturing

...AND FOLLOWING MEMBERSHIPS:

FCPE

Der Mittelstand. BVMW e.V. Bundesverband
MITGLIEDSUNTERNEHMEN

Cluster Leistungselektronik

ZFW Zentrum für Wärmemanagement

TÜV SÜD Management Service

PRODUCTION FACILITIES

- State-of-the-art hard- and software systems (e.g. CAD Arden Impact 3D and Icaro)
- Cutting-edge contactless optical 2D and 3D laser measuring systems
- Latest generation Zünd digital cutter-plotters (S3 Digital Cutter, 1200 & 1600 Tandem).
- Modern and innovative camera-controlled CO_2 laser cutting machine by SEI (H-TYPE Portal System)
- Electronically controlled flat-bed die-cutters, roll cutters and other production and machining tools
- Heatable laminating plant

UL-CERTIFIED REPACKAGER

UL-CERTIFIED REPACKAGER

Product liability legislation in the US and Canada is far stricter than in the European Union. Companies wishing to export their electronic products, component parts or accessories to North America are recommended to have their products certified by UL standards. The use of UL-listed materials is therefore an increasing priority in the development of hardware, components, and in labelling.

ICT SUEDWERK has taken the necessary steps and is now a UL-certified repackager. The UL Repackaging Program warrants the complete traceability of all basic materials in any given chain of custody, from the raw material supplier to the final product. To this end, clearly defined labelling rules must be observed during all steps of the manufacturing process, such as stamping, cutting, molding etc. Every UL repackager is required to undergo a quarterly, unannounced, on-site audit and certification to guarantee compliance with all relevant standards.

All ICT SUEDWERK products are consultable upon request in the mandatory UL Files of the suppliers and are stated in the labelling, according to UL requirements. **Full traceability is therefore ensured.**

TECHNICAL CONSULTANCY

Do you have any questions or do you need additional information regarding product-specific data sheets?

T + 49 (0)89 21 23 102-0

FILE E 506942

ICT SUEDWERK GmbH
Repackaged Recognized Components

TEOU2. E506942-
Repackaged Recognized Components

FILE E 506942

FILE E 506942

ICT SUEDWERK GmbH
Repackaged Recognized Components Certified for US & Canada

TEOU2. E506942-
Repackaged Recognized Components

REACH/ROHS

The **REACH** regulation of the European Union, (EC) No. 1907/2006, concerns the circulation of chemical substances within the EU and was passed in 2006.

The acronym stands for **R**egistration, **E**valuation, **A**uthorisation and restriction of **C**hemicals. The regulation is effective equally and immediately throughout all member states of the the EU. The system it imposes is based on the notion of corporate responsibility. Following the principle of **"no data, no market"**, all chemicals must be registered to be brought into circulation within the Union.

All distributors, including manufacturers but also industrial processors and wholesalers of these chemical materials within the scope of **REACH**, must have their products registered under the regulation.

For all our products listed in the catalogue, we, ICT SUEDWERK GmbH, as processor and supplier and in cooperation with our business partners (material suppliers) make available EU Safety Data Sheets as well as product-related **REACH** declarations.

In theses documents, you will find all the relevant information regarding our products.
For further information, we are at your disposal.
Please contact us at: Qualitaet@ict-suedwerk.de

TECHNICAL CONSULTANCY

Do you have any questions or do you need additional information regarding product-specific data sheets?

T + 49 (0)89 21 23 102-0

Source: German Federal Environmental Agency; see also: https://www.umweltbundesamt.de/themen/chemikalien/reach-chemikalien-reach

FUNDAMENTALS

INTRODUCTION

Power semiconductors, when in operation, produce a considerable amount of waste heat. If this heat is not dissipated adequately, it may lead to the destruction of the component and of the whole application.

In order to dissipate excess heat, power semiconductors are connected to so-called heat sinks such as coolers, thermally conductive plates, liquid-cooled plates, or simply casings. Rarely, however, the surfaces of the components and the heat sinks are entirely flat, which means that – without additional machining (e.g. the planing/polishing of the contact surfaces) – excellent thermal connections cannot be achieved.

Moreover, in many applications it is necessary to electrically insulate the component art from the carrier or substrate. This requires an electrically insulating material with low thermal resistivity.

FUNDAMENTALS

Dissipation of heat away from its source (e.g. transistor junctions) occurs through several layers of different materials, before the waste heat can be effectively transferred to the surrounding air, either through natural convection or active ventilation (forced convection).

Heat flow **H** (amount of heat **Q** transported per time unit) through a layer at thermal equilibrium is generally given as **A** being the contact surface, **dT/dx** being the gradient of temperature over the thickness of the layer, and **k** being the specific thermal conductivity of the interface material.

See text

$$H = \frac{dQ}{dt} = -kA \times \frac{dT}{dx}$$

In the case of a homogenous material of even thickness and at thermal equilibrium, the formula can be simplified as

See text

$$H = kA \times \frac{T2 - T1}{d}$$

where the temperature **T2** is greater than **T1** and **d** stands for layer thickness.
The specific thermal conductivity **k** is a material constant. The higher the value of **k**, identical geometries provided, the better thermal transport.

SOME VALUES FOR k

See text

Aluminium (99%):	**220 W/mk**
Graphite:	**169 W/mk**
Steel:	**45 W/mK**
Technical Ceramics (ALO):	**25 W/mK**
Air:	**0,0026 W/mK**

Analogous to the formula for electric current, the above equation may be stated as

See text

$$H = \frac{\Delta T}{R_{th}} \qquad H \times R_{th} = \Delta T$$

with $\mathbf{R_{th}}$ being thermal resistivity. By comparison with the above formula, $\mathbf{R_{th}}$ can be expressed as follows:

See text

$$R_{th} = \frac{d}{k \times A}$$

$\mathbf{R_{th}}$ is usually given in units of **°C/W.**

Quite obviously, thermal resistance depends both on material geometries and thermal conductivity of the interface. Thermal resistance decreases with increased contact surface, increased thermal conductivity and decreased layer thickness. It is therefore often stated as $\mathbf{R_{th}}$ Material.

Another influential factor affecting thermal transfer between two contact surfaces is thermal contact resistance, $\mathbf{R_{th}}$ Contact. In reality, surfaces are always uneven to some degree, and the larger the surface, the greater the detrimental effect of convex, concave or wave-like irregularities. As the thermal conductivity of air is very low, air pockets between layers have a negative effect on thermal transfer.

The heat path is limited to the actual points of contact between the two surfaces.

Thermal contact resistance, therefore, is a function of contact area, surface quality, evenness, adaptability of the interface material, and contact pressure.

Total thermal transfer resistance is the sum of the thermal resistance of the material and the thermal contact resistance:

See text

$$R_{th\ Total} = R_{th\ Material} + R_{th\ Kontakt}$$

In practice, contact surface area is limited by the dimensions of component casings. Material thickness is also limited by the application's requirements with regards to electric insulation, as well as by surface irregularities which the thermally conductive layer needs to compensate.

MATERIALS

In current electrical engineering, a large variety of thermally conductive insulating materials is in use. These include elastomers with thermally conductive fillers; polyimide films with a soft, thermoconductive coating; and also compression-molded or cut-to-measure ceramic parts in combination with thermally conductive paste.

ELASTOMERS

The time-consuming application of thermally conductive pastes, in combination with the problem of contamination of builds with components of the pastes led to the development of elastomeric insulating materials. These are composed of a binding agent and a thermally conductive filler. When subjected to pressure, these materials adapt very well to the contact surfaces, making for significantly reduced thermal contact resistance between them.

The most commonly used elastomeric binder is silicone rubber. Aside from its high dielectric strength and good chemical durability, silicone rubbers is highly temperature resistant.

By choosing the right surface pressure, thermal contact resistance can be optimized. As silicone rubber has a high degree of molecular cross-linking, there is practically no risk of silicone molecules leaking from the interface material over time and contaminating the build.

Elastomeric binders, by themselves, possess low thermal conductivity. They are able, however, to absorb considerable quantities of thermally conductive fillers.

By adding ceramic powders, the thermal conductivity of these materials can be enhanced. A cost-effective option is aluminium oxide as a ceramic filler. In comparison with mica or ceramic insulators, elastomeric insulating layers filled with aluminium oxide possess only medium thermal conductivity. They should, nevertheless, be sufficient for most applications.

HIGHLY THERMOCONDUCTIVE FILLERS

Another highly thermoconductive filler is boron nitride. It is more fine-grained and less dense than aluminium oxide and therefore renders the rubber softer and more supple. Its thermal conductivity is also far superior than that of aluminium oxide, but it is also more expensive. Elastomeric sheets filled with boron nitride adapt more easily to irregularities of the contact surfaces, minimizing thermal contact resistance. Elastomers filled with thermally conductive ceramics can also be reinforced with backing materials.

As a carrier, fibreglass is most commonly employed. The denser the fabric, the higher the dielectric strength of the sheet, while its thermal conductivity is reduced. A fibreglass substrate, at any rate, affords superior mechanical durability and flexibility of the insulator.

The thermal resistance of elastomeric insulating sheets depends much less on processing. In addition, the minimal tolerances in their manufacturing allow for only minimal variation in their thermal resistance. This, in turn, ensures process reliability and reproducibility in their application.

FUNDAMENTALS

POLYIMIDE FILMS ...

... can also be used for the electric insulation of component parts. The possess high dielectric strength and are tough and flexible at the same time, which makes them largely resistant to puncture or rupture.

Polyimide films are relatively poor thermal conductors, which requires for these **T.I.M.**s to be very thin and to be used mostly in conjunction with thermally conductive polycarbonate coatings.

In this context, highly thermoconductive phase-change materials, e.g. polymer-based materials or thermally conductive silicones are ideally suited for application to ensure almost complete contact surface linkage by wet-out.

PHASE-CHANGE MATERIALS

Phase-change interface materials consist of a thermally conductive substance which undergoes a phase-change, i.e. turns soft, at a predefined temperature. When returning to lower temperatures, the substance goes back to its solid state.

In its soft state, the material expands actively, wetting the contact surfaces, expelling air pockets from the micro-pores in the surfaces and compensating irregularities.

This results in optimal thermal linkage, minimizes thermal contact resistance and, consequently, total thermal transfer resistance. For mechanical stabilization, phase-change materials may be applied onto electrically insulating carriers such as polyimides, or onto electrically conductive metals such as aluminium, depending on the specific requirements regarding electric insulation.

GRAPHITE FILMS AND PYROLYTIC GRAPHENE FILMS

Ultrapure graphite films are manufactured in a special process (flaked structure) from natural carbon (98% purity) or from synthetic, pyrolytic graphene. They possess excellent thermal conductivity and very high temperature resistance up to 450°C; some high-performance materials are even able to withstand 650°C.

For the cooling of hotspots, these films and foils have proven highly efficient, as they are highly anisotropically thermoconductive due to their structure. They allow for waste heat to be spread over the interface film, away from point sources (hotspots), and precisely dissipated.

The anisotropic heat-conducting qualities especially of pyrolytic graphene films can exceed 1900 W/mK in the x-y plane and reach up to 25 W/mK in the z-plane. Due to their texture, the films adapt very well to the contact surfaces, making for minimal total thermal transfer resistance.

CERAMIC WASHERS

Insulating washers made from technical ceramics are also an option. These are usually made of aluminium oxide, beryllium oxide, boron nitride or aluminium nitride. They are – like mica – very hard, so that they mostly need to be used in combination with thermally conductive paste to ensure good thermal linkage. Mechanical treatment of the contact surfaces (polishing, lapping), however, can greatly reduce thermal contact resistance.

The thermal conductivity of ceramic washers is considerably higher than that of the mica commonly used in former times. To ensure high dielectric strength, therefore, ceramic washers can be used in thicker gauges. Technical ceramics are being increasingly employed due to novel manufacturing possibilities.

It must be taken into consideration, however, that technical ALO and ALN ceramics are more expensive than thermally conductive films or foils and that, to minimize thermal contact resistance, thermally conductive paste or phase-change materials are usually necessary as additional interface.

Another critical characteristic of ceramics is their brittleness and tendency to break, depending on material thickness. If ceramic washers are to be used in an application, contact surfaces must be very clean and even and assembly must be carried out with the utmost precision and care.

FINAL REMARKS

The breathtaking speed of technological evolution in the semiconductor and power electronics sector and the concomitant, continuous increase in power densities has many manufacturers facing enormous challenges regarding efficient thermal management. Their R&D engineers are taking recent developments very seriously and try to identify, through costly and time-consuming computer modelling, long-term trials and previous thermal simulations, the best possible interface materials.

These methods and procedures can help to greatly reduce costs and to save significant amounts of time in the development of power electronics applications by finding faster solutions to heat management problems. They can, nevertheless, only point in the right direction and can never substitute the final, practical testing of the application.

In the quest for the ideal solution, matters of cost-benefit-ratios, spatial restrictions and overall efficiency must, of course, always be taken into consideration. After all, it is the application which dictates the most suitable **T.I.M.**!

APPLICATION AREAS

We offer **T.I.M.** and additional products,
cutting sizes in according to customized drawings,
worldwide in following application areas:

COMPOSITION OF ICT PRODUCT NUMBER

EXPLANATION PRODUCT CODE VARIANT 1 → BASE MATERIAL:

	ICT SUEDWERK	MATERIAL	NUMBER	FORM OF DELIVERY
EXAMPLE:	ICT	TC-GFPS	4010	2 H | SHEET/MAT/BULK

LABELLING

L = BULK (LOOSE)
KT = KISS-CUT ON SHEET
KR = KISS-CUT ON ROLL
SG = BULK
SET = SET FORMAT

0 H = NON-ADHESIVE
1 H = ADHESIVE ONE SIDE
2 H = ADHESIVE BOTH SIDES
1 K = ADHESIVE ONE SIDE
2 K = ADHESIVE BOTH SIDES

MATERIAL-SPECIFIC NUMBER CODING

MATERIAL TYPE

EXPLANATION PRODUCT CODE VARIANT 2 → MATERIAL CUT:

ICT SUEDWERK	MATERIAL	NUMBER	ADHESION	FORMAT	MEASUREMENTS	FORM OF DELIVERY
ICT	TC-GFPS	4010	2 H	KS	0,00 x 0,00 MM	SHEET/MAT/BULK

LABELLING

COMPONENT MEASUREMENTS **IN MM AND/OR M**

KS = CUSTOMIZED
STA = STANDARD
SHC = SCREW-HOLE-CUT
DM = DIAMETER/FORM

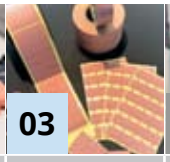
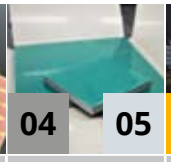
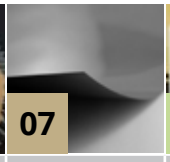
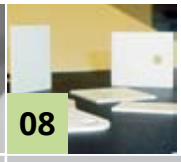
T.I.M.s – FORMS OF DELIVERY

INNOVATIVE AND HIGHLY EFFICIENT THERMALLY CONDUCTIVE MATERIALS BY ICT SUEDWERK ...

... can be used whenever there is waste heat to be dissipated immediately and seamlessly. Thanks to their material properties, **T**HERMAL **I**NTERFACE **M**ATERIALS – **T.I.M.**s are able to compensate surface irregularities and gaps. By expelling air pockets, replacing air by a highly thermoconductive **T.I.M.**, the heat path is optimized and the electronic component part can be cooled efficiently. If needed, the **T.I.M.** also ensures electric insulation between the component parts and the heat sink.

As an all-in-one supplier of thermally conductive materials, we offer a wide range of solutions for connecting heat source (component parts, e.g. power semiconductors, active component parts) and heat sink (cooler, PCB or chassis). Our products unite high-quality manufacturing with excellent thermal and electrical properties, affording innovative, integrated solutions in heat management and insulation technology.

Our heat management solutions allow you to prevent system failures as well as many other performance issues at an early stage → ICT SUEDWERK IS YOUR TEAM!

TECHNICAL CONSULTANCY **T +49 (0)89 21 23 102-0**	 01	 02	 03	 04 05	 06	 07	 08
FORMS OF DELIVERY	PSA-Foils Films Strips	Caps Tubes Foils Strips	Foils Films unreinforced reinforced	Gapfiller-pads Gapfiller-gel Soft-pads	Thermo-conductive phase-change materials	Graphite-Films Synthetic Pyrolytic Graphene Films · Foils	Thermo-conductive technical ceramicsen
Available silicone-based	✓	✓	✓	✓	✓		
Available silicone-free	✓		✓	✓	✓	✓	✓
Fibreglass reinforced	✓		✓	✓			
Polymer reinforced (PA, PET, PI)	✓		✓	✓	✓	✓	
Metal reinforced (AL, Graphite, CU)					✓	✓	
Material hardness (compressible)							
Hard surfaces	✓	✓	✓	✓	✓	✓	✓
Soft surfaces	✓	✓	✓	✓	✓	✓	
Soft-, compressible surfaces	✓			✓		✓	
Ultrasoft-, compressible surfaces				✓			
Electrically insulating	✓	✓	✓	✓	✓		✓
Adhesive variants							
Non-adhesive		✓	✓	✓	✓	✓	✓
Naturally adhesive, on both sides	✓		✓	✓	✓	✓	
on one side	✓		✓	✓	✓	✓	
On one side/on both sides adhesive	✓		✓	✓		✓	
On-roll	✓	✓	✓		✓	✓	
Mat/Carrier format	✓	✓	✓	✓	✓	✓	✓
Discrete transistor formats (TO)	✓	✓	✓	✓	✓	✓	✓
Customized designs	✓	✓	✓	✓	✓	✓	✓
Special delivery formats	✓	✓	✓	✓	✓	✓	✓

OTHER PRODUCTS BY ICT SUEDWERK

Our product range includes a broad array of electrically insulating surface insulation films, as well as sheets and semi-finished products made from **polyamide, polyimide, polyester, polycarbonate, aramide paper, PEEK, ISOLA 400, hard paper, acrylic,** and **epoxy fibreglass reinforced material**, from leading suppliers. Other special materials such as **single-** or **multi-coloured special polymers** for laser and CNC engraving, and **insulating bushings** made from thermally resistant and particularly durable **PA** and **SR polymers** complete our portfolio of polymer materials.

In addition, we are able to supply a selection of **metallic foils** consisting of **aluminium** and **copper**, **electrically conductive metallized fabrics** and **fleeces** with diverse **metallic coatings (Ni/Cu, Ag/Cu)**. Our **EMC shielding foils** are manufactured from very thin copper foils which can be laminated on one or both sides, according to customer requirements, with electrically insulating polymer films **(PI/ PET/PEEK).**

Customer-specific measurements and special delivery forms → ICT SUEDWERK IS YOUR TEAM!

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FORMS OF DELIVERY	Sufrace-/ Insulating-Foils, -Sheets, Bushings	Metallized fabric/ -Foils, Copper, Aluminium Films · Foils · Plates	PMMA-Acryl Plexiglass Foils · Plates	Polymers, Thermosets, Hard paper, Epoxy, Glass, Hard fabric
Available silicone-based	✓			
Available silicone-free	✓	✓	✓	✓
Fibreglass, Epoxy reinforced or laminated	✓		✓	✓
Polymer reinforced (PA, PET, PI)	✓	✓	✓	✓
Metal reinforced (AL, Graphite, CU)	✓	✓		
Material hardness (compressible)				
Hard surfaces	✓	✓	✓	✓
Soft surfaces	✓			
Soft-, compressible surfaces				
Ultrasoft-, compressible surfaces				✓
Electrically insulating/UL	✓		✓	✓
Adhesive variants				
Non-adhesive	✓	✓	✓	✓
Naturally adhesive, on both sides		✓		✓
on one side	✓	✓	✓	✓
Adhesive	✓	✓	✓	✓
On-roll	✓	✓		
Mat/Carrier format	✓	✓	✓	✓
Discrete transistor formats (TO)	✓	✓	✓	✓
Customized designs	✓	✓	✓	✓
Special delivery formats	✓	✓	✓	✓

01 THERMALLY CONDUCTIVE SILICONE-FREE PSA FILMS
ACRYLATE-BASED, UNREINFORCED/REINFORCED

PRODUCT DESCRIPTION

ICT SUEDWERK is able to supply a wide range of thermally conductive, silicone-free PSA (Pressure-Sensitive-Adhesive) films and strips that are (strongly) adhesive on both sides, based on acrylate with excellent thermal and electrically insulating properties.

The thermally conductive, silicone-free PSA products are resistant to high temperatures and ensure outstanding application reliability. Due to their auto-adhesive structure, they are eminently suited for the thermal connection of heat sinks (coolers) to electrically insulating or non-insulating power components.

The double-sided adhesive strips allow for quick and easy application, by simple removal of the protective film, to almost any surface. They are generally used wherever silicone-based **T.I.M.**s can not be employed for chemical or other application-specific reasons.

For increased mechanical stability, PSA materials are also available in fibreglass-reinforced or polymer-laminated versions.

TYPICAL AREAS OF APPLICATION

Thermally conductive, silicone-free PSA films and strips are suitable for application in the most diverse contexts:

- LED modules (strips, arrays, etc.)
- discrete semiconductors MOSFETs,
- diodes and other semiconductor components

Applications e.g.:

- oscillators, power supply units, LED lighting
- engine controls, automotive applications
- solar tech usw.


Sheet of customized kiss-cut PSA material


Loose cuts of PSA film for standard LED designs


Sheets of specific kiss-cut PSA films for standard LED formats

Background image: In-house high-performance plotter at ICT SUEDWERK during serial production of T.I.M. cuts

This QR code will take you directly to the product

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Do you have any questions or do you need additional information regarding product-specific data sheets? We are happy to assist you in the development of your products. Don't hesitate to contact us!

THERMALLY CONDUCTIVE SILICONE-FREE PSA FILMS
ACRYLATE-BASED, UNREINFORCED/REINFORCED

01

electrically insulating

PRODUCT PROPERTIES

- Thermal conductivity between 0.8 and 3.0 W/mK
- Low thermal resistivity Rth (0.1 to 0.8 °C-inch²/W)
- High dielectric strength (> 1 kV AC)
- Material thickness from 0.10 to 2,00 mm (other gauges available upon request)
- High peel strength and tear resistance
- Excellent wetting properties
- High temperature resistance and reliability (-60°C to 150°C)
- Flame proofing (UL 94 VO) for many variants

PRODUCT VARIANTS

- Acrylic polymer-based with ceramic filler
- Dielectric
- Re-positionable (detachable) or quick-adhesive
- Hard or soft/compressible adhesive surface
- Variable Shore-A hardness degrees available
- Unreinforced or reinforced (mesh, fibreglass or carrier film, e.g. Peek, PI, PET)
- Very thin material gauges possible

PROPERTIES AND ADVANTAGES AT A GLANCE

- Excellent handling due to reliable adhesion even on uneven or difficult surfaces
- Additional mechanic attachment (screws, clips, bolts etc.) may be unnecessary, depending on application
- Process-safe handling /pre-applicable during montage
- No smearing (smudge-free) and no migration, as opposed to thermally conductive pastes
- Solvent-proof and low outgassing
- Highly process-safe due to even layer thickness

DELIVERY FORMS AND VARIANTS

- In sheets or on rolls
- Bulk stamped units or kiss-cut punched parts on sheet or roll
- In defined mat formats with release liner on both sides
- In defined roll formats with one-sided carrier/release liner or, if required, with release lining on both sides (PET film or silicone-coated paper)
- Other customer-specific delivery formats available upon request

Background image: Customized High-Power LED application

02 THERMALLY CONDUCTIVE CAPS, FILMS, TUBES AND STRIPS
SILICONE-BASED

PRODUCT DESCRIPTION

ICT SUEDWERK offers a broad selection of caps, tubes films and strips made from silicone with a thermally conductive ceramic filler. The all-round electric insulation of the component part afforded by caps and tubes, depending on material thickness, makes for optimal protection against electric breakdown, minimizing dielectric creepage.

The silicone used for these materials guarantees durability. Silicone's other physical property, its ability to reduce its volume, i.e. to be compressible, makes for its application adaptability. Under pressure, it can adapt to contact surfaces, reducing total thermal transfer resistance.

The large variety of ICT caps, tubes and strips is available for the usual standard casings TO 220/TO 3P and TO 247. All tubes and strips listed here are also available in different diametres, lengths and thicknesses. Other material dimensions may be available upon request.

TYPICAL AREAS OF APPLICATION

Thermally conductive silicone caps, tubes, films and strips are generally used in a broad application spectrum, such as :

- discrete semiconductors, diodes and other semiconductor and component parts, LED strips and arrays ...

Applications e.g.:

- power semiconductor technology, power supply units
- electric drives, telecommunications, engine controls, frequency converters, UPS, USV.

Thermally conductive silicone caps TO 220 and 247

Thermally conductive silicone tubes TO 220 and 247

Thermally conductive silicone tubes cut to customer specifications

Background image: Thermally conductive silicone caps and tubes TO 220 and 247, mounted on discrete semiconductors

This QR code will take you directly to the product

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Do you have any questions or do you need additional information regarding product-specific data sheets? We are happy to assist you in the development of your products. Don't hesitate to contact us!

THERMALLY CONDUCTIVE CAPS, FILMS, TUBES AND STRIPS

SILICONE-BASED

02

electrically insulating

PRODUCT PROPERTIES

- Thermal conductivity from 0.8 to 4.00 W/mK
- Low thermal resistivity Rth (0.2 to 1.4 °C-inch²/W)
- Very high dielectric strength (> 3kV - >20 kV AC)
- Material thickness from 0.15 to 1.00 mm (other gauges available upon request)
- High temperature resistance and reliability (-60°C to 200°C)
- Non-flammable (UL 94 VO) for most variants

PRODUCT VARIANTS

- Silicone-based with ceramic filler
- Dielectric
- Re-positionable (detachable)
- Hard surface or easily compressible
- Variable IRHD / ISO 761 hardness degrees available (55 to >95)
- Very thin material gauges possible (0.15 –0.20 mm)
- TO 220, TO 3P and TO 247 and other designs are possible

PROPERTIES AND ADVANTAGES AT A GLANCE

- Very high thermal conductivity, minimal total thermal transfer resistance
- Safe all-round insulation; additional mechanical fastening (screws, clips, bolts etc.) are possible, depending on application design
- Solvent-proof and low outgassing
- High flexibility, quick and clean handling
- Very process-safe due to even, predefined material thickness

DELIVERY FORMS AND VARIANTS

- On rolls (tape)
- Bulk stamped units (tapes)
- Available in many TO formats as caps or tubes
  → TO 220, TO 3P and TO 247 (218/264 and multiwatt) and others
- Other customer-specific delivery formats available upon request

Background image: Thermally conductive silicone caps TO 220 and 247, mounted on discrete semiconductors

03 THERMALLY CONDUCTIVE FOILS, FILMS, FIBREGLASS POLYIMIDE (REINFORCED)

SILICONE-BASED

PRODUCT DESCRIPTION

The thermal conductivity of silicone is almost zero. Only by introducing, into the polymer structure of the elastomer, thermally conductive filler particles such as boron nitride, aluminium oxide, aluminium nitride or other ceramic mixtures, the desired thermal conductivity can be achieved. Patented special methods guarantee the correct and even geometric insertion of the thermally conductive particles into the structure of the silicone rubber. The final result of this process are products with excellent thermal, mechanical and electrical properties of up to 8 W/mK.

When subjected to pressure, the great capacity of silicone to adapt to the contact surfaces comes into play. Air pockets are expelled, and thermal contact resistance – and, therefore, total thermal transfer resistance – can be minimized. Fibreglass or polyimide substrates add mechanical stability to the interface material. Some product variants are available also with adhesive coating on one or both sides.

ICT SUEDWERK offers a wide and varied range of the most diverse, highly thermally conductive and electrically insulating T.I.M. foils and films.

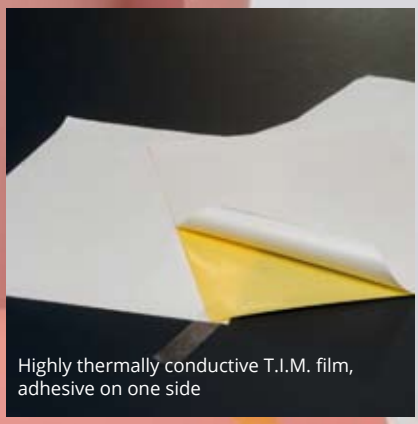
TYPICAL AREAS OF APPLICATION

Thermally conductive foils and films are used in manifold applications in

- high-Power LEDs (strips, arrays etc.), discrete semiconductors MOSFETs
- diodes, and other semiconductor and component parts, power semiconductors, brake resistors, heating resistors, etc.

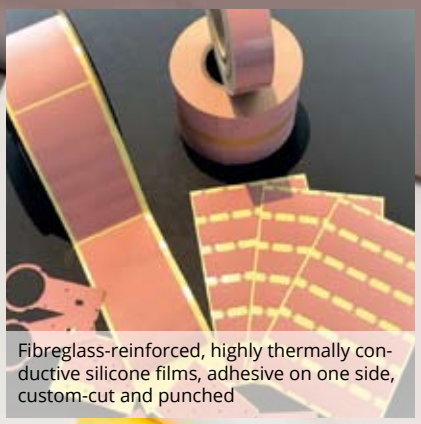
Applications e.g.:

- AC converters, power supplies, electric drives, engine controls, frequency converters
- UPS, LEDs, automotive
- photovoltaics, etc.



Highly thermally conductive T.I.M. film, adhesive on one side

Die-cut highly thermally conductive film, adhesive on one side



Fibreglass-reinforced, highly thermally conductive silicone films, adhesive on one side, custom-cut and punched

Background image: Fibreglass-reinforced, silicone-based thermally conductive films, cut to customer specifications by our in-house production

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THERMALLY CONDUCTIVE FOILS, FILMS, FIBREGLASS POLYIMIDE (REINFORCED) SILICONE-BASED

03

electrically insulating

PRODUCT PROPERTIES

- Thermal conductivity from 0.80 to 8.00 W/mK
- Low thermal resistivity Rth (from 0.08 °C-inch²/W)
- High dielectric strength (> 1 kV to >20 kV AC)
- Material thickness from 0.11 to 1.00 mm (other gauges available upon request)
- High temperature resistance and reliability (- 60°C to 200°C)
- Non-flammable (UL 94 VO) for most variants

PRODUCT VARIANTS

- Silicone polymer-based with ceramic filler
- Dielectric
- Re-positionable (detachable) or adhesive on one/both sides
- Hard surface or compressible/soft
- Variable IRHD/ISO 761 (55 to >95) and Shore A (85 to >90) hardness degrees available
- Unreinforced or reinforced (PET mesh, fibreglass or carrier film, e.g. PI film)
- Very thin material gauges possible

PROPERTIES AND ADVANTAGES AT A GLANCE

- Process-safe handling and pre-application due to one-sided adhesion
- Very safe electric insulation; mechanical stability due to fibreglass or substrate reinforcement; additional mechanical fastening (screws, clips, bolts etc.) are possible, depending on application design
- No smearing (smudge-free) and no migration, as opposed to thermally conductive pastes
- Solvent-proof and low outgassing
- Very process-safe due to even material thickness

DELIVERY FORMS AND VARIANTS

- In sheets or on rolls
- Loose bulk cuts or kiss-cut on sheets or on rolls
- In defined mat formats with release liner on both sides
- In defined roll formats with one-sided carrier/release liner or, if required, with release lining on both sides (PET film or silicone-coated paper)
- Other customer-specific delivery formats available upon request

Background image: Customized High Power LED application

04 THERMALLY CONDUCTIVE GAP FILLERS, PADS, SPACERS, SOFT-, ULTRASOFT-GEL SILICONE-BASED

PRODUCT DESCRIPTION

Highly thermally conductive, soft and ultrasoft, electrically insulating, silicone-based Gap Filler Pads (TC Soft Silicone Gel Pads) are suitable for applications which, aside from thermal conductivity, require the compensation of large gaps and tolerances – especially in the case of non-planar builds without pressure – as well as good electric insulation.

The high elasticity of these products additionally contributes to mechanical dampening within the application. Owing to their thermal properties, these elastomeric films – especially putty materials with low to no spring-back – are the ideal T.I.M. solution for application with electronic components on SMD circuit boards.

We are able to provide a broad range of excellent and innovative, highly thermoconductive soft elastomers with thermal conductivities ranging from 1.0 to 13 W/mK.

Some variants are equipped with carrier materials such as fibreglass reinforcement, polymer mesh, or surface lamination for added mechanical stability, and/or with one-sided adhesive that affords easy automated montage.

TYPICAL AREAS OF APPLICATION

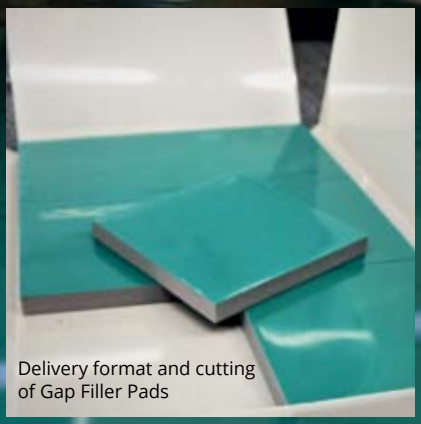
Silicone-based Gap Filler Pads for thermal linkage and electric insulation of heat source and heat sink, for compensation of large gaps and tolerances are used in:

- SMD power modules; engine controls; cooling systems; interfaces between vias in PCBs and casings or heat sinks; electrolytic capacitors; storage batteries

Applications e.g.:

- Heat-Pipes, CD-ROM coolers; CPU modules; battery storage systems
- UPS, SMPS displays etc.

Kiss-cut sheet of Gap Filler Pads



Delivery format and cutting of Gap Filler Pads

Heat sink (also from ICT SUEDWERK) equipped with Gap Filler Pad to customer specifications

Background image: Customized production of thermally conductive Gap Filler Pads in delivery and packaging format and the application of Gap Filler Pads to heat sinks (also from ICT SUEDWERK)

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THERMALLY CONDUCTIVE GAP FILLERS, PADS, SPACERS, SOFT-, ULTRASOFT-GEL SILICONE-BASED

04

electrically insulating

PRODUCT PROPERTIES

- Thermal conductivity from 1.0 to 13.00 W/mK
- Thermal resistivity <0.2 °C-inch²/W possible
- Very high dielectric strength (10 kV/mm AC)
- Material thickness from 0.25 to 10.00 mm (other gauges available upon request)
- Soft and very adaptive; very good mechanical dampening properties (plastic gap fillers lower still)
- Effective at very low or zero pressure
- High temperature resistance and reliability (-60°C to 200°C)
- Non-flammable (UL 94 VO) for many variants

PRODUCT VARIANTS

- Silicone-based elastomer with ceramic fillers
- Easy pre-application due to auto-adhesiveness; zero-residue removal after use
- Unreinforced or reinforced (PET mesh, fibreglass-PI laminate)
- Some variants possess very low outgassing rates, less low-molecular siloxane (LMW silicones)
- Very thin material gauges possible (0.25 – 0.30 mm)

PROPERTIES AND ADVANTAGES AT A GLANCE

- Process-safe handling/pre-application
- Easy montage due to natural auto-adhesion; zero-residue removal after use
- Some variants (LMW silicones) low outgassing
- Excellent mechanical dampening properties
- Very process-safe due to even material thickness
- Extraordinary elasticity and flexibility
- Low hardness (Shore 00 → <30), i.e. very soft

DELIVERY FORMS AND VARIANTS

- In sheets or on rolls (thickness <1mm) upon request for special cuts
- Auto-adhesive on one or both sides or laminated on one side
- Loose bulk, special kiss-cut formats on sheet
- Equipped with release lining on both sides (PET film)
- Other customer-specific delivery formats available upon request

Background image: Different customized cuts of thermally conductive high-performance gap filler pad materials and the serial manufacture of elaborate laser engravings of bicolour front panels for control cabinets (at our site)

05 GAP FILLERS, PADS, SPACERS, SOFT-, ULTRASOFT-GEL
SILICONE-FREE

PRODUCT DESCRIPTION

Elastic, silicone-free Gap Filler Pads consist of acrylic/acrylate resin and ensure thermal contact between component and heat sink, compensating small, medium and large gaps and sum tolerances between hot spot and heat sink, depending on build. Silicone-free gap filler films are used in applications that preclude the use of silicone-based materials. Silicone-free soft elastomers possess very good thermal conductivity and excellent dielectric strength due to advanced composite engineering. These materials are naturally adhesive/sticky and make for easy processing.

For increased mechanical stability, some variants are available with PE mesh-reinforcement. Our portfolio includes several types of outstanding and innovative, highly thermoconductive silicone-free soft elastomers, the thermal conductivity of which ranges from 1.0 to 5 W/mK. These products are soft, compressible and highly resilient. They are also light in weight and very cost effective.

TYPICAL AREAS OF APPLICATION

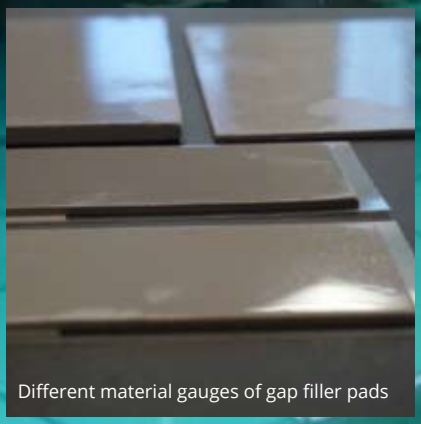
Silicone-free, acrylic-based Gap Filler Pads for electric insulation and thermal linkage of heat source to heat sink are used in:

- LED modules; discrete semiconductor MOSFETs; connections to casings or coolers; electrolytic capacitors, storage batteries etc.

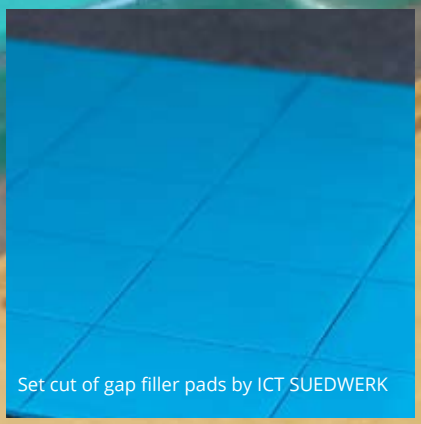
Applications e.g.:

- Battery storage systems; robotics; UPS; displays
- CPU modules; LEDs; automotive applications; white goods etc.

Kiss-cut set of gap filler pads



Different material gauges of gap filler pads



Set cut of gap filler pads by ICT SUEDWERK

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GAP FILLERS, PADS, SPACERS, SOFT-, ULTRASOFT-GEL
SILICONE-FREE

05

electrically insulating

PRODUCT PROPERTIES

- Thermal conductivity from 1.0 TO 5.0 W/mK
- Thermal resistivity <0,55 °C-inch2/W possible
- Very high dielectric strength (>8 kV/mm AC)
- Material gauges from 0.25 to 3.00 mm (other gauges available upon request)
- Soft and highly adaptable, very good mechanical dampening properties
- Effective at very low or zero pressure
- High temperature resistance and reliability (-40°C to 125/150°C)
- Silicone-free and no oil bleeding

PRODUCT VARIANTS

- Acrylic / acrylate resin-based with ceramic filler
- Hard adhesive surface if laminated, or compressible/soft
- Different hardness degrees available (Shore 00 ¬ 40 –85)
- Unreinforced or reinforced (PET mesh or PI lamination)
- Some variants very low outgassing
- Very thin material gauges possible (0.25 – 0.30 mm)
- Non-flammable (UL 94 VO) for some variants

PROPERTIES AND ADVANTAGES AT A GLANCE

- Process-safe handling/pre-application
- Easy montage due to natural auto-adhesion
- Some variants low outgassing
- Excellent mechanical dampening properties
- Very process-safe due to even material thickness
- Extraordinary elasticity and flexibility
- Low hardness (Shore 40 – 85), i.e. very soft

DELIVERY FORMS AND VARIANTS

- In sheets or on rolls (thickness < 0.50 mm) upon request for special cuts
- Auto-adhesive on one or both sides or laminated on one side
- Loose bulk, special kiss-cut formats on sheet
- Equipped with release lining on both sides (PET film)
- Other customer-specific delivery formats/cuts (in bulk or on carrier lining, also kiss-cut) available upon request

Background image left/right: Customized cutting of thermoconductive gap filler pads in delivery and packaging format, with tab and release lining protruding on the upper side

06 THERMALLY CONDUCTIVE PHASE-CHANGE MATERIALS

SILICONE-FREE, ANISOTROPIC, HIGH-PERFORMANCE INTERFACE MATERIALS

PRODUCT DESCRIPTION

Thermally conductive phase-change materials (PCM), manufactured in the form of thin films or foils or compounds, electrically insulating or non-insulating are ideal T.I.M.s for applications that require strongly reduced thermal contact resistance between the metal surfaces of the power semiconductor and the heat sink.

We offer our customers a range of 3 product variants:

TYPE 1:

The electrically insulating PCM product range in composed of a very thin polyimide carrier film – the thickness of which is optional – coated, on both sides, with silicone-free thermally conductive wax. This composition merges the excellent dielectric and mechanical properties of polyimides with the thermal capacities of heat-conductive wax. The PC thermally conductive wax is available both in a silicone-free version and in a silicone-based one. A lightly adhesive PC thermoconductive wax variant completes this product range. Phase-change temperature of these materials is at around 60°C.

TYPE 2:

This electrically non-insulating PCM product range consists of a very thin aluminium foil – the thickness of which is optional – which is also coated with thermally conductive wax on both sides. As fillers, either ceramic materials or highly thermoconductive graphite are used. Volumetric expansion of the thermally conductive wax, above phase-change temperature, by around 15-20% and the resulting wet-out of the surfaces demonstrably minimizes thermal contact resistance to < 0,09 °C-inch²/W. Phase-change temperature of theses products is around 51°C.

TYPE 3:

This non-insulating PCM product range consists of **PC freestanding thin films** enriched with highly thermoconductive ceramic or graphite/graphene particles without a carrier substrate. Beside the silicone-free variant, silicone-based **PC freestanding thin films** are also available.

ICT standard roll delivery format

PCM BAR wax sticks, PCM tubes and PCM films

Specific LED cuts of electrically insulating and non-insulating PCM films at our production facilities

Background image: Customer-specific die-cutting of thermally conductive PCM-aluminium graphite films at our facilities. Delivery format single stamped pieces on carrier film.

This QR code will take you directly to the product

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Do you have any questions or do you need additional information regarding product-specific data sheets? We are happy to assist you in the development of your products. Don‘t hesitate to contact us!

THERMALLY CONDUCTIVE PHASE-CHANGE MATERIALS 06

SILICONE-FREE, ANISOTROPIC, HIGH-PERFORMANCE INTERFACE MATERIALS

electrically insulating | non-insulating

This material range comes in diverse delivery formats – solid blocks (bars), the ICT fill-up stick or in a syringe (tube). The latter two forms are excellently suited for small-batch production, for small surfaces or for servicing applications. Phase-change temperature of theses materials is around 45-51°C.

PRODUCT PROPERTIES

- Thermal conductivity from 0.45 bis 220 W/mK
- Very low Rth (<0,08 °C-inch²/W)
- Very high dielectric strength (>4kV AC)
- Material thickness from 0.025 to 0.30 mm
- High temperature resistance and reliability (-60°C to 200°C)
- Non-flammable (UL 94 VO)
- Silicone-free and silicone-based PCMs

PRODUCT VARIANTS

- Electrically insulating/non-insulating
- Foils, films, freestanding thin film, blocks & tubes
- Non-adhesive, adhesive on one side, lightly adhesive on both sides, narrow lateral adhesive strips, loose bulk
- Also available on-roll
- Very low outgassing
- Non-flammable (UL 94 VO)

DELIVERY FORMS AND VARIANTS

- As foils/films and sheets, on-roll, blocks, tubes
- Loose bulk stamped parts, kiss-cut stamped parts on-sheet or on-roll
- In defined mat formats with both-sided release liner
- Narrow lateral adhesive strips of acrylate glue for better application available; total R_{th} remains unaffected by these; glue can be positioned outside the contact area
- Available in defined roll formats, equipped with release lining on one or on both sides (PET film or siliconized paper)

TYPICAL AREAS OF APPLICATION

Thermally conductive PCMs are used in a wide range of applications:

- LED modules (strips, arrays etc.); discrete semiconductors; diodes; IGBT modules;
- Cooling plates; as a substitute for thermally conductive pastes, etc.

Background image: Specific LED cuts of electrically insulating and non-insulating PCM films at our facilities.

07 THERMALLY CONDUCTIVE GRAPHITE FILMS SYNTHETIC PYROLTIC GRAPHENE FILMS

SILICONE-FREE, ANISOTROPIC HIGH-PERFORMANCE INTERFACE MATERIAL

PRODUCT DESCRIPTION

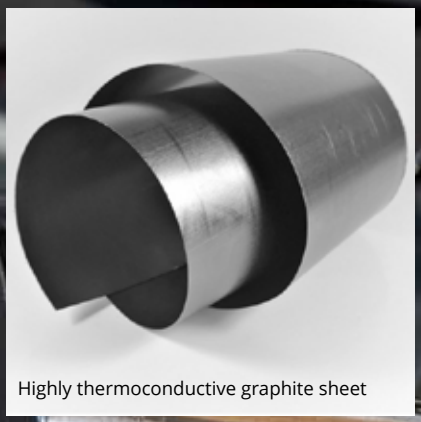
ICT SUEDWERK holds a top-range selection of the most diverse, highly thermoconductive interface materials made of natural graphite or synthetic pyrolytic graphene. The different product types pair superior thermal conductivity with very low thermal transfer and contact resistances in an ideal way. The material structure of theses products is the reason for their anisotropic conductivity, both in the **x-y direction (in-plane)** and the **z-direction (through-plane)**. As T.I.M.s, they are ideally suited for heat spreading at point sources of heat, avoiding the formation of hot spots.

The natural softness of these materials allows for direct surface contact even at very low pressure. Air pockets are eliminated, thermal contact and total transfer resistances are minimized. Graphite films are silicone-free and an alternative to thermally conductive pastes. They are excellently suited for applications which do not reach temperatures required for phase-change and therefore preclude the use of PC films. The high temperature resistance of graphite/graphene-based interface materials makes them ideal even for applications where working temperatures of >200°C are common. Owing to their electric properties, these ICT SUEDWERK products also ensure EMI shielding upt to the GHz range, with excellent dampening efficiency.

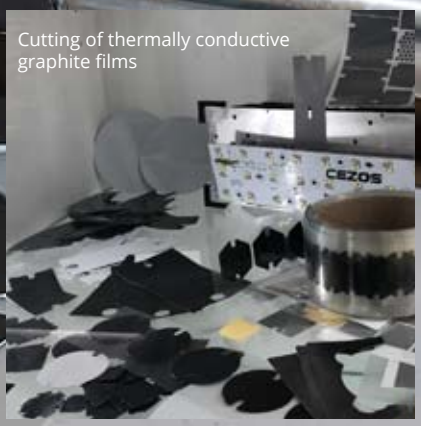
TYPICAL AREAS OF APPLICATION

Thermally conductive graphite films and synthetic pyrolytic graphene films are used in manifold applications:

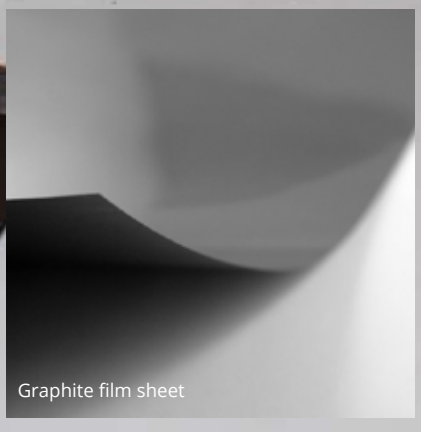
- Power-LED modules; discrete semiconductors; white goods components; IGBTs; rail-train technology; wind energy; electric drives; engine controls
- notebook computers; automotive and photovoltaic applications; DC/DC, etc.



Highly thermoconductive graphite sheet



Cutting of thermally conductive graphite films



Graphite film sheet

Background image: Customized die-cutting of thermally conductive PCM-aluminium graphite films at ICT SUEDWERK, Roll format - Loose parts stamped on carrier film

This QR code will take you directly to the product

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THERMALLY CONDUCTIVE GRAPHITE FILMS
SYNTHETIC PYROLTIC GRAPHENE FILMS

SILICONE-FREE, ANISOTROPIC HIGH-PERFORMANCE INTERFACE MATERIAL

07

electrically non-insulating

PRODUCT PROPERTIES

- Thermal conductivity up to 5-12 W/mK (Z-axis) → and from 240 to1500 W/mK (X-Y/in-plane)
- Very low R_{th} (0,08 °C-inch²/W) possible
- Excellent electrical properties
- Low density, lightweight
- High temperature resistance (250°C – 400°C)
- No drying-out, no outgassing

PRODUCT VARIANTS

- Natural graphite films → (99%), → synthetic pyrolytic graphene films
- Material gauges from 0.07 mm to 2.00 mm
- Available with one-sided adhesion and one-sided electric insulation and adhesion (PET laminate)
- Non-flammable (UL 94 VO) for some product types

PROPERTIES AND ADVANTAGES AT A GLANCE

- Very high thermal conductivity → Very low **total** R_{th}
- Good electrical properties → EM shielding; good dampening properties
- Compressible, soft and flexible → (compressible up to 50%)
- Low density (lightweight)
- Very high temperature resistance → (250°C – 400°C)
- Very process-safe due to even material thickness
- Ideal in combination with Cu as heat spreader lamination
- Excellent handling and application; long → lifespan at high temperatures

DELIVERY FORMS AND VARIANTS

- As films and foils, as sheets and panels
- Loose bulk or adhesive on one side as kiss-cut stamped parts, in bulk or on sheets (stackable)
- In defined sheet or mat formats, adhesive on one side, on PET or siliconized paper release lining
- Customer-specific cuts according to drawing; other delivery formats available upon request

Background image: Customized high-power LED application

08 THERMALLY CONDUCTIVE TECHNICAL CERAMICS
ALUMINIUM OXIDE AND ALUMINIUM NITRIDE

PRODUCT DESCRIPTION

Ceramic insulating washers consist of aluminium oxide or aluminium nitride. The ALO-96 and -99, made from aluminium oxide (Al2O3) is probably the best-known of these oxide ceramic materials.

In cooperation with our renowned German and Japanese suppliers, we are able to offer our clients a large variety of material types with different properties and different degrees of purity which are achieved through a precisely defined process. We typically provide ceramic washers between 0.5 and 2mm in thickness. Other gauges (3.0 to >5 mm or customized) are available only upon specific request.

Aluminium nitride ceramics is the **"cool" high-performance** solution, ideal for cutting-edge electronic performance. Maximum efficiency combined with high assembly density means that electronic components become increasingly hot. In this context, once again, the application dictates the most suitable T.I.M. to ensure efficient dissipation of waste heat for the protection of the component.

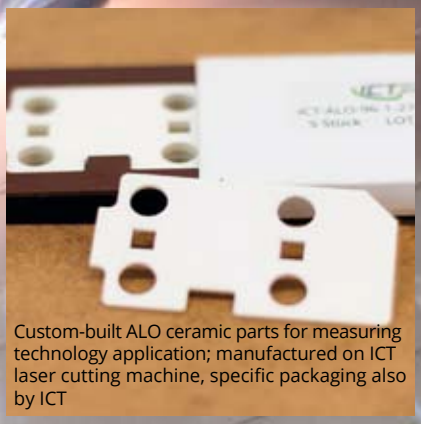
This is where ICT SUEDWERK comes into play: in collaboration with our renowned suppliers of aluminium nitride (ALN) ceramics we provide the ICT-ALN-200 product series which boasts outstanding insulating properties and extraordinary thermal conductivity (150 – 180 W/mK) that make it perfect for high-performance application in power electronics. ALN ceramics are also generally available in thicknesses between 0.5 and 2 mm; other gauges are available upon request. However, due to the current global material shortage, long delivery periods must be expected.

TYPICAL AREAS OF APPLICATION

Thermally conductive ceramics ALO and ALN are used in a wide range of applications:

- discrete TO semiconductor technology and other component parts; IGBTs; rail-train technology; wind energy; electric drives; engine controls; automotive; brake resistors; converters; high-voltage applications etc.

Delivery formats of finished ceramic cuts



Custom-built ALO ceramic parts for measuring technology application; manufactured on ICT laser cutting machine, specific packaging also by ICT

Designs and gauges of cut ceramic parts

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THERMALLY CONDUCTIVE TECHNICAL CERAMICS
ALUMINIUM OXIDE AND ALUMINIUM NITRIDE

08

electrically highly insulating

PRODUCT PROPERTIES

- Extraordinary thermal conductivity (ALO ⟶ 25 – 30 W/mK; ALN up to 150/180 W/mK)
- High dielectric strength of ALO ⟶ (15 kV/mm)
- Medium to extremely high mechanical stability (300 – 630 MPa)
- Very high pressure stability (2000 – 4000 MPa)
- ALN & ALO ⟶ both very hard (9 Mohs)

PRODUCT VARIANTS

- **ICT-ALN-200**
  ⟶ with outstanding insulating properties and extreme heat conductivity (150 – 180 W/mK)
- **ICT-ALO-96/99 (S)**
  ⟶ with excellent thermal properties, mechanical stability and high dielectric strength

PROPERTIES AND ADVANTAGES AT A GLANCE

- ALO ⟶ medium to very high mechanical stability (300 – 630 MPa)
- ALO ⟶ high pressure stability (2000 – 4000 MPa) and hardness (9 Mohs)
- ALO ⟶ max. application temperature range -65 °C to 850 °C; ALN max. application temperature 1000°C; 1500 °C (without mechanical strain); both thermal shock resistant
- ALO non-corrosive, non-abrasive, good anti-friction properties
- ALO ⟶ density 3.78 to 3.95 g/cm³; ALN ⟶ density 3.30 to 3.35 g/cm³
- ALO & ALN ⟶ suitable for thick-layer pastes; suitable also for many thin-film applications (sputtering)

DELIVERY FORMS AND VARIANTS

- In substrate plate format ⟶ 115 x 115mm, 138 x 190mm
- In loose bulk, standard transistor casing dimensions
- Also available pre-scored
- Deburring and edge polishing for pre-scored and laser cuts are optionally available (additional charges apply)
- Customer-specific delivery formats available upon request
- Deflection from gauges >0,5 mm, 0,2 – 0,3% of the longest side

Background image left/right: Serial manufacturing (cutting and scoring) of Technical Ceramics with CO_2 laser cutting machine

09 OTHER PRODUCTS: FOILS, SHEETS SURFACE INSULATION MATERIALS ELECTRICALLY INSULATING

PRODUCT DESCRIPTION

Electrically insulating surface insulation films and foils are a perfect user-friendly solution when it comes to galvanic separation/isolation of electric and electronic component parts from their environment (casings, heat sinks). At ICT SUEDWERK, we are able to provide, even on short notice, a wide array of suitable surface insulating materials – cut, stamped, or laser-cut; optionally partially or totally adhesive; from single-item (prototype) to large-series production.

The product range includes materials with extreme dielectric strength as well as flame-retardant and temperature resistant materials.
The following materials are part of our portfolio:

- NOMEX® films (aramide paper pressboard)
- KAPTON® films,
- PEN films,
- polyester films (PET) such as Mylar®, Melinex® and PEEK films,
- Forex, Torelina and many others.

Our state-of-the-art die-cutters, plotters and laser-cutting machines enable us to produce insulating films according to customer specifications, fast and cost-effectively. For example, bends in the materials can be pre-fashioned to facilitate montage in the application. Lettering, labelling and surface engravings are also possible.

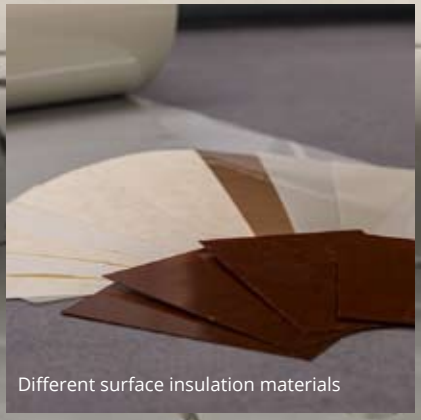
TYPICAL AREAS OF APPLICATION

Electrically insulating surface insulation materials are used in diverse applications:

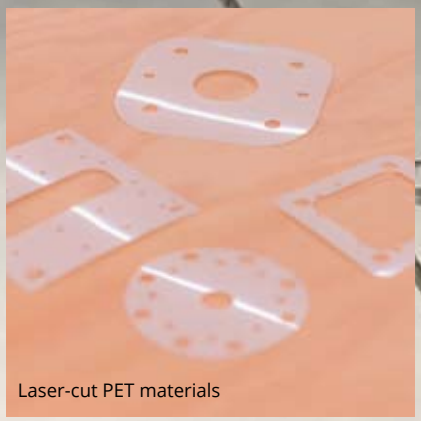
- Insulation of discrete semiconductors, casings, carrier plate covers; end plates; intermediate layer insulation; transformer technology

Applications e.g.:

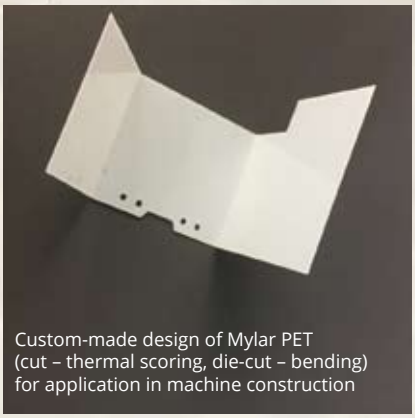
- Power inverters; soldering instruments; power supply units; LED lighting; engine controls; automotive application; photovoltaics;
- DC/DC inverters; high-voltage applications etc.



Different surface insulation materials



Laser-cut PET materials



Custom-made design of Mylar PET (cut – thermal scoring, die-cut – bending) for application in machine construction

Background image left/right: Serial processing (scoring and cutting) of Mylar PET materials with our CO_2 laser cutting plant

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OTHER PRODUCTS: FOILS, SHEETS
SURFACE INSULATION MATERIALS
ELECTRICALLY INSULATING

09

highly electrically insulating

PRODUCT PROPERTIES

- High dielectric strength ⟶ (up to 280 kV/mm)
- Insulation class ⟶ (130 to >280°C)
- Very high temperature resistance ⟶ (up to 400°C)
- High mechanical durability (tensile and tear strength)

PRODUCT PORTFOLIO

- NOMEX® films ⟶ (aramide paper pressboard)
- Polyimide films extruded ⟶ (e.g. Kapton®)
- PEN films - extruded ⟶ (e.g. Teonex®)
- PET films - extruded ⟶ (e.g. Mylar®, Melinex®)
- PEEK films - extruded ⟶ (e.g. Torelino®)

PROPERTIES AND ADVANTAGES AT A GLANCE

- Extremely high mechanical stability (high tensile and tear strength); good plasticity for some variants, also available as high-temperature resistant composites
- Very good electric insulation, low dielectric constant, insulation class ⟶ (130°C to 220°C),
- Some thermally conductive variants ⟶ (0.35 – 0.7 W/mK)
- Continuous service temperature resistant ⟶ (UL 546 B); some variants self-extinguishing and hardly flammable (UL 94 V-0); corona resistant
- High-temperature resistant composites and other special variants available
- Almost all films can be laminated with an adhesive coating

DELIVERY FORMS AND VARIANTS

- Diverse material gauges: <0,01 mm to >2 mm (composites possible)
- In sheets, on rolls; other delivery formats available
- Loose bulk die-cut or kiss-cut parts, on rolls or sheets
- In pre-defined mat formats, adhesive on one or on both sides
- In pre-defined roll formats, adhesive on one or on both sides
- Customized cuts and delivery formats available upon request

10 OTHER PRODUCTS: METALLIC FOILS, FILMS, ALUMINIUM, COPPER FABRIC, LAMINATES, SHEETS

PRODUCT DESCRIPTION

Many EMC/EMI problems can be solved by using electrically conductive foils. Some of the most commonly employed materials are metallic foils made from aluminium and copper, as well as reinforced, conductive fabrics and fleeces that possess excellent dampening properties and are ideally suited for processing. Metallic foils, especially copper foils, provide outstanding shielding, are easily folded in the desired form and perforated, and can be soldered. All of these materials are additionally available with or without conductive adhesion and an optional insulating layer (on one or both sides).

ICT SUEDWERK holds a wide selection of metallic and electrically conductive foils, fabrics and fleeces – technologically advanced EMC/EMI shielding materials – by renowned manufacturing partners. All of the materials in this range are processed by us to customer specifications and can be delivered in almost any size, form and shape. Of course, we also provide the basic materials for further processing.

TYPICAL AREAS OF APPLICATION

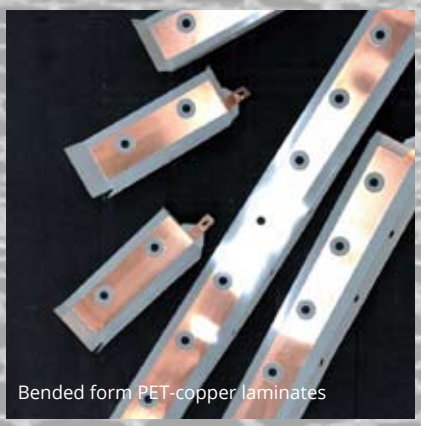
Aluminium and copper foils, reinforced conductive fabrics and fleeces are used in a large number of applications:

- shielding of polymer casings and other non-conducting materials,
- shielding of discrete TO semiconductors and many other component parts

Applications e.g.:

- shielding in monitors and shielded cables
- electric connection between surfaces etc.


Different punched copper foils


Bended form PET-copper laminates


Customized superthin adhesive copper foils on release liner for case shielding in medical tech application

Background image: Matrix illustration by ICT SUEDWERK

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OTHER PRODUCTS: METALLIC FOILS, FILMS, ALUMINIUM, COPPER
FABRIC, LAMINATES, SHEETS

10

electrically conductive

PRODUCT VARIANTS

- Material gauges from 0.035 mm to >0,25 mm
- Al-CU foil with insulating layer (UL94V-0)
- Flame-retardant version
- With (conductive) adhesive back
- Adhesive and/or insulation on one or both sides
- Copper tape; tin-plated copper tapes are suitable for soldering

PROPERTIES AND ADVANTAGES AT A GLANCE

- Metallic foils, especially copper foils, allow for excellent handling, processing, and application
- Outstanding shielding capacity; suitable for soldering; easy perforation and folding into desired shape
- Fabrics and fleeces made from 100% polyester galvanized with Cu/Ni or Ag/Cu; delivered on-roll
- Available in standard or customized width; with optionally conductive or non-conductive adhesive coating

DELIVERY FORMS AND VARIANTS

- As thin or thick sheets; on rolls
- Copper and aluminium tape
- Tin-plated copper tape
- Galvanized fabric and fleece
- Conductive fabrics and fleeces on-roll as tape (with electrically conductive adhesion), in standard or customized width
- Double-sided conductive, adhesive tapes
- Stamped parts as loose bulk; kiss-cut stamped parts on-sheet or on-roll
- In pre-defined mat format, self-adhesive and with optional insulating layer (also double-sided)
- In pre-defined roll formats, self-adhesive and with optional insulating layer (also double-sided)
- Customer-specific delivery formats available upon request

Background image: Different adhesive copper and aluminium foils on kiss-cut carriers

11 OTHER PRODUCTS: PMMA ACRYLIC GLASS, FILMS, SHEETS, OTHER POLYMERS
DISPLAYS, CASINGS, ENGRAVING

PRODUCT DESCRIPTION

Membrane keyboards, panels, front plates, foil keypads, but also bar code and component part labels, ventilation plates, cable storage for industrial computers, welding units or robotics are among the essential controls and systemically relevant internal components of machinery and equipment in machine construction, medical technology and many other fields of application. For all these applications, utmost ease of use and functional design are paramount. In this context, we offer our clients efficient solutions for the most diverse and specific applications.

Employing a range of different technologies, we carry out laser-cutting, engraving, and labelling work using our in-house laser cutting plant and CNC surface milling machine, or – if required – the help of our business partner ABC Beschriftungsbedarf GmbH, to manufacture individual solutions to meet the highest demands.

We are providing our services (and those of our partner) to customers from the most diverse areas – in electronics, metal and machine construction, but also to advertising and design agencies, architectural firms, trade fair suppliers, resellers and direct customers. Our service portfolio is completed by job order production at our in-house facilities.

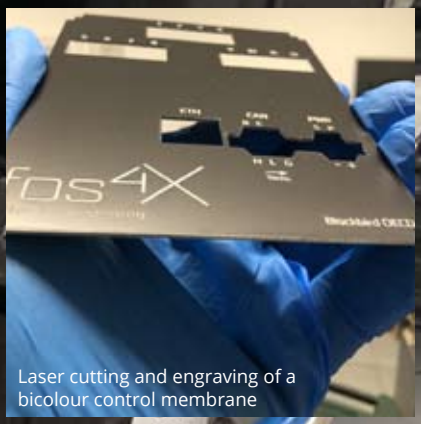
TYPICAL AREAS OF APPLICATION

PMMA acrylic glass PP extruded films, panels, and other plastics are used in applications in:

- Membrane keyboards and keypads; control panels; front plates; bar code and component part labelling;
- production of special packaging and shapes; internal components (ventilation plates, cable storage); industrial computers; welding units;
- robotics

Applications e.g.:

- Displays; casings; engraving technology
- special packaging; control cabinets etc.



Laser cutting and engraving of a bicolour control membrane


Serial processing at ICT SUEDWERK (heat scoring for subsequent bending and cutting) of pre-bended, customized PET films with our CO_2 lasser cutting machine; for application in casings insulation for indoor use


Assorted delivery formats – sheets and film

Background image: Serial processing (scoring and cutting) of PET film with CO_2 laser cutting machine

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OTHER PRODUCTS: PMMA ACRYLIC GLASS, FILMS, SHEETS, OTHER POLYMERS
DISPLAYS, CASINGS, ENGRAVING

11

highly electrically insulating

PRODUCT VARIANTS

- Wide selection of special, monochrome or poly-chrome laser-engraved polymer types on a PMMA base, with optional thin colour coating of the back, or with choice of colours for core layers and surfaces
- Specialized high-performance multi-coloured acrylic glass variants

PROPERTIES AND ADVANTAGES AT A GLANCE

- Thin, two-layered flexible engraving materials with micro-coating on a acrylic core, self-adhesive back; UV resistant and suitable for kiss-cutting, CO_2 laser engraving; quick processing
  → all-round material for a broad spectrum of in- and outdoor applications
  → choice of 10 optional colour coatings
- Special laminates and polymer sheets with a PMMA core, perfectly suited for quick and efficient laser engraving and cutting. Laser cutting results in very clean, polished edges so that additional polishing is almost unnecessary. great selection of colours, surface finishes, and material gauges available
- Other specialized laser engraving materials with metallized and anodized surfaces available; brushed, adhesive, UV protective or anti-scratch surfaces upon request (among others)

DELIVERY FORMS AND VARIANTS

- Different one-, two- and three-layered polymer sheets for laser machining; flexible and robust films with self-adhesive back
- Sheets, cuts and component builds to customer specifications upon request
- Customized delivery formats upon request; loose bulk parts, stamped parts available with adhesive coating on one or on both sides
- Material gauges depend on product type (from 0.15 mm), please contact us

Are you looking for a supplier who can cut your plastics?
One who can produce laser-cut control membranes and panels, keyboards and front plates precisely to your specifications?
Do you want your product to carry a unique label or bar code?
Call us, we are happy to help!

Background image: Serial machining (laser engraving and cutting), at ICT SUEDWERK, of two-layered plastics or UV resistant acrylic-based laminates for indoor or outdoor applications (membrane keyboards/keypads, control panels, front plates etc.)

12 OTHER MATERIALS: THERMOSETS, HARD PAPER, FABRIC, LAMINATES
INSULATING SHEETS, HARD FABRICS

PRODUCT DESCRIPTION

At ICT, we carry out sophisticated cutting, engraving and labelling work with the help of our CNC controlled laser equipment, processing a great variety of thermosetting and thermoplastic standard, construction and high-performance polymeric materials of renowned manufacturers, as well as technical ceramics and many other materials.

In particular, laser cutting of plastics affords a series of advantages for our customers, as a laser is able to easily work a wide range of plastics quickly, cost-efficiently and with the utmost precision. This is due to the fact that lasers can be adjusted to realize cuts thinner than 0.1mm. Material waste is significantly reduced; post-processing becomes unnecessary in most cases. For example, the laser processing of PMMA acrylic glass allows for the thermal polishing or satin-finishing of the incisal edges, which ensures absolutely clean cutting edges.

The following plastics can be worked with our in-house laser-cutting technology: PMMA, HDPE, POM, PETG, PC, PETP, PA, PI, PP, SAN, PS, PUR, ABS, PTFE, and PEEK.

Of course, our production facilities are able to process other materials as well, e.g. hard paper and laminates (well-known under the product names Pertinax, Resitex and Novotex), including thermosets. Some thermosets, as opposed to thermoplasts, are rigid up to the decomposition temperature of about 300°C and tend therefore to be machined rather than laser-cut, but laser-cutting remains an option for very clean results, depending on material thickness.

TYPICAL AREAS OF APPLICATION

Thermosetting and thermoplastic standard, construction and high-performance plastics are used in a wide range of applications:

- Electrically insulating applications; structural component parts; reinforcements; carrier plates; spacers; flanges, etc.

Different semi-finished products and polymer panels

Laminated insulation panels with adhesive coating on both sides

PET film bended to customer specification with CO_2 laser cutting machine

Background image: Processing of PET films with CO_2 laser cutting machine

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OTHER MATERIALS: THERMOSETS, HARD PAPER, FABRIC, LAMINATES
INSULATING SHEETS, HARD FABRICS

12

highly electrically insulating

PRODUCT PROPERTIES

- Thermal classes to >280°
- High temperature resistance (up to 400°C)
- High mechanical stability (high tensile/tear strength)
- Easy handling/processing
- Very good electrical insulating properties, high chemical stability (solvent-proof)

PRODUCT PORTFOLIO

- **Thermosets** (hard paper, hard fabrics) on a phenolic and epoxy resin base, available melamine-coated on both sides; hard acrylic fabric epoxy, silicone, phenol and melamine-based; hard acrylic mats made from fibreglass-reinforced melamine
- **Thermoplastics,** such as PMMA, HDPE, POM, PETG, PC, PETP, PA, PI, PP, SAN, PS, PUR, ABS, TFE, PEEK.
- Other materials available

PROPERTIES AND ADVANTAGES AT A GLANCE

- **Thermosets:**
  Very good dimensional stability; excellent mechanical and dielectric properties; high chemical stability (resistant against organic solvents) even at high operating temperatures. Fire resistance can be achieved without halogenated flame retardants
- **Thermoplastics:**
  Versatile in application, robust and light materials. Suitable for the easy, precise and relatively cost-effective production of component parts in high numbers

DELIVERY FORMS AND VARIANTS

- Panels, special cuts and component parts to customer design upon request
- Customized delivery formats feasible upon request
- Loose parts or cuts with adhesive coating on one or both sides
- Material thickness depending on product type (from 0,20 mm to >90mm)
- Other material gauges possible, please contact us

Are you looking for a supplier who can cut your plastics?
Do you want your product to carry a unique label or bar code?
Call us, we are happy to help!

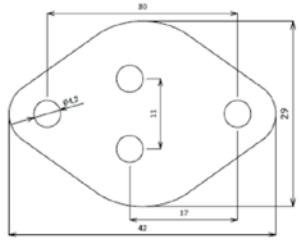
Background image: Highly electrically insulating laminate panels with double-sided adhesive tape for control cabinet construction

ICT STANDARD DELIVERY FORMATS

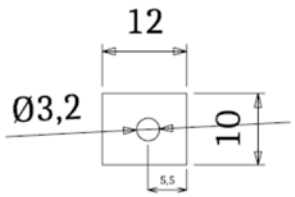
CERAMICS AND THERMALLY CONDUCTIVE FILMS

- All measurements in mm
- Technical ALO ceramic materials feasible from 0.50mm to 2.00mm
- Other material gauges and semiconductor dimensions available upon request – **Contact us!**

TO-3



TO-126



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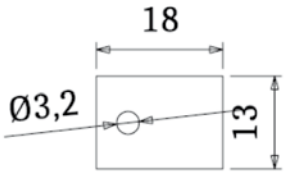

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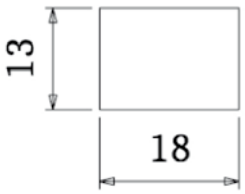
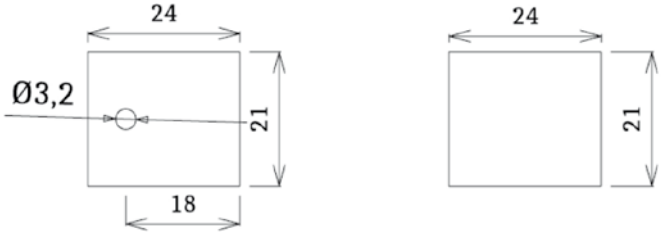


TO-3P, TO-218, 247/246, MT100



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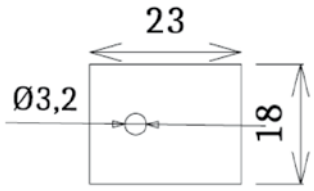

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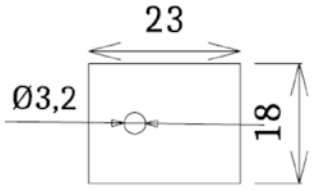

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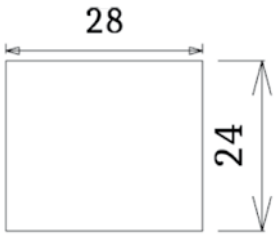
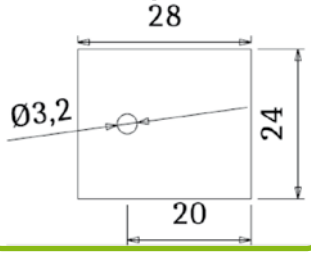


TO-3PL, TO264



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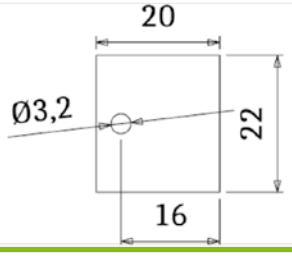

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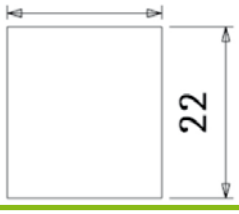

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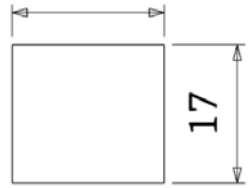
CERAMICS AND THERMALLY CONDUCTIVE FILMS

- All measurements in mm
- Technical ALO ceramic materials feasible from 0.50mm to 2.00mm
- Other material gauges and semiconductor dimensions available upon request – **Contact us!**

TO-3



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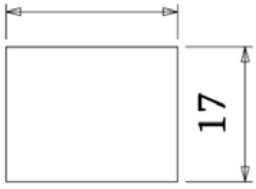

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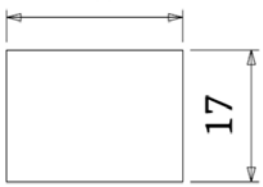

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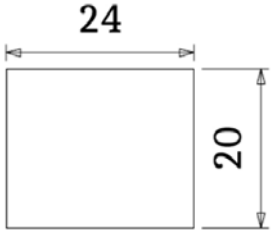
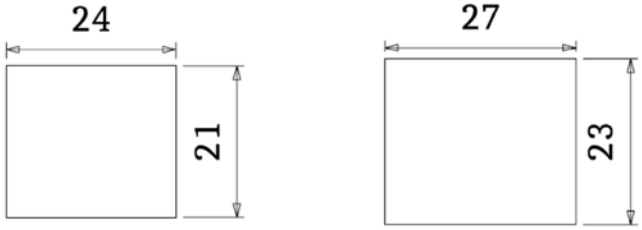


TO-3P, TO-218, 247/246, MT100



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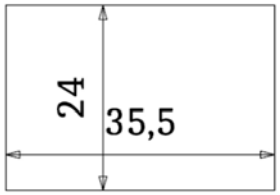
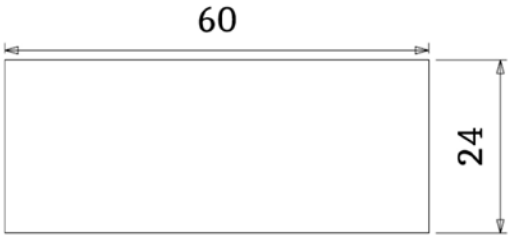
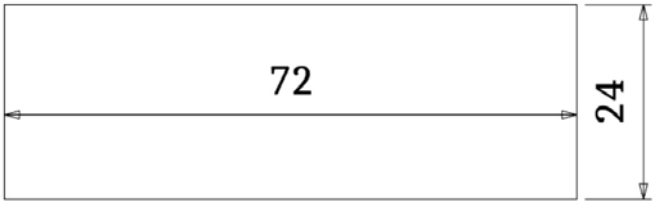


TO-220 X 3



TO-3PL, TO264 X 3



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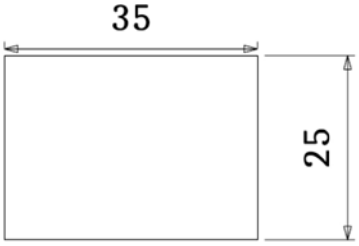

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ICT STANDARD DELIVERY FORMATS

CERAMICS AND THERMALLY CONDUCTIVE FILMS

- All measurements in mm
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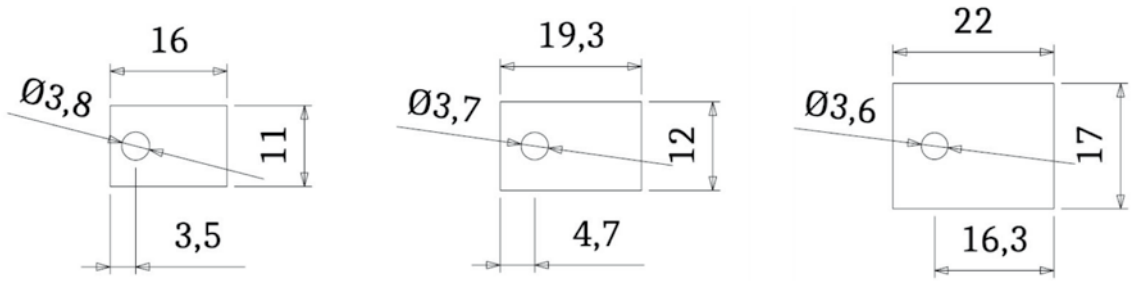
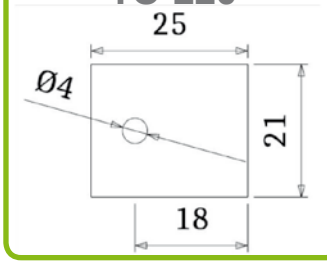
- Other material gauges and semiconductor dimensions available upon request – **Contact us!**

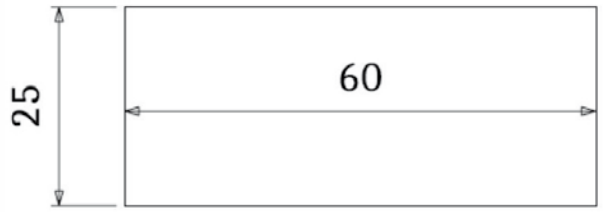
SPECIAL DIMENSIONS OF DISCRETE SEMICONDUCTOR TYPES



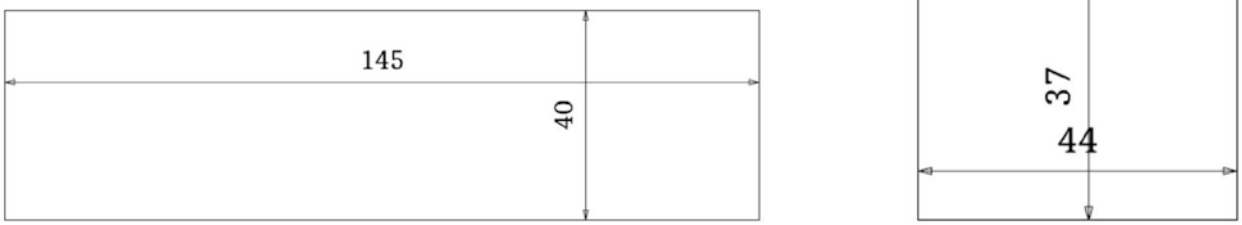
TO-220



MULTIWATT x 3



OTHER ICT STANDARD FORMATS



See more standard delivery formats on our homepage. Just scan the QR code on the left!

No responsibility is taken for the correctness of the information contained herein. All information herein is subject to technical change. All measurements in mm. Manufacturing is carried out according to technical drawings provided by the customer and in agreement with any arrangements regarding production tolerances (ISO 2768-mK, ISO 2768-1 & ISO 2768-2).
Cuts without prior provision of technical drawings or other relevant arrangements are generally produced according to DIN ISO 2768–1 g norm (roughly). Other production tolerances may be agreed upon.

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INSULATING POLYMER BUSHINGS

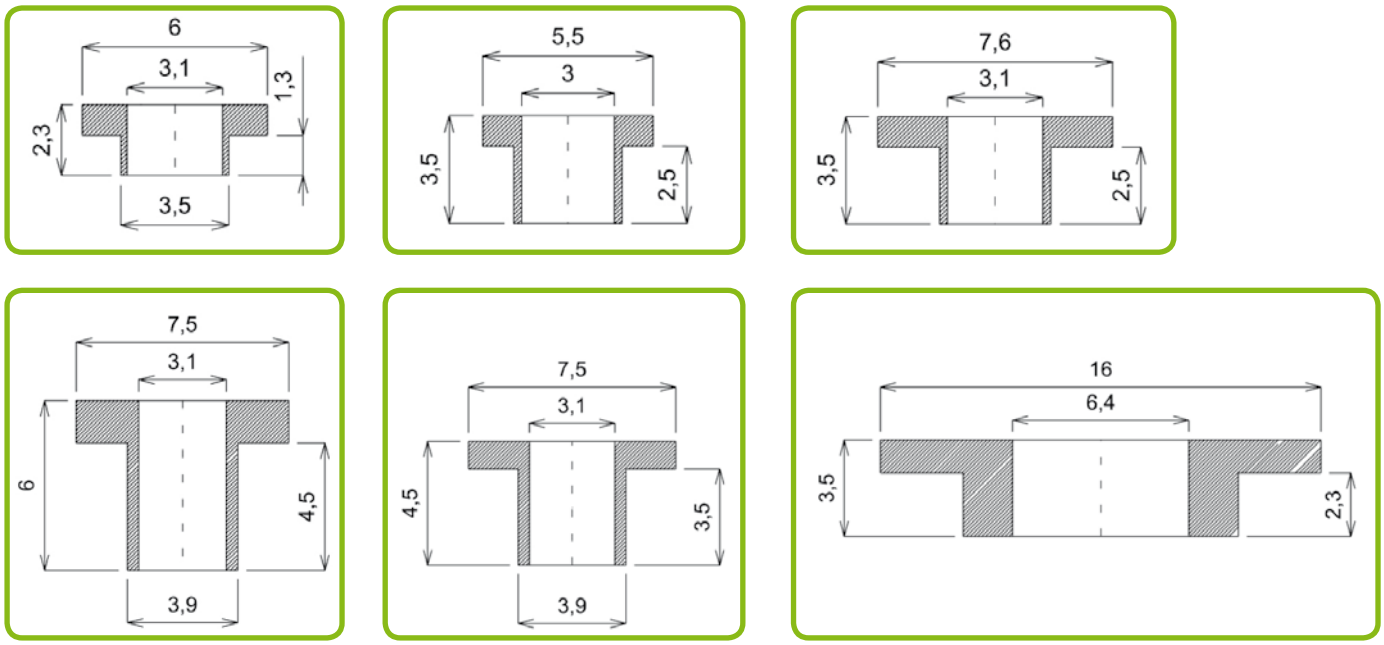
■ Insulating polymer bushings up to 140°C ■ Fastening management ■ Made from high-temperature resistant PA plastic (GV) ■ Other dimensions feasible - **Contact us!**

INSULATING BUSHINGS UP TO 140°C, CONSISTING OF THERMALLY RESISTANT PA (GV) POLYMER

This product variant is made from polyamide with added heat stabilizers, enabling it to permanently resist temperatures of up to 140°C.
Its particular dimensional stability is achieved by the addition of ~ 25% fibreglass and polymerisates. Due to its mechanical stability and high temperature resistance, the product series ICT-BU-PA is suited for electric insulation of mounting screws and for use with many mounting clips currently available on the market.
The ICT-BU-PA series of insulating bushings has very high dielectric strength of up to 40 kV/mm.

DIMENSIONS

Other dimensions and designs upon request.



No responsibility is taken for the correctness of the above information. Subject to technical change. All measurments in mm.

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ICT STANDARD DELIVERY FORMATS

INSULATING POLYMER BUSHINGS

■ Insulating polymer bushings up to 200°C ■ Fastening management ■ Made from highly thermoresistant Silicone Rubber ■ Other dimensions feasible - **Contact us!**

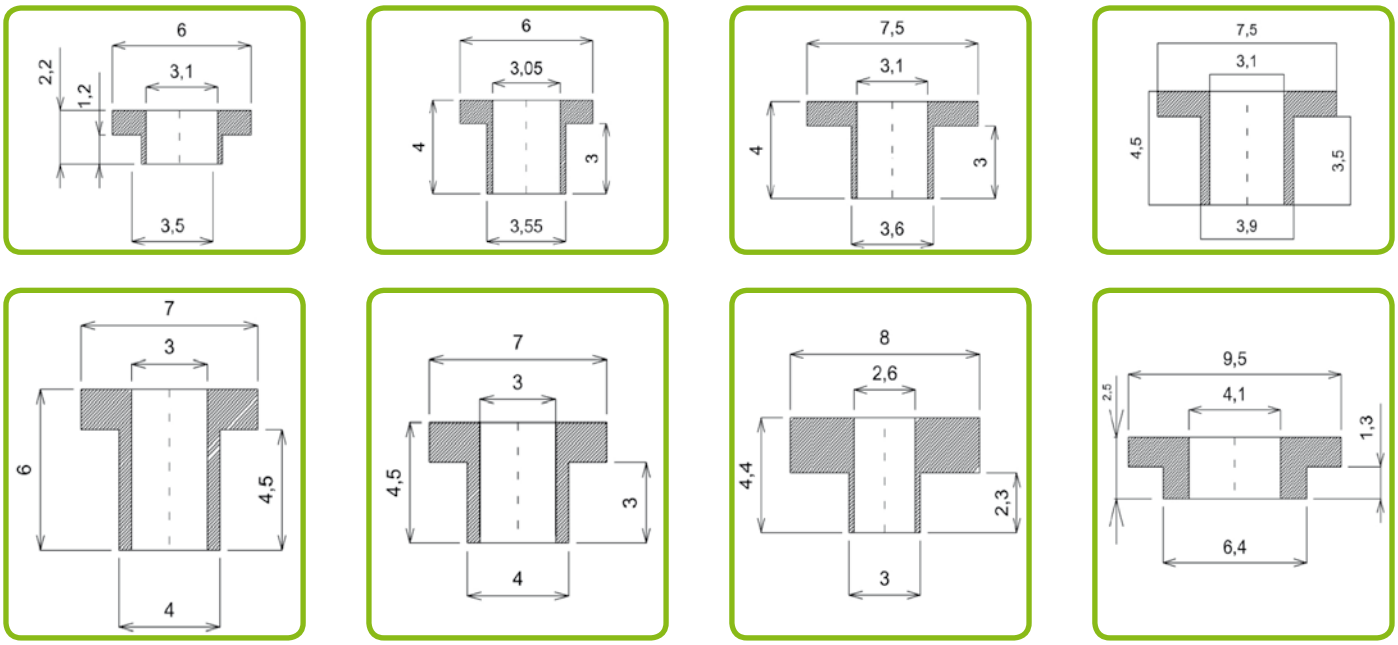
INSULATING BUSHINGS UP TO 200°C, CONSISTING OF HIGHLY THERMALLY RESISTANT SR POLYMER

Due to its mechanical stability and high temperature resistance, the ICT-BU-SR product series is ideally suited for the electric insulation of mounting screws, as well as for application with many of the mounting clips available on the market.

This material is permanently resistant to temperatures up to about 200°C, boasts excellent mechanical stability and passes the DIN 52453 impact strength test without breakage. Additionally, the SR insulating bushings possess superior dielectric strength of up to 40 kV/mm.

DIMENSIONS

Other dimensions and designs upon request.



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FOR YOUR NOTES

FOR YOUR NOTES

SUPPLIER PROFILE
SHORT PORTRAIT

ICT 4 TIM
Innovative Competence Team
for Thermal Interface Materials

ICT SUEDWERK
TIM Solutions & Services

ADDRESS

ICT SUEDWERK GmbH
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82041 Oberhaching, Germany
T +49 (0)89 21 23 102-0
F +49 (0)89 21 23 102-10
info@ict-suedwerk.de ▪ **www.ict-suedwerk.de**

FOUNDED IN: 2017

COMPANY PROFILE

PRODUCTS AND SERVICES

- Thermal management solutions and thermally conductive materials
- Consultancy and support – from pre-development to serial production
- Customer-specific solutions
- Job order production

PRODUCT PORTFOLIO

Thermally conductive, electrically insulating materials:

- Highly thermoconductive TC Sheets
- Gap-filler Silicone and silicone-free films
- Polyimide films coated with thermally conductive wax
- Thermally conductive silicone tubes and caps
- Thermally conductive ceramics

Thermally conductive, electrically non-insulating materials:

- Aluminium foils and films coated with thermoconductive wax
- Free-standing films
- Graphite films and synthetic graphene films
- Shielding foils and other metal and polymer films and foils

Electrically insulating surface materials and insulating bushings

SHORT PROFILE

From the pre-development stages all the way to serial production, ICT SUERWERK provides thermal management solutions, especially for power semiconductors and active electronic component parts in power electronics. For our customers, we generate individual high-end solutions involving thermal interface materials, always striving for top-notch precision and quality as an all-in-one supplier. Technical institutional consultancy as well as state-of-the-art in-house production complete our company portfolio. **Processing of our product range takes place at our manufacturing facilities at Oberhaching – Made in Germany.**

TARGET MARKETS

Companies in the electronics industry, especially in power electronics, microelectronics, and machine construction, as well as all companies that require optimal solutions regarding the dissipation of waste heat. ICT SUEDWERK is a supplier of thermal management applications to renowned clients in the automotive, aerospace, IT, controls, medical tech, future drives and renewable energy industries, primarily in German-speaking countries and the European Union.

PRODUCTION

Our state-of-the-art manufacturing facilities at our headquarters in Oberhaching enable us to carry out production on demand, juts-in-time, according to customer requirements, even at very short notice.
At ICT SUEDWERK, we offer our customers an economic and sustainable process for customized serial manufacturing as well as for job order production.

CERTIFICATIONS

ICT SUEDWERK and its innovative technology guarantee product quality and process safety in all its business units through **DIN EN ISO 9001:2015** and **14001:2015** certificates.

CONTACTS

- By phone or at our headquarter **Mon through Fri 8 a.m. - 5.00 p.m.**
- Via E-Mail (24/7 – 365 days per year) **info@ict-suedwerk.de** or **vertrieb@ict-suedwerk.de**
- Website: **www.ict-suedwerk.de**
- Newsletter: (https://www.ict-suedwerk.de/de/aktuelles/news)

LOGISTICS

- Customer-specific labelling available (upon request)
- EDI connection available
- Safe storage if needed (upon request)
- Just-in-time or set-date delivery
- Eco-friendly packaging

TECHNICAL SUPPORT

- TCS (technical customer service)
- Special procurement (job order production), fast-quote service
- Field service, tech support and design-in support (if required)
- On-site consultancy

PRICING

- Optimal price-benefit ratio through efficient and state-of-the-art in-house manufacturing
- Short decision paths, small overhead cost, high material efficiency allow for excellent price-quality performance
- Competitive pricing, always in line with the market, even for customer-specific requirements and small quantities
- Small orders available at any time
- Minimum order volume € 250.-

AVAILABILITY

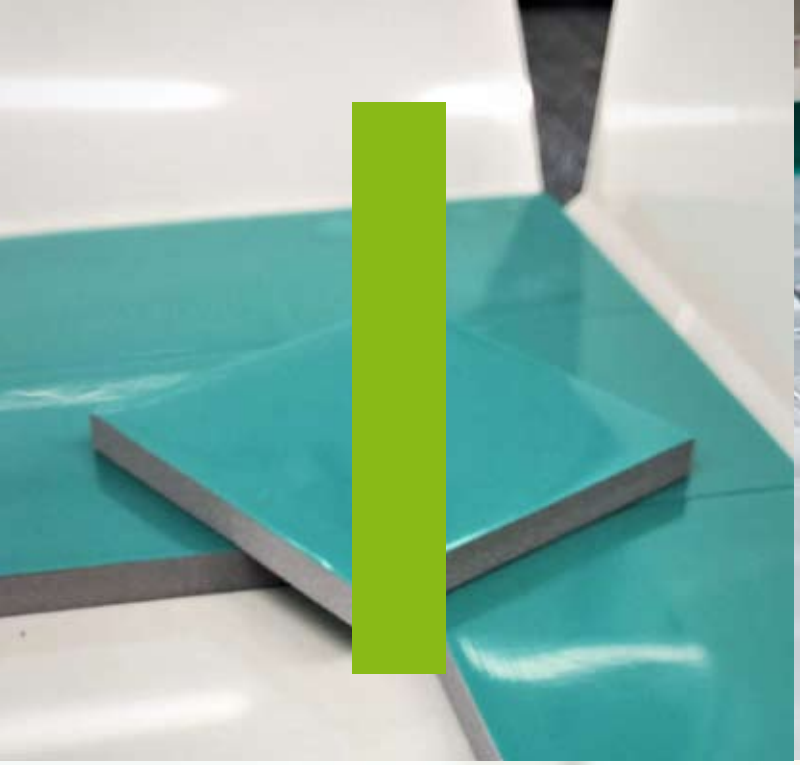
- Precursor/base materials (in stock)
- Customer-specific cuts (prototypes) feasible at short notice
- <3 days, if base materials are in stock
- **Standard delivery time A:** 14 to 20 working days – or less if parameters are met and agreed upon
- **Standard delivery time B:** approx. 30 to 35 working days, if basic material is out of stock and needs to be procured

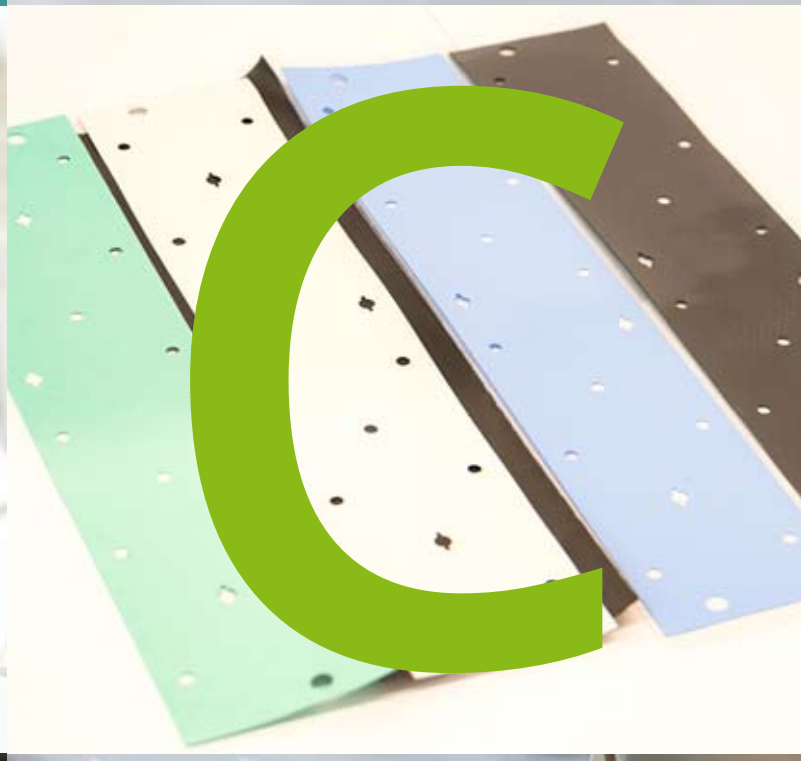
ICT SUEDWERK's keynotes are innovation, competence and superior quality, combined with fast delivery ...

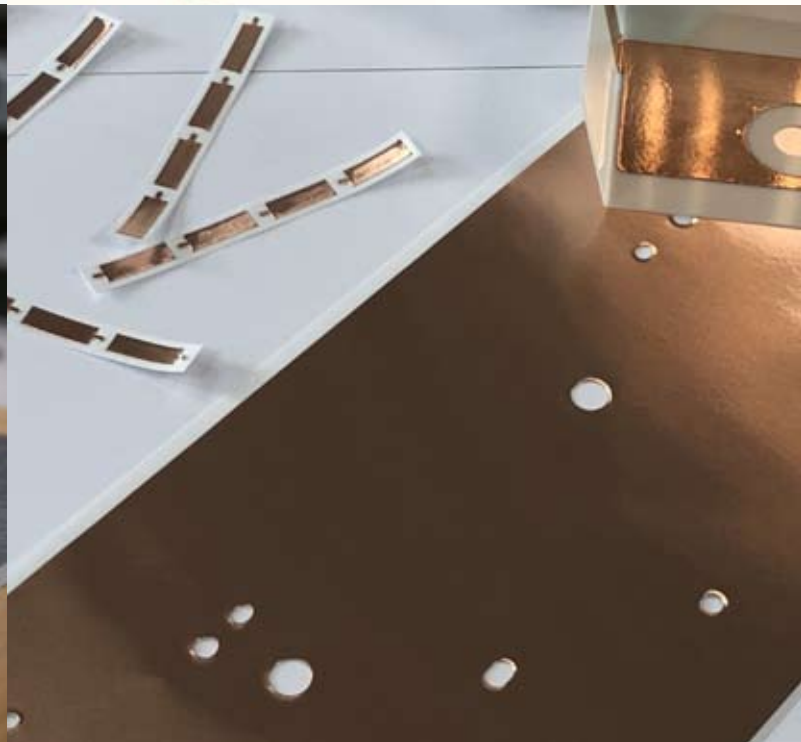
Wolfgang Reitberger-Kunze
(CEO and owner of ICT SUEDWERK GmbH)

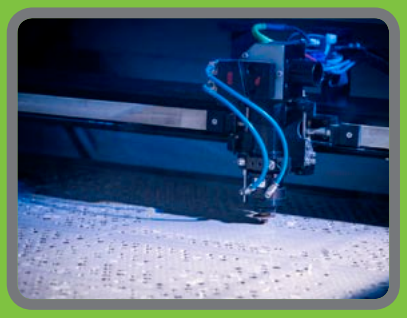
Cut here, if you like

ALL YOU NEED TO MANAGE YOUR HEAT ■ INSPIRED CUSTOMIZED T.I.M. SOLUTIONS







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F +49 (0)89 21 23 102-10
E info@ict-suedwerk.de
www.ict-suedwerk.de

QR code to our business card

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