

to cool to protect to connect



The
right
contact!
f.tim.e

Thermally conductive material



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Fischer Elektronik GmbH & Co. KG

Boîte postale 15 90
58465 Lüdenscheid
ALLEMAGNE

Adresse

Nottebohmstr. 28 • 58511 Lüdenscheid
ALLEMAGNE

Téléphone: +49 2351 435-0

Téléfax:

Ventes

+49 2351 45754

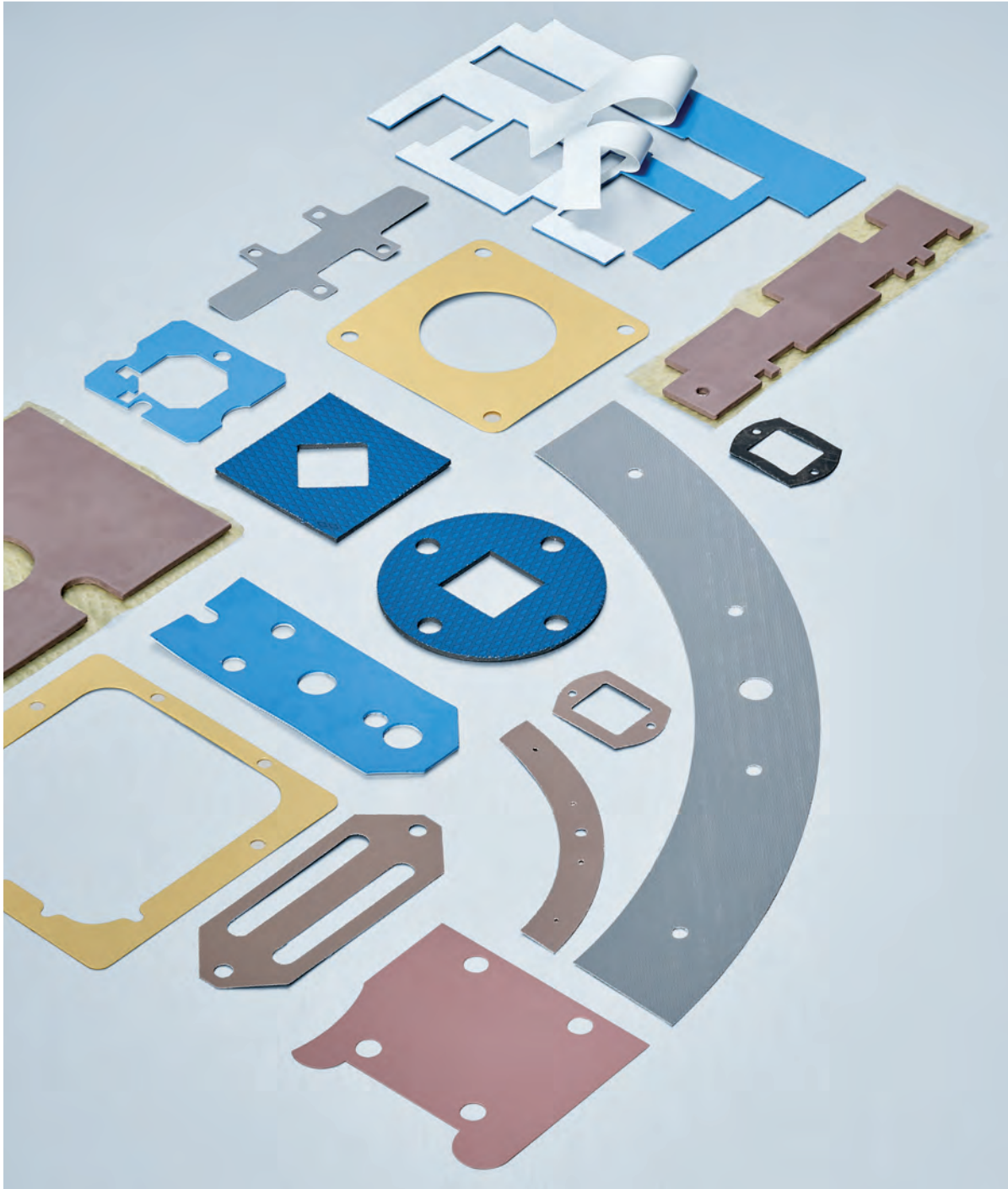
Achats

+49 2351 459433

Exports

+49 2351 435185

info@fischerelektronik.de
www.fischerelektronik.de/fr



Innovative thermal conductive foils

very good thermal properties • silicone containing and silicone-free versions • optimal contacting between device and heatsink • easy fitting by means of adhesive coating • 24 h sample cut service • individual cuts according to customer specifications

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Quality-Management System ISO 9001

We are certified to ISO 9001. This process-directed quality management system implies a constant focus on satisfying the demands of customers, and this is the major objective of our company.

The implementation and further development of our quality management system demonstrably ensures

- guaranteed customer satisfaction and thus the success of our company,
- compliance with customers' requirements at all times through defined processes,
- early detection and prevention of errors, and
- checking of both process effectiveness and efficiency on a regular basis together with steady improvement.

It is through constant vigilance and the provision of evidence that we deliver flawless products, which fully comply with quality requirements, that we maintain our quality certification.

In order to secure lasting company success and to meet our customers' expectations now and in the future, we define measurable objectives within the framework of our quality system, which are regularly checked and developed. We are committed to constant measurement and improvement of our performance.

Our quality management system applies to all processes carried out by our company.

Certificate

Standard **ISO 9001:2015**
Certificate Registr. No. **09 100 4274**

Certificate Holder: **fischer elektronik**
Fischer Elektronik GmbH & Co. KG
Nottebohmstr. 28
58511 Lüdenscheid
Germany

Scope: Design/construction, manufacture, assembly and technical advice for heatsinks, sockets, connectors, mounting parts, cases, 19" assembly systems, computer accessories

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2021-11-01 until 2024-10-31. First certification 1994

2021-09-09


TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

Certificate

Standard **ISO 14001:2015**
Certificate Registr. No. **01 104 8209**


Certificate Holder: **fischer elektronik**
Fischer Elektronik GmbH & Co. KG
Nottebohmstr. 28
58511 Lüdenscheid
Germany

Scope: Design/construction, manufacture, assembly and technical advice for heatsinks, sockets, connectors, mounting parts, cases, 19" assembly systems, computer accessories

Proof has been furnished by means of an audit that the requirements of ISO 14001:2015 are met.

Validity: The certificate is valid from 2021-10-09 until 2024-10-08. First certification 1998

2021-09-09


TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com



Environmental Management System ISO 14001

We consider protection of the environment and saving of natural resources entrepreneurial tasks of high priority.

Aware of this, our company was the first German heat-sink manufacturer to implement, the environmental management system in accordance with ISO 14001 in 1998.

Our entrepreneurial responsibility comprises preventing accidents, safeguarding against occupational diseases, designing workplaces to suit human requirements, developing products which are safe to use, saving resources and avoiding environmental impact to the maximum extent possible.

We already consider environmental compatibility in the product and process development stage. The environmental impact of our activities is documented, assessed and in a continuous improvement process reduced to a minimum.

Implementation and consistent working on and with the environmental management system is a vital process and a constant challenge but finally it will always lead to better results.

www.tuv.com



Information management norm DIN EN ISO/IEC 27001

Information security is becoming more important. For the success of our business information are essential values. Administering and protecting those has our top priority.

The information security management system to ISO/IEC 27001 considers three kinds of information: availability, confidentiality and integrity.

This information security management system is the basis for continuous monitoring and optimisation processes. It also ensures the scrupulous handling with information. A protection against attacks on the corporate network and theft is ensured.

Within the information security management system the risk evaluation such as human misconduct takes place by means of error-possibility-influence-analysis.



Europäische Gemeinschaft

AEO-Zertifikat

1. Inhaber des AEO-Zertifikats Fischer Elektronik GmbH & Co KG EORI-Nummer: DE 2499770 Nr. der amtl. Eintragung: HRA 2836 UST-IDNr(n): DE 125797501	DE AEOC 101367 (Nummer des Zertifikats) 2. Erteilende Behörde Hauptzollamt Dortmund Kronenburgallee 7 DE-44139 Dortmund  
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Der in Feld 1 genannte Inhaber ist

Zugelassener Wirtschaftsbeteiligter

"AEOC (zollrechtliche Vereinfachungen)"

3. Tag, ab dem das Zertifikat wirksam ist:

16.03.2010

Certificate

Standard **ISO/IEC 27001:2013**

Certificate Registr. No. **01 153 101878**

Certificate Holder:



Fischer Elektronik GmbH & Co. KG
 Nottebohmstr. 28
 58511 Lüdenscheid
 Germany

Scope: Design/construction, manufacture, assembly and sales for heatsinks, sockets, connectors, mounting parts, cases, 19" assembly systems, PCB accessory

SoA Version 2.3 dated 29.11.2021

Proof has been furnished by means of an audit that the requirements of ISO/IEC 27001:2013 are met.

Validity: The certificate is valid from 2023-12-21 until 2025-10-30.
 First certification 2011;
 Date of recertification audit: 2023-12-01;
 Expiry date of last certification cycle: 2023-09-30

2023-12-29

TÜV Rheinland Cert GmbH
 Am Grauen Stein · 51105 Köln

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The authorised economic operator AEO-certificate

Since 1st January 2008 companies based in the European Union and involved in customs activities have been able to apply for the status of Authorised Economic Operator (AEO). The status entitles a benefit of safety-relevant custom controls and/or simplification according to custom regulations.

The goal is here to ensure an uninterrupted global supply chain from the producer to the end user. The status of an authorised economic operator is valid in all Member States and is not limited in time.

Our company has the status AEO-C (customs simplification).

The legal requirements of an authorised economic operator are essentially the result of:

- Article 5a community custom code (ZK)
- Article 14a - 14x community custom code implementing provision (ZK-DVO)



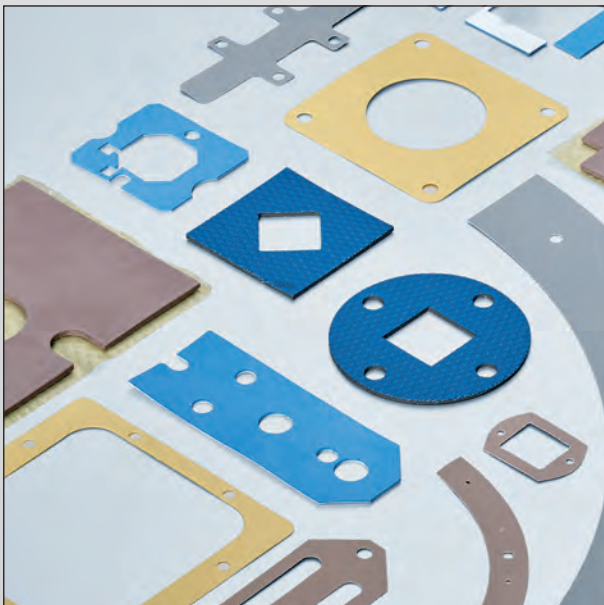
Thermal contact materials

- aluminium oxide-, Kapton- and mica discs
- high dielectric strength at very good thermal conductivity
- best mechanical properties
- easy and clean handling
- wide operating temperature range
- cuts and special designs acc. to customer's requirement



Thermal conductive materials

- with high long-term stability and thermal conductivity
- smallest heat transfer resistances
- excellent compensation of unevennesses
- electrical conductive and insulating
- as sheet material or rolled goods
- customised cuts by means of 24 h sample delivery service



Innovative thermal conductive foils

- very good thermal properties
- silicone containing and silicone-free versions
- optimal contacting between device and heat sink
- easy fitting by means of adhesive coating
- 24 h sample cut service
- individual cuts according to customer specifications



Efficient thermal conductive materials

- fluid GEL thermal conductive material, thermal conductive paste and glue
- optimum balance of roughnesses and unevennesses
- good performance and processing properties
- automatic dispensable
- containing silicone and silicone-free
- other packaging sizes and container types upon request

The connection of the device to be dissipated to the heat sink is especially important as for a poor heat transfer, i.e. from the device to the heatsink, the heat conduction respectively the heat transition is reduced and the device temperature will be significantly increased. Beside functional restrictions an uncontrolled temperature increase or even a device destruction is also possible. An optimal heat transfer can only be achieved if the inevitable tolerances, unevennesses and roughnesses of the surfaces to be connected which occur by production processes will be equalised. Suitable thermal conductive foils matching to the application provide excellent solutions for the thermotechnical contact optimization.

Our wide range of products contains i.e. silicon-containing and silicone-free thermal conductive foils, one sided and double sided adhesive thermal conductive foils, high thermal conductive graphite foils, thermal conductive silicone foam foils, silicone-containing and silicone-free GEL thermal conductive foils, dispensable GEL thermal conductive foils, kapton insulating washers, aluminium oxide and mica washers, phase change thermal conductive materials, silicone-containing and silicone-free thermal conductive pastes as well as various thermal conductive glues.

The different thermal conductive foils can be produced individually out of plate- or roll material according to customer specific drawings. Please also use our **24 hour sample service** for individual cuts of our standard thermal conductive materials according to your specification.

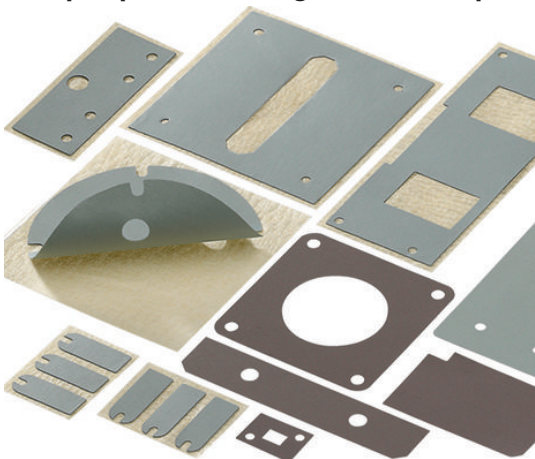
Production process:

Drawing parts with digital cutter



CAD data as a dxf file can be realised directly in ready and zero-toleranced exact cut templates without tooling costs. The outstanding production speed and a cutting technology perfected to the last detail provide an optimal result.

Stamped parts according to customer specific requirements



We produce contour die-cutting according to your drawing specification flexibly and fast for you. The fully automatised punching machine with the associated steel strip blanking die is particularly suitable for smaller, but also for higher quantities. Beside contour- and kiss-cut parts the possibility of cutting roll material to size or machining according to customer's requirements is also given.

The thermal data in the catalogue refers to an area of 1 inch² (6.45 cm²) if not indicated otherwise.

Overview thermal interface material

art. no.	thermal conductivity [W/m*K]	material thickness [mm]	page
WLFT 404 ... / WLFT 414 ... (double sided)	0,400	0,127	E 37
WLFT 405 ... (double sided)	0,500	0,15	E 37
WLPF ...	0,500	-	E 70
WSF(S) ...	0,460 @ 1,6 mm 0,520 @ 3,2 mm	0,8 / 1,6 / 2,4 / 3,2 / 4,8 / 6,35	E 41
WLFT 88 ... (double sided)	0,600	0,13 / 0,25 / 0,38 / 0,5	E 39
WLP ...	0,610	-	E 70
WLK ...	0,836	-	E 72
FSF 52 P	0,900	0,127	E 67
WFPK 09	0,900	0,152	E 26
WFS 09 ...	0,900	0,178 / 0,229	E 14
WFP 09	0,900	0,229	E 27
WK ... (one sided)	0,920	0,2	E 12
WLK DK ...	1,000	-	E 73
WG ...	1,130	0,2	E 12
WS ...	1,220	0,3	E 12
WFPK 13	1,300	0,152	E 28
WLFT 412 ... (double sided)	1,400	0,23	E 37
GEL 14 (G) ...	1,400	0,5 / 1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0 / 4,5 / 5,0	E 45
WB ...	1,430	0,15	E 12
FSF 15 P ...	1,500	0,114 / 0,127 / 0,140	E 68
WLFT 8926 ... (double sided)	1,500	0,2 / 0,25 / 0,5	E 40
GEL (G) ...	1,500	0,5 / 1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0 / 4,5 / 5,0	E 46
WFG 15 ...	1,500	0,508 / 1,016 / 1,524 / 2,032 / 2,54 / 3,175 / 4,064 / 5,08	E 47
GEL F 15 (G) ...	1,500	1,0 / 1,5 / 2,0	E 42
FSF 16 P ...	1,600	0,102 / 0,114 / 0,127	E 69
WFS 16	1,600	0,229	E 15
WFKF 18 ...	1,800	0,150 / 0,175 / 0,325	E 29
WFS 18	1,800	0,203	E 16
WFK 18 ...	1,800	0,225 / 0,25	E 17
GEL S 18 (liquid)	1,800	-	E 60
GEL S 20 (liquid)	1,800	-	E 61
FSF 20 P	2,000	0,200	E 67
WFKF 20 ...	2,000	0,5 / 1,0	E 43
WLK SK 50	2,000	-	E 74
WFQ 25	2,500	0,152	E 32
WFK 25 ...	2,500	0,225 / 0,25	E 18
GEL 28 (G) ...	2,500	0,5 / 1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0 / 4,5 / 5,0	E 50
GEL 28 S ...	2,500	1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0 / 4,5 / 5,0	E 56
FSF 30 P	3,000	0,12	E 67

Explanation of the colours:

Thermally conductive foils containing silicone	Silicone-free thermally conductive foils	Aluminium and graphite foils	Adhesive thermally conductive foils	GAP Filler thermally conductive foils	GAP Fillers for extreme compressions	Phase Change thermally conductive foils	Thermally conductive pastes	Thermally conductive glues
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art. no.	thermal conductivity [W/m*K]	material thickness [mm]	page
WLFT 30 ... (one sided)	3,000	0,15 / 0,23	E 35
WFKF 30 02	3,000	0,2	E 30
WFS 30 ...	3,000	0,381 / 0,508	E 19
GEL F 30 ...	3,000	0,5 / 1,0 / 1,5	E 44
WFGH 30 ...	3,000	0,508 / 1,016 / 1,524 / 2,032 / 2,54 / 3,175	E 49
GEL 30 S ...	3,000	0,5 / 1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0	E 55
GEL S 30 (liquid)	3,000	-	E 61
WFF 33 ...	3,300	0,2 / 0,3	E 20
WFS 34 ...	3,400	0,2 / 0,3 / 0,45	E 21
WFK 35 ...	3,500	0,125 / 0,225 / 0,25	E 22
GEL S 35 ... (liquid)	3,500	-	E 62
WLFT 40 023 (one sided)	4,000	0,23	E 36
GEL S 40 (liquid)	4,300	-	E 61
GEL 45 (G) ...	4,500	0,5 / 1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0 / 4,5 / 5,0	E 50
WFC 50 ...	5,000	0,2 / 0,3 / 0,45 / 0,8	E 23
WFGH 50 ...	5,000	0,508 / 1,016 / 1,524 / 2,032 / 2,54 / 3,175	E 51
GEL 50 S ...	5,000	0,5 / 1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0	E 56
WFK 60 ...	6,000	0,1 / 0,2 / 0,225 / 0,3	E 31
GEL 60 (G) ...	6,000	0,5 / 1,0 / 1,5 / 2,0 / 2,5	E 54
GEL 60 S ...	6,000	1,5 / 2,0 / 2,5	E 57
WFK 65 ...	6,500	0,25 / 0,275	E 24
GEL 70 S ...	7,000	1,0 / 1,5 / 2,0 / 2,5 / 3,0 / 3,5 / 4,0	E 58
WLFG S 900 ...	7,500	0,15 / 0,175	E 33
WLFG 98 ...	8,000	0,13 / 0,25 / 0,5	E 34
WFS 80 ...	8,000	0,2 / 0,3 / 0,45	E 25
WLPK ...	10,000	-	E 71
GEL 80 (G) ...	13,000	0,3 / 0,5 / 1,0 / 1,5 / 2,0 / 2,5 / 3,0	E 53
GEL 130 S ...	13,000	0,5 / 1,0 / 1,5 / 2,0	E 59

Explanation of the colours:

Thermally conductive foils containing silicone	Silicone-free thermally conductive foils	Aluminium and graphite foils	Adhesive thermally conductive foils	GAP Filler thermally conductive foils	GAP Fillers for extreme compressions	Phase Change thermally conductive foils	Thermally conductive pastes	Thermally conductive glues
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Thermal conductive foils for semiconductors

- thermal conductive foils cut to size for IGBT, DC/DC converters and Solid State Relais
- other thermal conductive materials and cuts according to customer's specifications

art. no.	page	thermal conductivity [W/m·k]	material thickness [mm]	type
WFQ 25 ...	E 32	2.5	0.152	aluminium foil
WLFQ S 900	E 33	7.5	0.150	graphite foil
WLFQ S 900 K	E 33	7.5	0.175	
WLFQ 9813	E 34	8.0	0.130	
WLFQ 9825	E 34	8.0	0.250	
WLFQ 9850	E 34	8.0	0.500	
FSF 15 P 011	E 68	1.5	0.114	phase-change thermal conductive foil
FSF 15 P 012	E 68	1.5	0.127	
FSF 15 P 014	E 68	1.5	0.140	
FSF 20 P	E 67	2.0	0.200	

Order example

<p>WLFQ 9010</p> <p> </p> <p>Thermally conductive foil</p>	<p>54 x 94</p> <p> </p> <p>dimension</p>
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IGBT

dimension [mm]	blanks	manufacturer	component
34 x 94		Infineon MCC IXYS Semikron	Int-A-Pak (New) / 34mm Module MF ... F2 / MT ... T2 / MD ... D2 Y4-M6 SEMISTRANS 2 / SEMIPACK 2
45 x 108		Infineon IXYS	Econo 2 / Econo PIM 2 / Econo PACK 2 / Econo BRIDGE / Iso PACK 2 E2-Pack
54 x 94		Infineon MCC IXYS Semikron	MTC / Iso PACK 54 MD ... M3 / MD ... M5 PWS-E Flat / PWS-E SEMIPOINT 4
62 x 107		Infineon MCC IXYS Semikron	Dual Int-A-Pak / 62 mm Module MT ... L2 E3-Pack SEMISTRANS 3 / SEMISTRANS 4
62 x 122		Infineon IXYS Semikron	Econo 3 / Econo DUAL + / Econo PIM 3 / Econo PACK 3 SimBus F SEMIX 3p / SEMIX 3lp
73 x 140		Infineon	IHV
130 x 140		Infineon	IHM / IHV
140 x 190		Infineon	IHM / IHV

DC/DC converter

dimension [mm]	blanks	component
36.9 x 58		Micro DC/DC-converter
55.9 x 58		Mini DC/DC-converter
55.9 x 117		Maxi DC/DC-converter

Solid State Relais

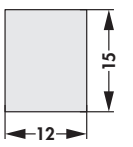
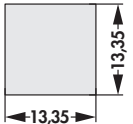
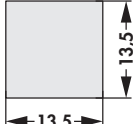


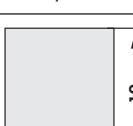
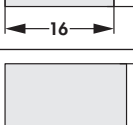
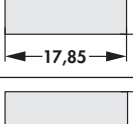
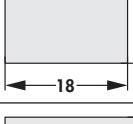
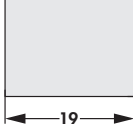
dimension [mm]	blanks	component
45 x 57		SSR 1
73.5 x 104.5		SSR 2
17 x 38.1		SSR 3
34 x 94		SSR 4

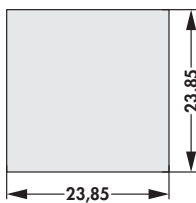
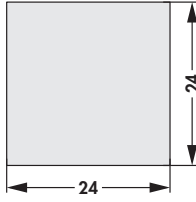
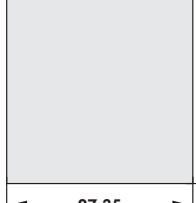

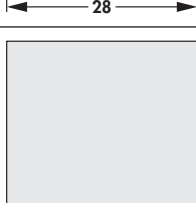
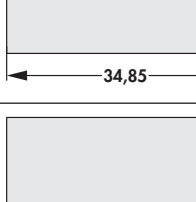
- thermal conductive foils cut to size for LEDs
- other thermal conductive materials and cuts according to customer's specifications

art. no.	page	thermal conductivity [W/m.k]	material thickness [mm]	type
WFQ 25 ...	E 32	2.5	0.152	aluminium foil
WLFQ S 900	E 33	7.5	0.150	graphite foil
WLFQ S 900 K	E 33	7.5	0.175	
WLFQ 9813	E 34	8.0	0.130	
WLFQ 9825	E 34	8.0	0.250	
WLFQ 9850	E 34	8.0	0.500	
WLFT 404	E 37	0.4	0.127	double-sided adhesive thermal conductive foil
WLFT 405	E 37	0.5	0.150	
WLFT 8805	E 39	0.6	0.130	
WLFT 8810	E 39	0.6	0.250	
WLFT 8815	E 39	0.6	0.380	
WLFT 8820	E 39	0.6	0.500	
WLFT 8926	E 40	1.5	0.2 / 0.25 / 0.5	
WLFT 30	E 35	3.0	0.15 / 0.23	
FSF 15 P 011	E 68	1.5	0.114	phase-change thermal conductive foil
FSF 15 P 012	E 68	1.5	0.127	
FSF 15 P 014	E 68	1.5	0.140	
FSF 20 P	E 67	2.0	0.200	

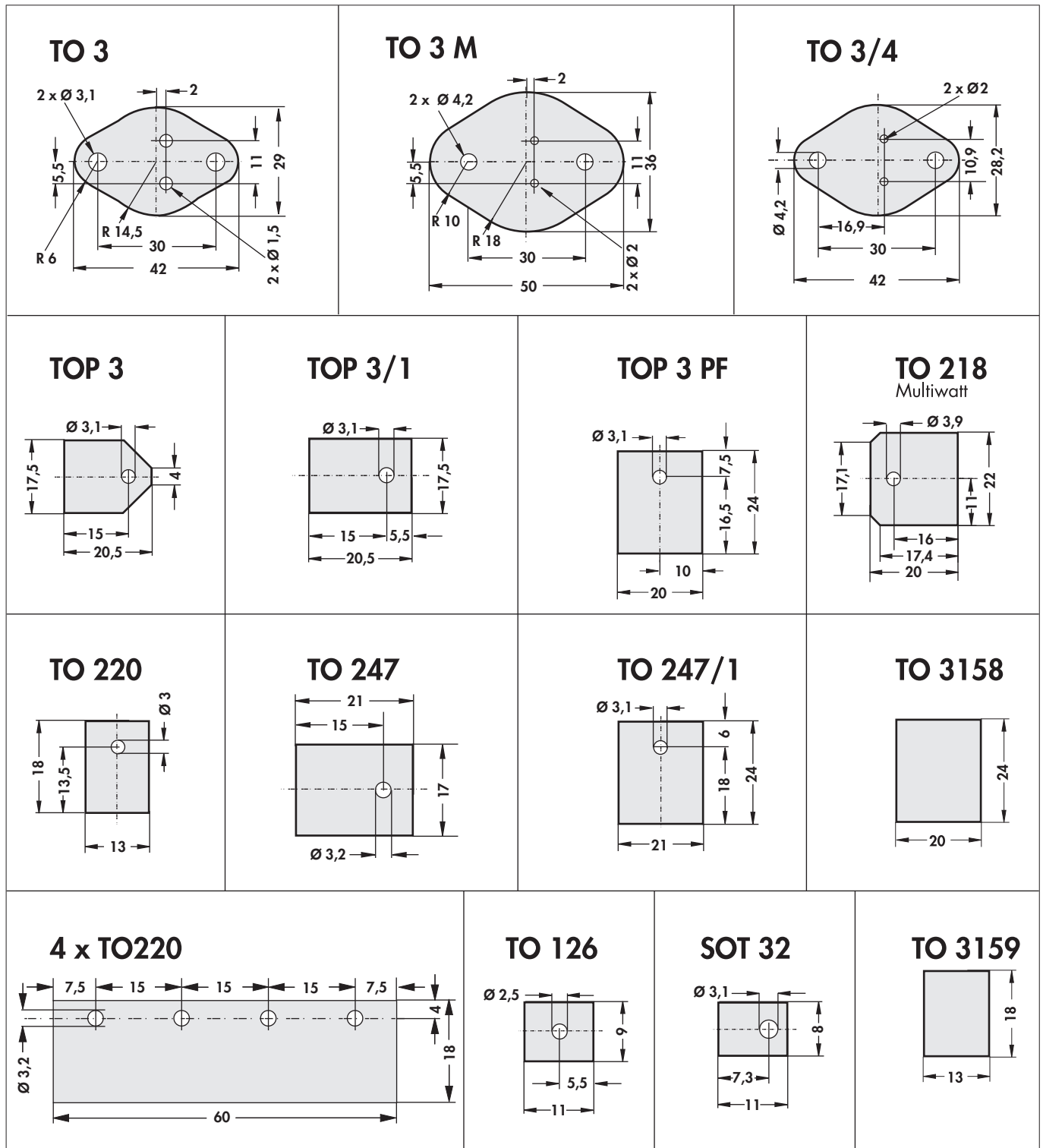
Order example

WLFT 8810	20 x 24
Thermally conductive foil	dimension

dimension [mm]	blanks	manufacturer	LED package
12 x 15		Lumileds Luxeon Sharp Nichia LG Innotec	CoB 1202S Mini ZENIGATA / GW6BMG / GW6BGG / GW6BMW / GW6BGW / GW6NGW NTCWT / NTCWS / NVNWS / NJCWS LEMWM12480 / LEMWM12490
13.35 x 13.35		Cree Seoul Semiconductor	CXA13XX / CXB13XX SAW 806 / SAW810 / SAW906 / SAW910
13.5 x 13.5		Citizen	CLU026 / CLU027 / CLU028 / CLU700 / CLU701
15 x 15		Osram	Soleriq P9
15.85 x 15.85		Cree	CXA15XX / CXB15XX
16 x 19		Lumileds Luxeon Nichia LG Innotec	CoB 1202 / CoB 1203 NFCWL / NVEWL / NVCWL LEMWM19480 / LEMWM19490 / LEMWM19680 / LEMWM19690
17.85 x 17.85		Cree	CXA18XX / CXB18XX
18 x 18		Osram	Soleriq S13
19 x 19		Citizen Seoul Semiconductor	CLU036 / CLU038 / CLU710 / CLU711 / CLU720 / CLU721 SAW815 / SAW915
20 x 24		Lumileds Luxeon Sharp LG Innotec	CoB1204 / CoB1205 / CoB1208 Mini ZENIGATA / GW6DMB / GW6DGB / GW6DMC / GW6DGC / GW6DMD / GW6DGD / GW6DME / GW6DGE / GW6TGB / Tiger ZENIGATA / GW6TGC LEMWM24780 / LEMWM24790 / LEMWM24980 / LEMWM24990 / LEMWM24B80 / LEMWM24B90

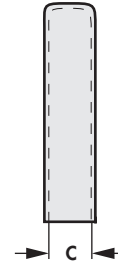
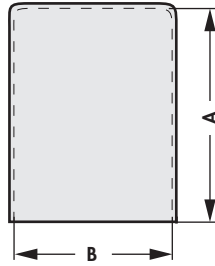
dimension [mm]	blanks	manufacturer	LED package
23.85 x 23.85		Cree	CXA25XX / CXB25XX
24 x 24		Osram	Soleriq S19
27.35 x 27.35		Cree	CXA30XX / CXB30XX
28 x 28		Lumileds Luxeon Citizen Seoul Semiconductor LG Innotec	CoB 1211 CLU046 / CLU048 / CLU731 SAW822 / SAW922 LEMWM28D80 / LEMWM28D90 / LEMWM28E80 / LEMWM28E90
34.85 x 34.85		Cree	CXA35XX / CXB35XX / CXA2Studio
38 x 38		Citizen Seoul Semiconductor Nichia	CLU056 / CLU058 / CLU550 SAW833 / SAW933 NFEWH

– other cuttings on request

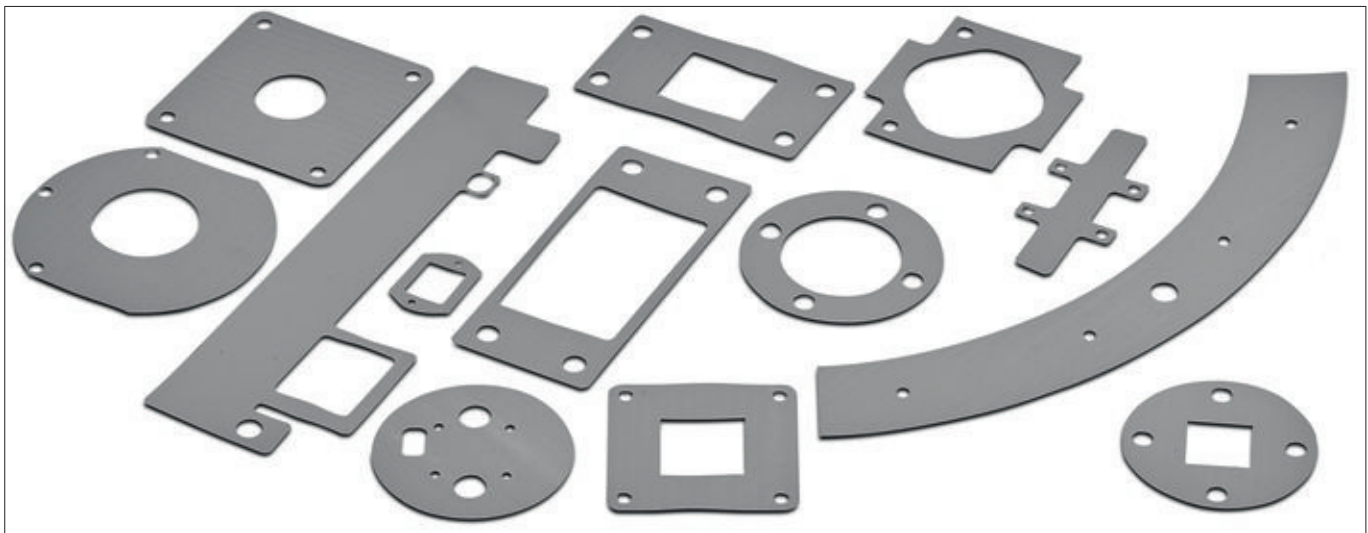


foil type	foil WS	foil WG	foil WK	foil WB
material	silicone foil, standard	silicone foil, GF reinforced	silicone foil, GF reinforced, one side self-adhesive	silicone foil, GF reinforced
washer				
TO-3	WS 3	WG 3	WK 3	WB 3
TO-3 M	WS 3 M			
TO-3/4	WS 3/4		WK 3/4	
TO-3 PF	WS 3 P	WG 3 P	WK 3 P	WB 3 P
3158	WS 3158		WK 3158	WB 3158
TOP 3	WS TOP 3			
TOP 3/1	WS TOP 3/1		WK TOP 3/1	
TO 218 (Multiwatt)		WG 218		
TO 247	WS 247		WK 247	
TO 220	WS 220	WG 220	WK 220	WB 220
4 X TO 220	WS 4 220			
3159	WS 3159		WK 3159	WB 3159
TO 126			WK 126	
SOT 32			WK 32	
TO 247/1	WS 247/1			
insulating tube				
TO-220 Ø 11 mm, length 25 mm	WSC-220			
TO-3 PF Ø 13.5 mm, length 25 mm	WSC-3 P			
TO-247 Ø 14.5 mm, length 30 mm	WSC-247			
insulating tube as meterpiece				
TO-220 Ø 11 mm	WSM-220			
TO-3 PF Ø 13.5 mm	WSM-3 P			
tape material (width)				
24 mm			WKT 24	
30 mm	WST 30		WKT 30	WBT 30
36 mm	WST 36	WGT 36	WKT 36	WBT 36
85 mm	WST 85		WKT 85	
300 mm		WGT 300	WKT 300	WBT 300
	Foil WS	Foil WG	Foil WK	Foil WB
colour		green		brown
material	silicone foil, standard	silicone foil, GF reinforced	silicone foil, GF reinforced, one side self-adhesive	silicone foil, GF reinforced
material thickness	0.3 mm +0.1/-0	0.2 mm +0.02/-0.04		0.15 mm +0.02/-0.04
thermal resistance	0.4 K/W	0.42 K/W	0.45 K/W	0.34 K/W
hardness	75 IRHD	87 IRHD		92 IRHD
thermal conductivity	1.2 W/m·K	0.9 W/m·K		1.44 W/m·K
temperature range	-40°C... +150°C			
insulation resistance	1·10 ¹³ Ω·m			
elongation	100 %	2 %		
dielectric strength	10 kV	6 kV		3 kV
class of inflammability	UL 94 V-0			

Insulating caps



art. no.	type	dim. [mm]		
		A	B	C
WSI 220 225	TO 220	22.5	11	5.0
WSI TOP 3 280	TO 3 PL/TO 247	28.0	16	
WSI 220 210	TO 220	21.0	11	
WSI TOP 3 235	TOP 3	23.5	18	
WSI TO 3 PL	TO 3 PL/TO 247	34.0	22	5.5
		Foil WSI 0.3 mm		Foil WSI 0.9 mm
colour		green		
material thickness		0.3 mm $+0.1/-0$	0.9 mm $+0.15/-0.1$	
thermal resistance		0.4 K/W	0.96 K/W	
hardness		75 Shore A		
thermal conductivity		1.22 W/m·K		
temperature range		-60°C... +180°C		
insulation resistance		$2.9 \cdot 10^{15} \Omega \cdot \text{cm}$		
elongation		100 %		
dielectric strength		10 kV	15 kV	
class of inflammability		UL 94 V-0		

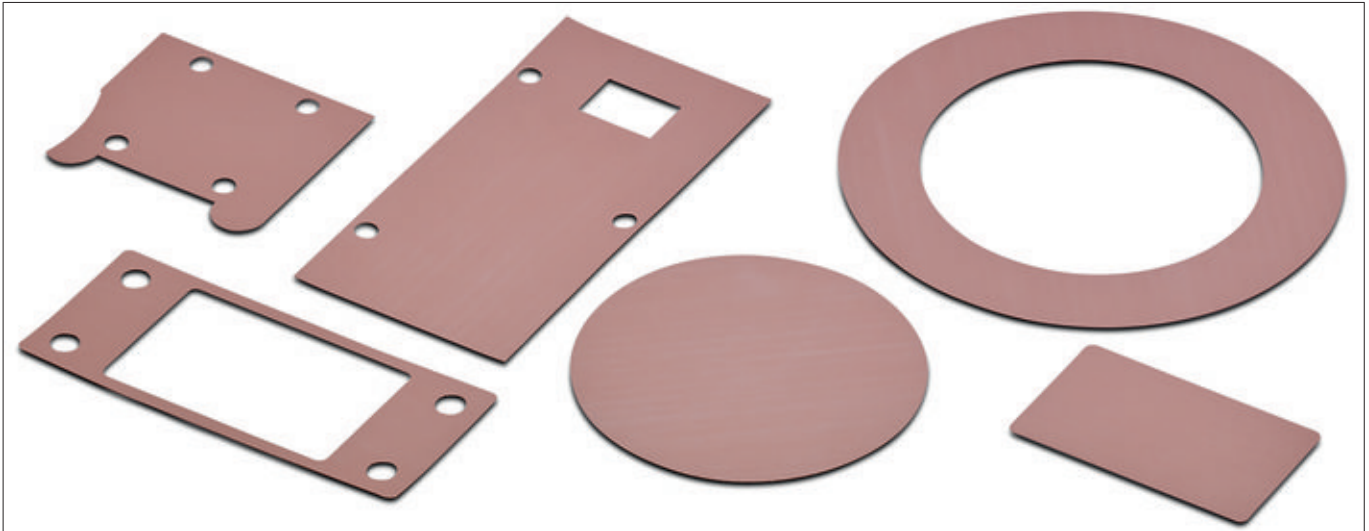


- silicone foil with glass fibre reinforcement
- free from toxic substances
- very good thermal and mechanical properties
- one-sided or double-sided adhesive layer upon request
- cuts and contours according to customer specific drawing specifications

art. no.	material thickness [mm]	art. no.	material thickness [mm]
WFS 09 18	0.178	WFS 09 23	0.229
	WFS 09 18		WFS 09 23
version	silicone foil with glass fibre reinforcement		
colour	grey		
hardness	85 Shore A		
thermal conductivity	0.9 W/m·K		
temperature range	-60°C... +180°C		
elongation	54 %		
volume resistance	10 ¹¹ Ω·m		
dielectric constant	5.5 [1 kHz]		
tear strength	3,000 psi		
tensile strength	5 kN/m		
dielectric strength	3.5 kV		4.5 kV
class of inflammability	UL 94 V-0		
type of delivery	rolled goods, roll width 300mm/ cuttings on customer's requirement		

Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance WFS 09 18 [K/W]	6.62	5.93	5.14	4.38	3.61
thermal resistance WFS 09 23 [K/W]	8.51	7.62	6.61	5.63	4.64
thermal impedance WFS 09 18 [K·cm ² /W]	11.37	8.87	7.06	5.12	3.37
thermal impedance WFS 09 23 [K·cm ² /W]	14.62	11.43	9.06	6.56	4.31

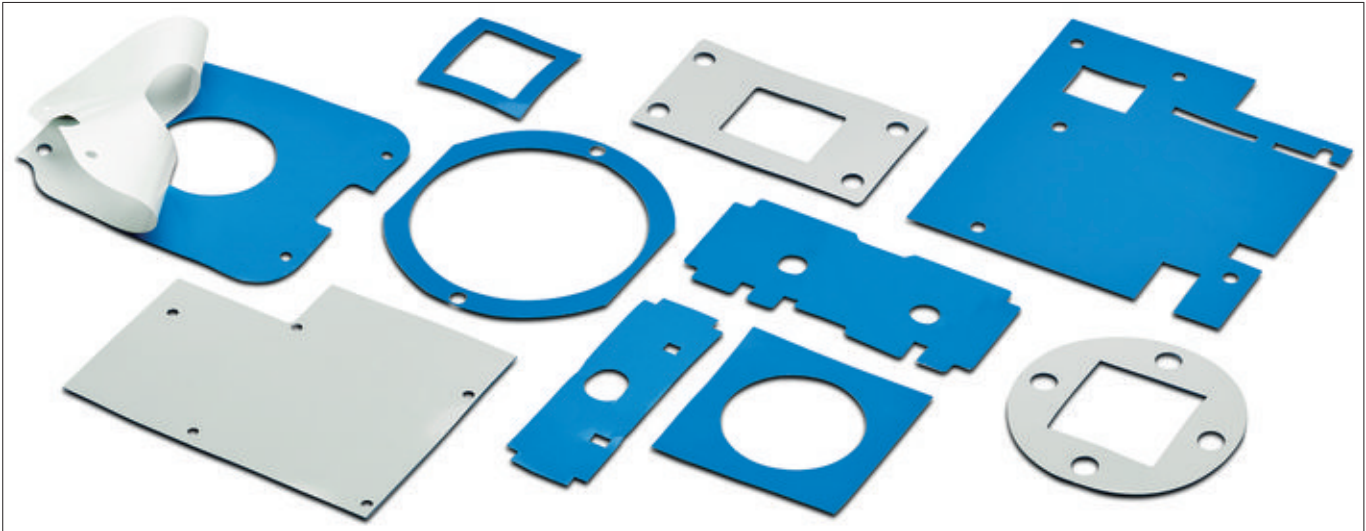
Thermally conductive foil made of siliconelastomer



- very good suitable for low tightening torques or spring applications
- good electrical insulating properties
- optimal contacting between device and heatsink
- one-sided adhesive layer upon request
- cuts and contours according to customer specific drawing specifications

art. no.	material thickness [mm]
WFS 16	0.229
	WFS 16
version	silicone foil with glass fibre reinforcement
colour	pink
hardness	92 Shore A
thermal conductivity	1.6 W/m·K
temperature range	-60°C... +180°C
elongation	20 %
volume resistance	10 ¹⁰ Ω·m
dielectric constant	6 [1 kHz]
tear strength	1,300 psi
dielectric strength	5.5 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 300mm/ cuttings on customer's requirement

Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance WFS 16 [K/W]	3.96	3.41	2.90	2.53	2.32
thermal impedance WFS 16 [K·cm ² /W]	5.93	4.68	3.81	2.93	2.56

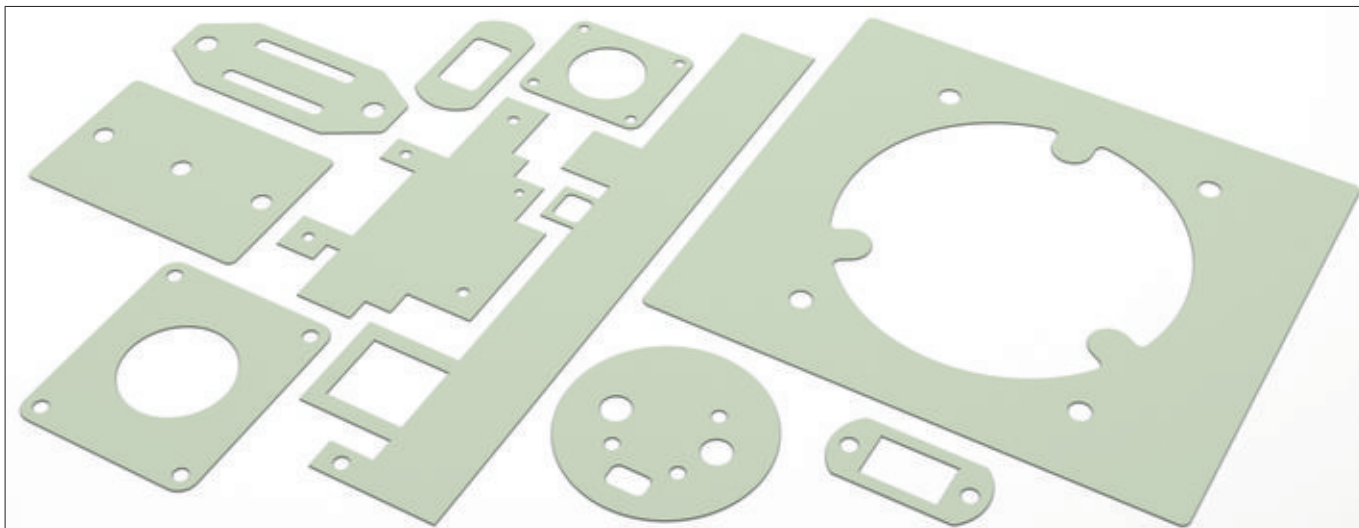


- silicone material with glass fibre reinforcement
- optimal contacting between device and heatsink
- simplified mounting by means of double-sided adhesive layer
- automatic assembling possible
- cuts and contours according to customer specific drawing specifications

art. no.	material thickness [mm]
WFS 18	0.203
	WFS 18
version	silicone foil with glass fibre reinforcement
colour	blue
hardness	75 Shore A
thermal conductivity	1.8 W/m·K
temperature range	-60°C... +180°C
elongation	22 %
volume resistance	10 ¹¹ Ω·m
dielectric constant	6.1 [1 kHz]
tear strength	238 psi
tensile strength	0,34 kN/m
dielectric strength	3 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 250mm/ cuttings on customer's requirement

Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance WFS 18 [K/W]	1.54	1.52	1.51	1.49	1.46
thermal impedance WFS 18 [K-cm ² /W]	2.31	1.75	1.43	1.31	1.25

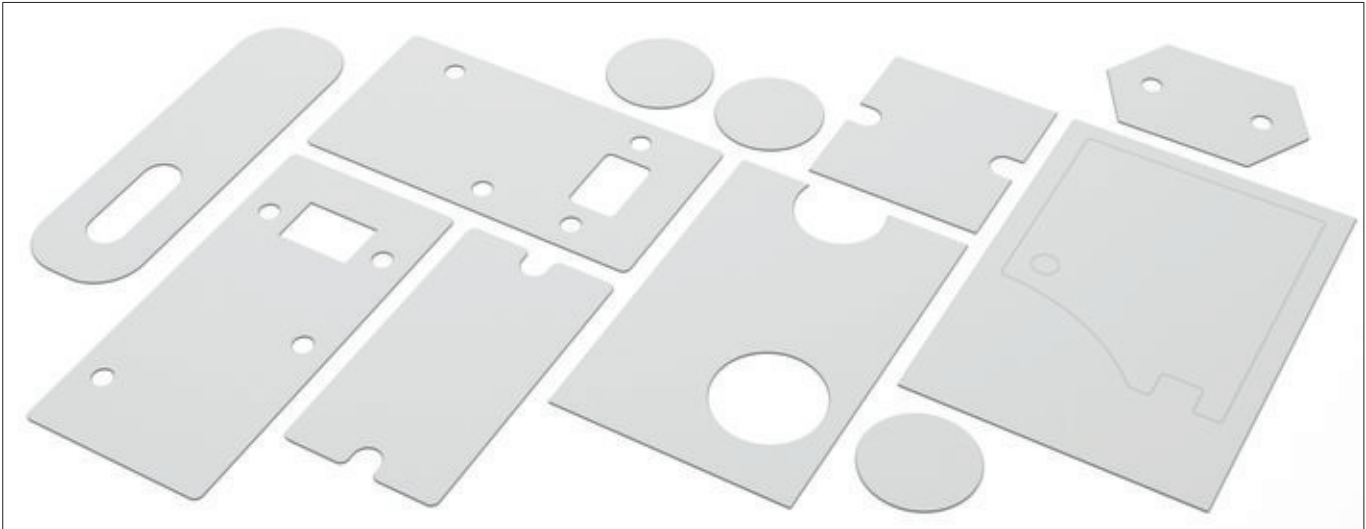
Thermally conductive foil made of siliconelastomer



- silicone foil with a high operating temperature range
- high mechanical stability
- easy handling and application
- cuts, punch-outs and contours according to customer-specific drawing specifications

art. no.	material thickness [mm]		art. no.	material thickness [mm]
WFK 18	0.225		WFK 18 GK	0.250
WFK 18 G			WFK 18 K	
	WFK 18	WFK 18 G	WFK 18 GK	WFK 18 K
version	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil	silicone foil without glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil
colour	lime-green			
density	2.29 g/cm ³			
hardness	65 - 75 Shore A			
thermal conductivity	1.8 W/m·K			
thermal resistance	0.32 K/W	0.5 K/W	0.55 K/W	0.39 K/W
temperature range	-60°C ... +250°C			
elongation	75 %			
volume resistance	2.5·10 ¹¹ Ω·m			
dielectric constant	2.9 [1 kHz]			
tensile strength	2 N/mm ²	7,5 N/mm ²		2 N/mm ²
dielectric strength	8 kV			
class of inflammability	UL 94 V-0			
type of delivery	plates, usable area 300x250mm/ other dimensions upon request			

Thermal resistances vs. contact pressure				
pressure [psi]	7.25	29	58	87
thermal resistance WFK 18 [K/W]	0.50	0.42	0.37	0.33
thermal impedance WFK 18 [K·cm ² /W]	1.75	1.38	1.25	1.18

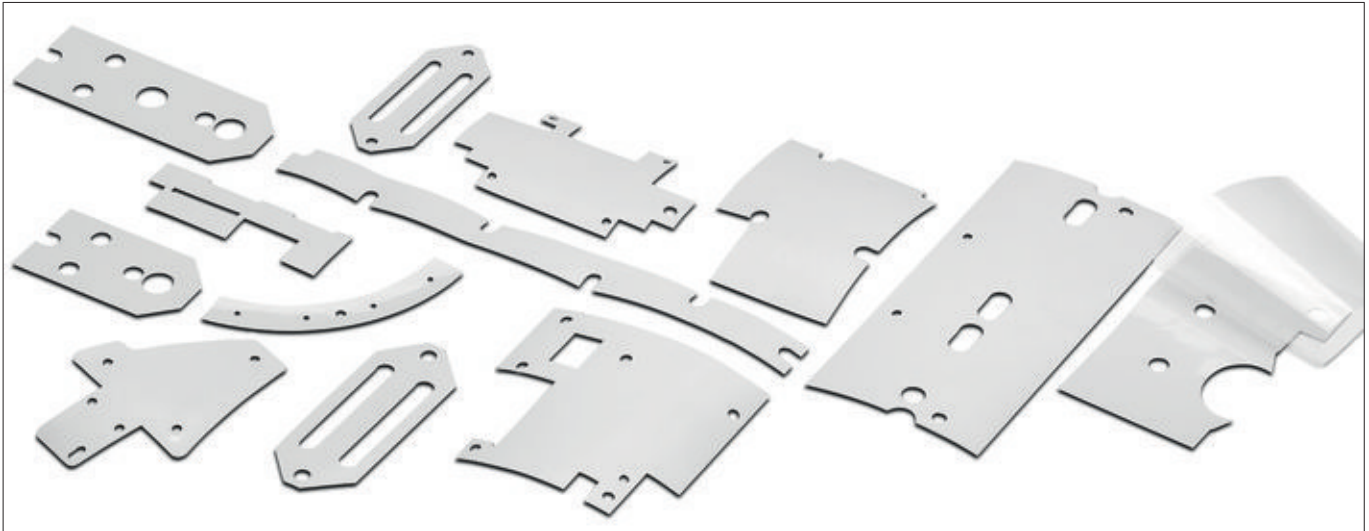


- silicone foil with very good thermal properties
- good electrical insulation resistance
- easy handling and application
- cuts and contours according to customer specifications

art. no.	material thickness [mm]		art. no.	material thickness [mm]	
WFK 25	0.225		WFK 25 GK	0.250	
WFK 25 G			WFK 25 K		
	WFK 25	WFK 25 G	WFK 25 GK	WFK 25 K	
version	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil	silicone foil without glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil	
colour	white				
density	2.33 g/cm ³				
hardness	70 - 80 Shore A				
thermal conductivity	2.5 W/m·K				
thermal resistance	0,22 K/W	0,25 K/W	0,3 K/W	0,265 K/W	
temperature range	-60°C ... +250°C				
elongation	31 %				
volume resistance	2.5·10 ¹¹ Ω·m				
dielectric constant	3 [1 kHz]				
tensile strength	1,5 N/mm ²	7,5 N/mm ²		1,5 N/mm ²	
dielectric strength	1.5 kV				
class of inflammability	UL 94 V-0				
type of delivery	plates, usable area 300x250mm/ other dimensions upon request			plates, usable area 300x235mm/ other dimensions upon request	

Thermal resistances vs. contact pressure				
pressure [psi]	7.25	29	58	87
thermal resistance WFK 25 [K/W]	0.38	0.33	0.30	0.27
thermal impedance WFK 25 [K-cm ² /W]	1.13	1.00	0.92	0.83

Thermally conductive foil made of siliconelastomer



- silicone-foil with very good thermal properties
- excellent insulating properties
- simple and stable handling by means of glass fibre carrier material
- one-sided adhesive layer upon request
- cuts and contours according to customer specific drawing specifications

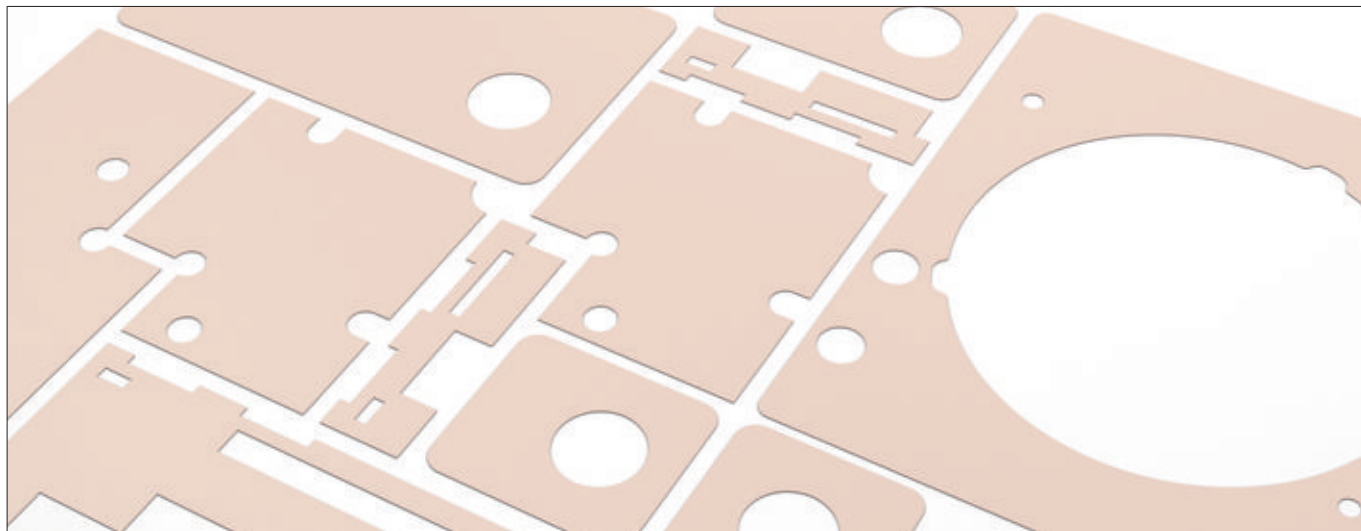
art. no.	material thickness [mm]
WFSA 30 50	0.508
	WFSA 30 50
version	silicone foil with glass fibre reinforcement
colour	white
hardness	90 Shore A
thermal conductivity	3 W/m·K
temperature range	-60°C ... +200°C
volume resistance	10 ¹¹ Ω·m
dielectric constant	7 [1 kHz]
heat capacity	1 J/g·K
dielectric strength	4 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 250mm/ cuttings on customer's requirement



- silicone foil with very good thermal conduction properties
- high dimensional stability due to glass fibre layer
- good electrical properties
- excellent processing properties
- contour and drawing parts according to customer specifications

art. no.	material thickness [mm]
WFS 34 020	0.20
WFS 34 030	0.30
WFS 34 045	0.45
WFS 34	
version	silicone foil with glass fibre reinforcement
colour	dark gray
density	2.84 g/cm ³
hardness	90 Shore A
thermal conductivity	3.4 W/m·K
temperature range	-40°C ... +180°C
volume resistance	3·10 ¹³ Ω·cm
dielectric strength	7 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 300mm/ other dimensions upon request

Thermally conductive foil made of siliconelastomer



- silicone foil with very good thermal conductivity
- high insulation and dielectric strength
- very large operating temperature range
- one-sided adhesive coating as an mounting aid
- customer-specific cuts and punch-outs according to drawing

art. no.	material thickness [mm]			
WFK 35 012	0.125			
WFK 35 022	0.225			
WFK 35 G	0.250			
WFK 35 GK	0.250			
WFK 35 K	0.250			
	WFK 35	WFK 35 G	WFK 35 GK	WFK 35 K
version	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement, one-sided protection foil	silicone foil with glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil	silicone foil without glass fibre reinforcement and one-sided adhesive layer, one-sided protection foil
colour	pink			
density	1.97 g/cm ³			
hardness	70 - 80 Shore A			
thermal conductivity	3.5 W/m·K			
thermal resistance	0.16 K/W	0.22 K/W	0.27 K/W	0.26 K/W
temperature range	-60°C ... +250°C			
elongation	25 %			
volume resistance	1.3·10 ¹⁴ Ω·m			
dielectric constant	2.3 [1 kHz]			
tensile strength	1,3 N/mm ²	10 N/mm ²	10 N/mm ²	1,3 N/mm ²
dielectric strength	1.5 kV			
class of inflammability	UL 94 V-0			
type of delivery	plates, usable area 300x250mm/ other dimensions upon request		plates, usable area 300x235mm/ other dimensions upon request	

Thermal resistances vs. contact pressure				
pressure [psi]	7.25	29	58	87
thermal resistance WFK 35 [K/W]	0.25	0.21	0.17	0.15
thermal impedance WFK 35 [K·cm²/W]	0.94	0.81	0.75	0.56

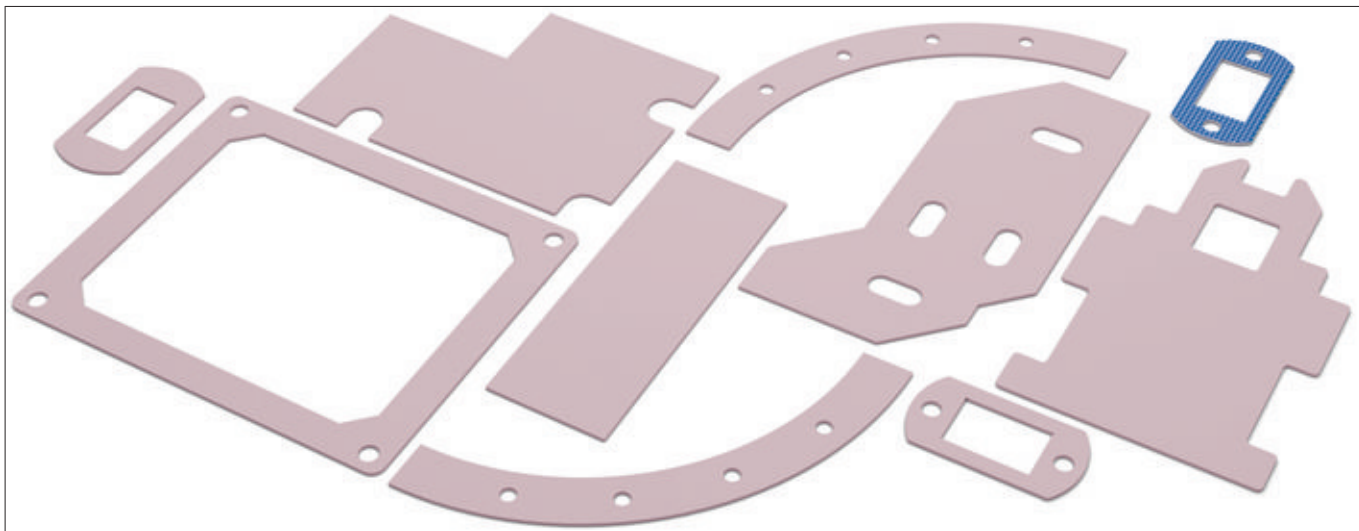


- silicone foil with ceramic filling and high thermal conductivity
- optimal connection of electronic components
- high mechanical stability and easy handling
- extreme aging- and chemical resistance
- special cuts or geometries according to customer specifications

art. no.	material thickness [mm]		art. no.	material thickness [mm]
WFC 50 02	0.20		WFC 50 04	0.45
WFC 50 03	0.30		WFC 50 08	0.80
	WFC 50 02	WFC 50 03	WFC 50 04	WFC 50 08
version	silicone foil with ceramic filling and glass fibre reinforced design			
colour	white			
thermal conductivity	5 W/m·K			
temperature range	-50°C ... +200°C			
volume resistance	1.7·10 ¹³ Ω·m	7.9·10 ¹³ Ω·m	9.2·10 ¹³ Ω·m	8.9·10 ¹³ Ω·m
dielectric constant	3.3 [1 MHz]			
dielectric strength	3 kV	6 kV	9 kV	>10 kV
class of inflammability	UL 94 V-0			
type of delivery	plates, usable area 440x510mm/ other dimensions upon request			

Thermal resistances vs. contact pressure		
pressure [psi]	29	145
thermische impedance WFC 50 02 [K·cm ² /W]	1.87	0.71
thermische impedance WFC 50 03 [K·cm ² /W]	2.06	0.96
thermische impedance WFC 50 04 [K·cm ² /W]	2.26	1.10
thermische impedance WFC 50 08 [K·cm ² /W]	3.35	1.74

Thermally conductive foil made of siliconelastomer



- silicone foil with excellent thermal conductivity
- very good electrical properties
- adhesive coating for easy assembly handling
- particularly suitable for high-performance applications
- cuts and contours according to customer's drawing specifications

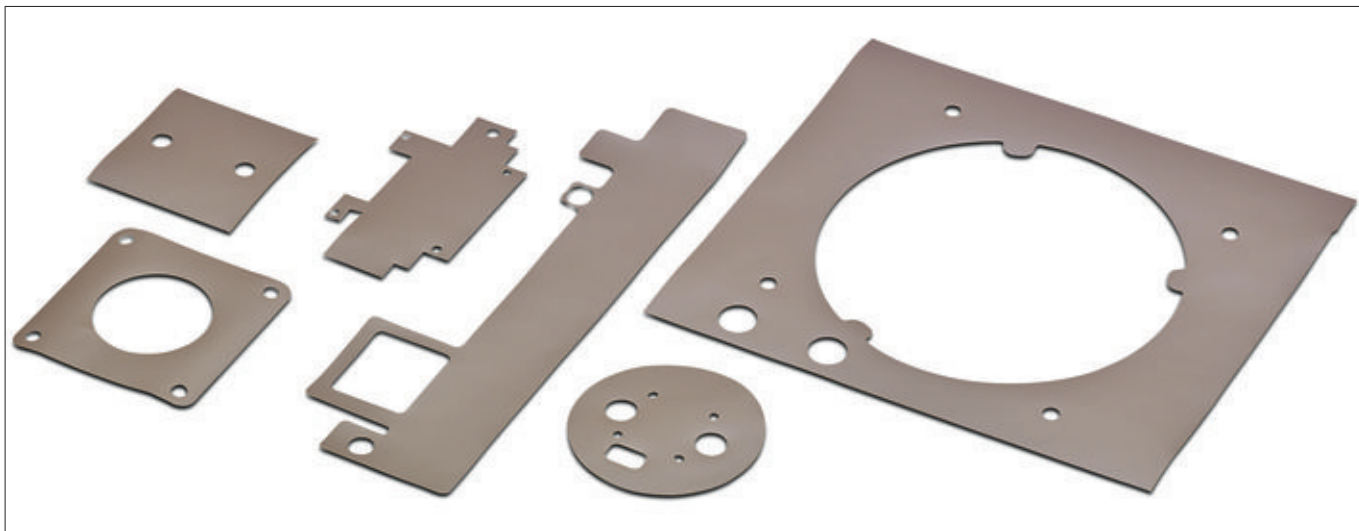
art. no.	material thickness [mm]	
WFK 65	0.250	
WFK 65 K	0.275	
	WFK 65	WFK 65 K
version	silicone foil without glass fibre reinforcement, one-sided protection foil	silicone foil with adhesive layer, one-sided protection foil
colour	red	
density	1.23 g/cm ³	
hardness	60 - 70 Shore A	
thermal conductivity	6,5 W/m·K	
thermal resistance	0,09 K/W	
temperature range	-40°C... +200°C	
elongation	2 %	
volume resistance	2·10 ¹⁴ Ω·m	
dielectric constant	2.4 [1 kHz]	
tensile strength	13 N/mm ²	
dielectric strength	1 kV	
class of inflammability	UL 94 V-0	
type of delivery	plates, usable area 300x250mm/ other dimensions upon request	plates, usable area 300x235mm/ other dimensions upon request

Thermal resistances vs. contact pressure				
pressure [psi]	7.25	29	58	87
thermal resistance WFK 65 [K/W]	0.18	0.12	0.10	0.08
thermal impedance WFK 65 [K-cm ² /W]	0.68	0.50	0.39	0.31



- silicone foil with excellent thermal conductivity
- very good insulation properties
- high material strength due to glass fibre reinforcement
- simple handling and application
- customised cuts and geometries according to drawing

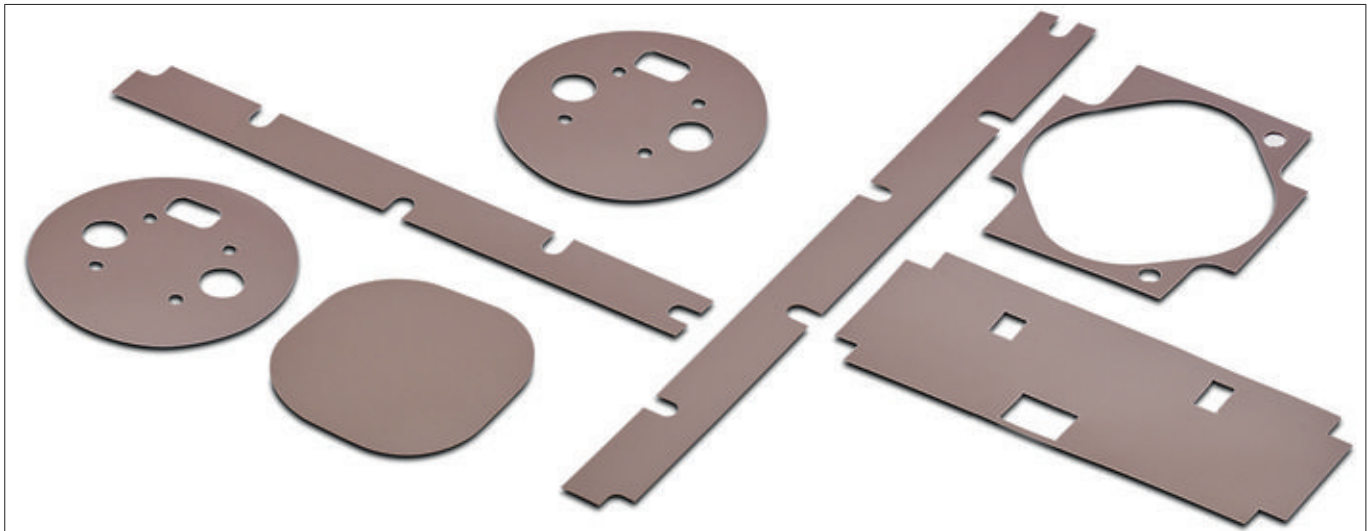
art. no.	material thickness [mm]
WFS 80 020	0.20
WFS 80 030	0.30
WFS 80 045	0.45
WFS 80	
version	silicone foil with glass fibre reinforcement
colour	light gray
density	1.6 g/cm ³
hardness	85 Shore A
thermal conductivity	8 W/m·K
temperature range	-40°C ... +180°C
volume resistance	2.9·10 ¹⁴ Ω·cm
tear strength	1,885 psi
tensile strength	45 kN/m
dielectric strength	7 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 420x500mm/ other dimensions upon request



- thermal conductive foil based on polyester
- particularly suitable for silicone-free applications
- very good insulating properties
- one-sided adhesive layer upon request
- cuts and contours according to customer specific drawing specifications

art. no.	material thickness [mm]
WFPK 09	0.152
	WFPK 09
version	kapton carrier foil with ceramic filled polyester resin double-sided fully coated
colour	brown
hardness	90 Shore A
thermal conductivity	0.9 W/m·K
temperature range	-20°C... +150°C
elongation	40 %
volume resistance	10 ¹² Ω·m
dielectric constant	5 [1 kHz]
tear strength	5,000 psi
tensile strength	5 kN/m
dielectric strength	6 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 292mm/ cuttings on customer's requirement

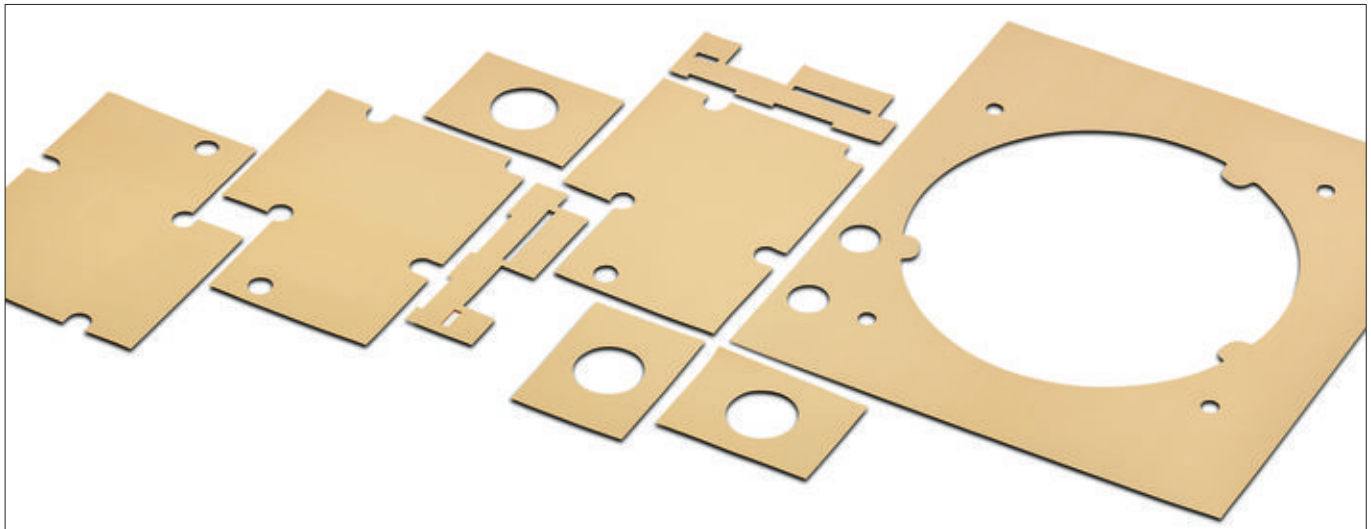
Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance WFPK 09 [K/W]	5.64	5.04	4.34	3.69	3.12
thermal impedance WFPK 09 [K·cm ² /W]	9.68	7.56	5.93	4.37	2.87



- thermal conductive foil based on polyester
- particularly suitable for silicone-free applications
- very good thermal and mechanical properties
- simplified mounting by means of adhesive layers upon request
- cuts and contours made of sheet or roll material as per your specifications

art. no.	material thickness [mm]
WFP 09	0.229
	WFP 09
version	glass fibre-carrier foil with ceramic filled polyester resin double-sided fully coated
colour	brown
hardness	90 Shore A
thermal conductivity	0.9 W/m·K
temperature range	-20°C... +150°C
elongation	10 %
volume resistance	10 ¹¹ Ω·m
dielectric constant	5.5 [1 kHz]
tear strength	7,000 psi
tensile strength	18 kN/m
dielectric strength	2.5 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 300mm/ cuttings on customer's requirement

Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance WFP 09 [K/W]	5.85	5.61	5.13	4.59	4.12
thermal impedance WFP 09 [K-cm ² /W]	10.12	8.43	7.06	5.37	3.81



- thermal conductive foil for silicone-free applications
- thermal conductive foil based on polyester
- very good insulating properties
- one-sided adhesive layer upon request
- cuts and contours according to customer specific drawing specifications

art. no.	material thickness [mm]
WFPK 13	0.152
	WFPK 13
version	kapton carrier foil with ceramic filled polyester resin double-sided fully coated
colour	yellow
hardness	90 Shore A
thermal conductivity	1.3 W/m·K
temperature range	-20°C... +150°C
elongation	40 %
volume resistance	10 ¹² Ω·m
dielectric constant	3.7 [1 kHz]
tear strength	5,000 psi
tensile strength	5 kN/m
dielectric strength	6 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 292mm/ cuttings on customer's requirement

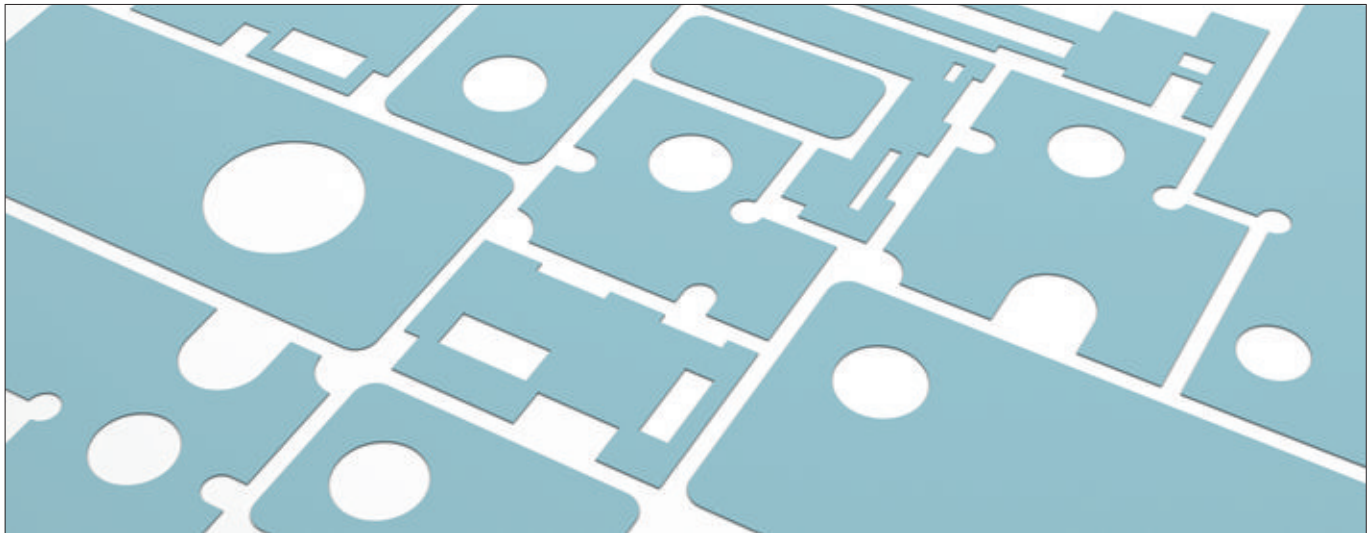
Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance WFPK 13 [K/W]	3.76	3.35	2.75	2.30	2.03
thermal impedance WFPK 13 [K·cm ² /W]	6.50	5.00	3.75	2.68	1.88



- polyurethane-based thermal conductive foil
- very good mechanical properties
- excellent insulation properties
- adhesive coating for easy handling
- cut to size and contours according to customised drawing specifications

art. no.	material thickness [mm]	
WFKF 18 015	0.150	
WFKF 18 017 K	0.175	
WFKF 18 032 K	0.325	
	WFKF 18 015	WFKF 18 ... K
version	ceramic-filled heat-conducting foil based on polyurethane, one-sided protective film	ceramic-filled heat-conducting foil based on polyurethane including adhesive coating, one-sided protective film
colour	blue	
density	2.26 g/cm ³	
hardness	80 - 90 Shore A	
thermal conductivity	1.8 W/m·K	
thermal resistance	0.2 K/W	
temperature range	-40°C... +125°C	
elongation	130 %	
volume resistance	1.4·10 ¹⁴ W·m	
dielectric constant	3.2 [1 kHz]	
tensile strength	3 N/mm ²	
dielectric strength	4 kV	
class of inflammability	UL 94 V-0	
type of delivery	plates, usable area 500x470mm/ other dimensions upon request	plates, usable area 500x460mm/ other dimensions upon request

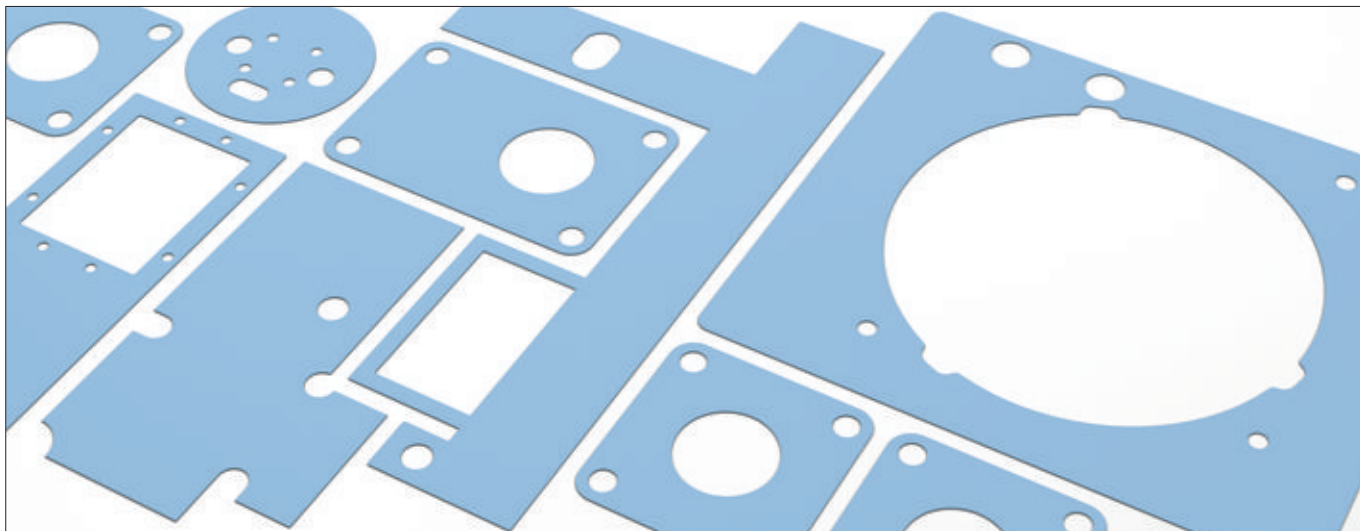
Thermal resistances vs. contact pressure				
pressure [psi]	7.25	29	58	87
thermal resistance WFKF 18 [K/W]	0.19	0.15	0.12	0.11
thermal impedance WFKF 18 [K·cm ² /W]	1.23	0.94	0.74	0.70



- thermal conductive foil for silicone-free applications
- epoxy-based thermal conductive foil
- excellent insulation properties
- cuts and contours according to customised drawing specifications

art. no.	material thickness [mm]
WFKF 30 02	0.2
	WFKF 30 02
version	silicone-free, ceramic-filled heat conducting foil
colour	light blue
density	1.44 g/cm ³
hardness	70 - 85 Shore A
thermal conductivity	3 W/m·K
thermal resistance	0.165 K/W
temperature range	-40°C... +150°C
elongation	>50 %
volume resistance	4.1·10 ⁹ Ω·m
dielectric constant	2 [1 kHz]
tensile strength	1 N/mm ²
dielectric strength	6 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 500x500mm/ other dimensions upon request

Thermal resistances vs. contact pressure				
pressure [psi]	7.25	29	58	87
thermal resistance WFKF 30 02 [K/W]	0.25	0.18	0.16	0.16
thermal impedance WFKF 30 02 [K·cm ² /W]	0.49	0.35	0.32	0.31



- heat conductive foil based on polyurethane
- very good mechanical properties
- high thermal conductivity for smallest heat transfer resistances
- adhesive coating for easy handling (WFK 60 K)
- cuts and contours according to customer's drawing specifications

art. no.	material thickness [mm]
WFK 60 01	0.100
WFK 60 02	0.200
WFK 60 03	0.300
WFK 60 K	0.225

	WFK 60	WFK 60 K
version	ceramic-filled heat-conducting foil based on polyurethane	ceramic-filled heat-conducting foil based on polyurethane including adhesive coating, one-sided protective film
colour	light blue	
density	1.46 g/cm ³	
hardness	70 - 85 Shore A	
thermal conductivity	6 W/m·K	
thermal resistance	0.082 K/W	
temperature range	-40°C... +125°C	
elongation	150 %	
volume resistance	2·10 ¹¹ Ω·m	
dielectric constant	3.1 [1 kHz]	
tensile strength	2 N/mm ²	
dielectric strength	4 kV	
class of inflammability	UL 94 V-0	
type of delivery	plates, usable area 300x235mm/ other dimensions upon request	plates, usable area 300x230mm/ other dimensions upon request

Thermal resistances vs. contact pressure				
pressure [psi]	7.25	29	58	87
thermal resistance WFK 60 [K/W]	0.24	0.16	0.12	0.09
thermal impedance WFK 60 [K·cm ² /W]	0.88	0.56	0.38	0.31

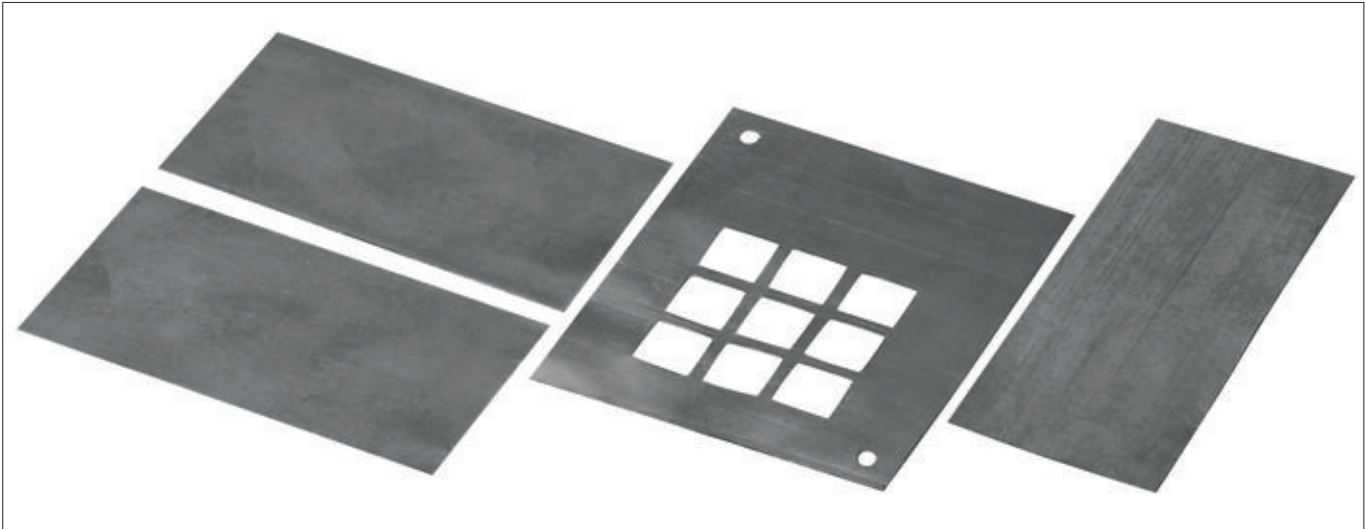
Thermal conductive foil made of aluminium



- double-sided coated aluminium foil
- good replacement for thermal pastes
- electroconductive with wide temperature range
- low heat-transmission resistance between device and heatsink
- cuts and contours according to customer specific drawing specifications

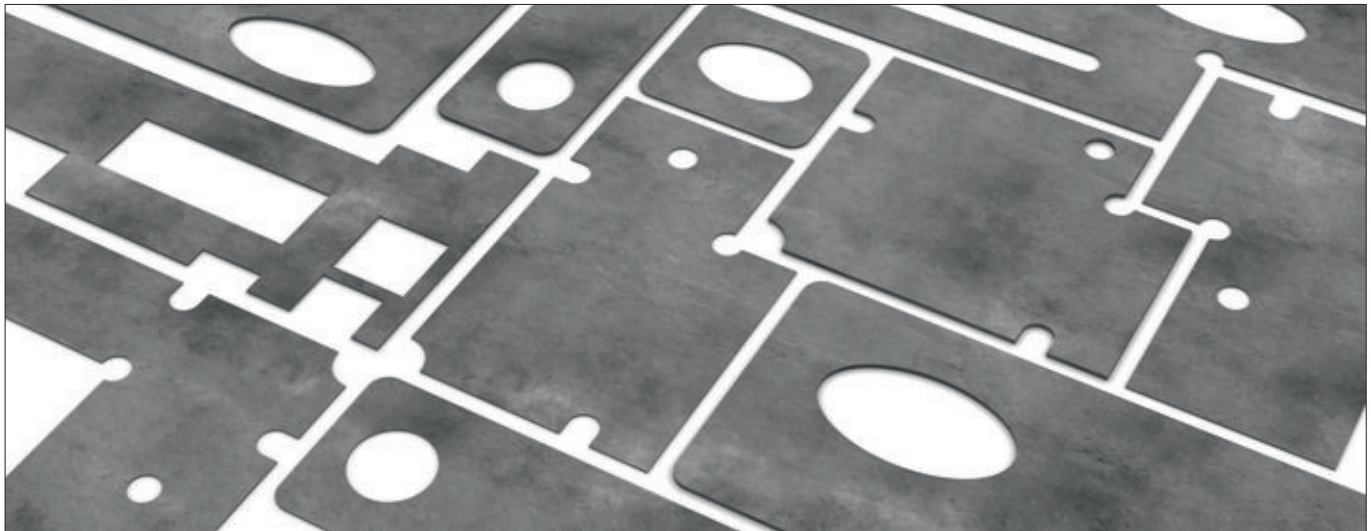
art. no.	material thickness [mm]
WFQ 25	0.152
	WFQ 25
version	aluminium foil with double-sided coating
colour	black
hardness	93 Shore A
thermal conductivity	2.5 W/m·K
temperature range	-60°C... +180°C
volume resistance	10 ² Ω·m
dielectric strength	electrically conductive
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 300mm/ cuttings on customer's requirement

Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance WFQ 25 [K/W]	2.44	1.73	1.23	1.05	0.92
thermal impedance WFQ 25 [K-cm ² /W]	3.25	1.88	1.38	0.94	0.75



- high-compressed anisotropic natural graphite
- very good thermal characteristics
- optimal for heat spreading
- high operating temperature range
- tape width (B) available in different dimensions and lengths
- different material thicknesses and coatings upon request
- customer specified cuttings and stampings acc. to drawing

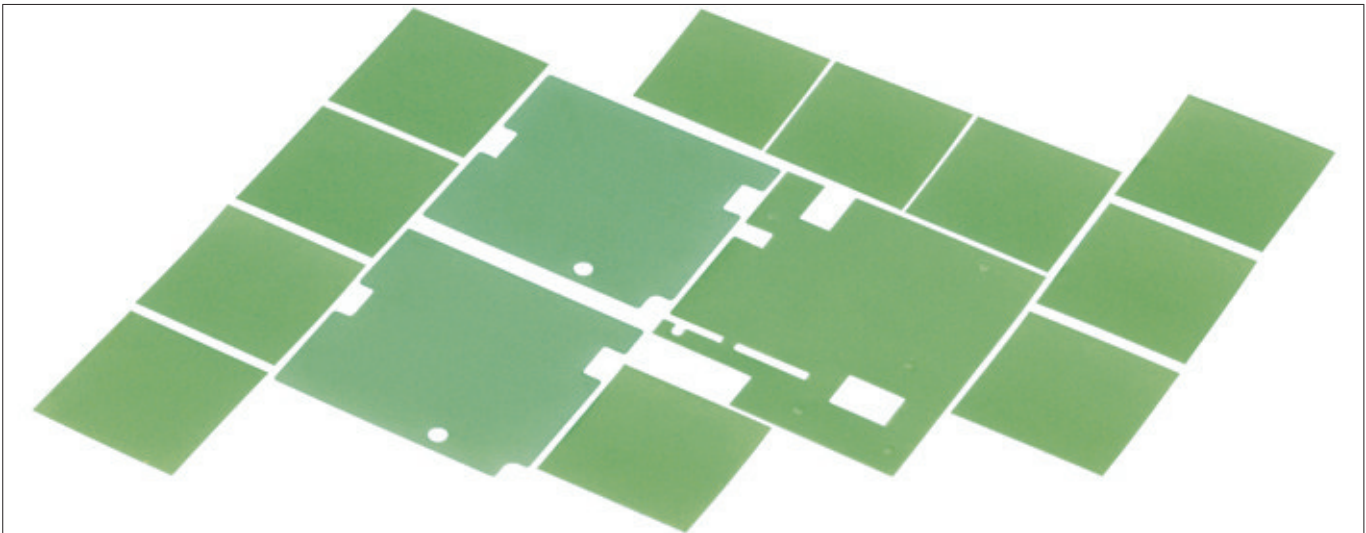
art. no.	B [mm]
WLFG S 900 R 25	25
WLFG S 900 R 50	50
WLFG S 900 R 100	100
WLFG S 900	
version	graphite foil, electrically conductive
version	without adhesive coating
material thickness	0.15 mm
colour	dark gray
density	> 1.6 g/cm ³
hardness	30 Shore D
thermal conductivity z (x/y)	7.5 (>450) W/m·K
thermal resistance	0,08 K/W
specific thermal resistance	34°C mm ² /W
temperature range	-40°C... +500°C
tear strength	10 N/mm ²
elongation at break	5 %
class of inflammability	UL 94 V-0
type of delivery	sold by the meter



- highly thermally conductive graphite foil
- with and without adhesive coating
- very good temperature resistance
- ideally suited as a heat spreader
- customer-specific cuts and molded parts

art. no.	material thickness [mm]	art. no.	material thickness [mm]
WLFG 9813 R310	0.13	WLFG 9813 K R310	0.13
WLFG 9825 R310	0.25	WLFG 9825 K R310	0.25
WLFG 9850 R310	0.50	WLFG 9850 K R310	0.50
	WLFG 98 ...		WLFG 98 ... K
version	graphite foil, electrically conductive		
version	without adhesive coating	adherent layer on one side	
colour	grey		
hardness	85 Shore A		
thermal conductivity z (x/y)	8 (140) W/m·K		
temperature range	-240°C ... +350°C		
volume resistance	$11 \cdot 10^{-4} \Omega \cdot \text{cm}$		
dielectric constant	<0,001 [1 MHz]		
class of inflammability	UL 94 V-0		
type of delivery	rolled goods, roll width 310mm/ other dimensions upon request/ sheet material upon request		

Thermal resistances vs. contact pressure / surface TO 220			
pressure [psi]	10	29	145
thermal impedance WLFG 9813 (K) R310 [K·cm ² /W]	0.77	0.58	0.39
thermal impedance WLFG 9825 (K) R310 [K·cm ² /W]	1.55	1.00	0.64
thermal impedance WLFG 9850 (K) R310 [K·cm ² /W]	2.60	1.48	1.00



- one-side adhesive thermal conductive foil
- glass fibre reinforced design
- very good thermal conductivity
- simple handling and mounting
- cuts and contours according to customer's drawing specifications

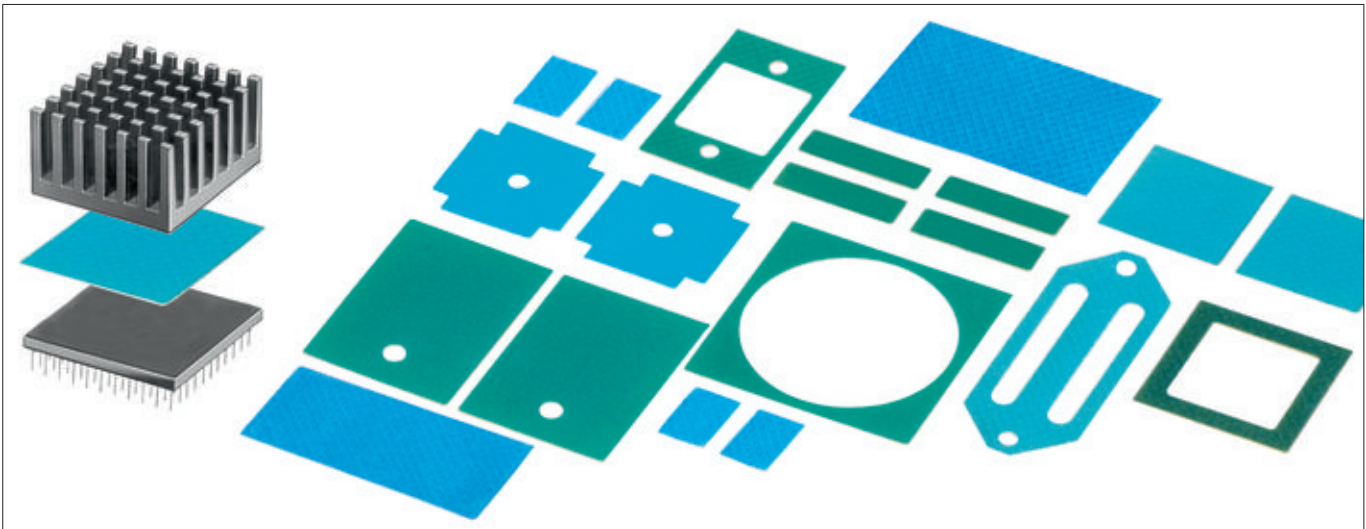
art. no.	material thickness [mm]	
WLFT 30 015	0.15	
WLFT 30 023	0.23	
	WLFT 30 015	WLFT 30 023
version	silicone foil with glass fibre reinforcement	
colour	green	
hardness	80 Shore A	
thermal conductivity	3 W/m·K	
temperature range	-60°C ... +200°C	
elongation	5 %	
volume resistance	> 10 ⁹ Ω·cm	
dielectric constant	6 [1 kHz]	
tear strength	1 N/mm ²	
dielectric strength	4 kV	6 kV
class of inflammability	UL 94 V-0	
type of delivery	plates, usable area 300x200mm/ other dimensions upon request	

Thermal conductive foil one-sided adhesive



- one-sided adhesive thermal conductive foil
- additional fiberglass reinforcement
- high long-term and mechanical stability
- easy handling and mounting
- cuts and contours according to customer-specific drawing specifications

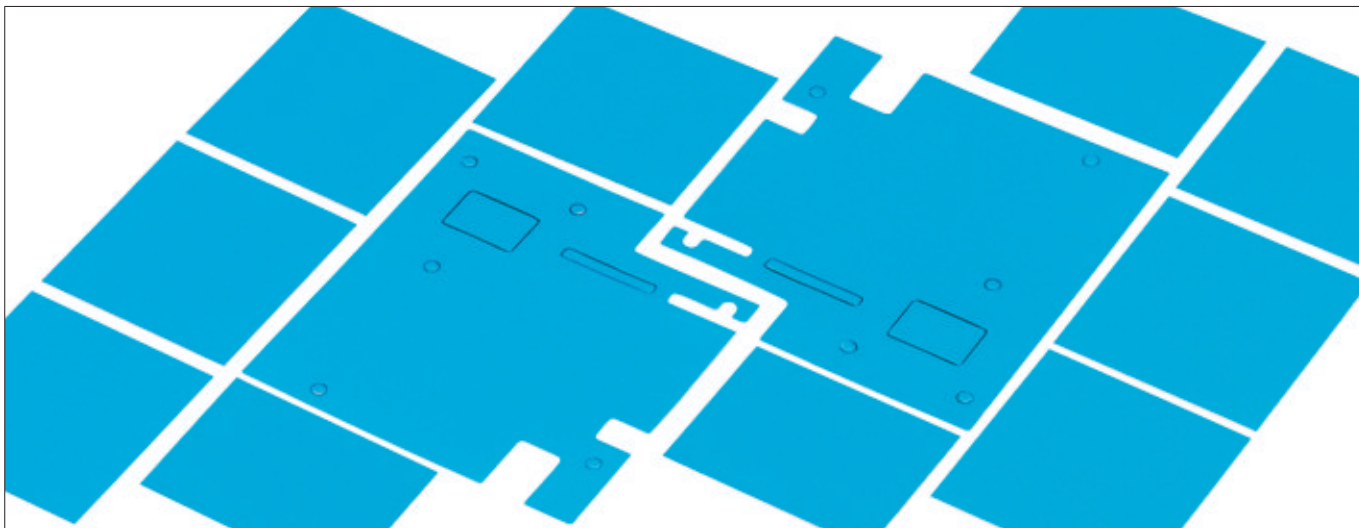
art. no.	material thickness [mm]
WLFT 40 023	0.23
	WLFT 40 023
version	silicone foil with glass fibre reinforcement
colour	white
hardness	90 Shore A
thermal conductivity	4 W/m·K
temperature range	-60°C ... +200°C
elongation	5 %
volume resistance	$10 \cdot 10^{11} \Omega \cdot \text{cm}$
dielectric constant	4.2 [1 MHz]
tear strength	4.9 N/mm ²
dielectric strength	6 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 300mm/ cuttings on customer's requirement



- double-side adhesive thermal conductive foil with good thermal properties
- coated carrier film with pressure-sensitive acrylate adhesive
- curing of the adhesive layer can be influenced by temperature and time
- serves as a substitute for mechanical connections
- excellent adhesive properties on aluminium and ceramics
- simple and secure attachment of e.g. heatsinks to electronic devices
- designs as electrically conductive or electrically insulating thermal conductive foil
- supplied in sheet and tape form, other forms on request
- tape width (B) available in different dimensions and lengths
- 24h sample delivery service for individual production according to customer drawing
- customised cuts and contours according to drawing specifications

art. no.	B [mm]	type of delivery
WLFT 404 R25	25	sold by the meter
WLFT 404 R50	50	
WLFT 404 R100	100	
WLFT 404 R200	200	
WLFT 414 R25	25	
WLFT 414 R50	50	
WLFT 414 R100	100	
WLFT 414 R200	200	
WLFT 405 R25	25	
WLFT 405 R50	50	
WLFT 405 R100	100	
WLFT 405 R200	200	
WLFT 412 R25	25	
WLFT 412 R50	50	
WLFT 412 R100	100	
WLFT 412 R200	200	

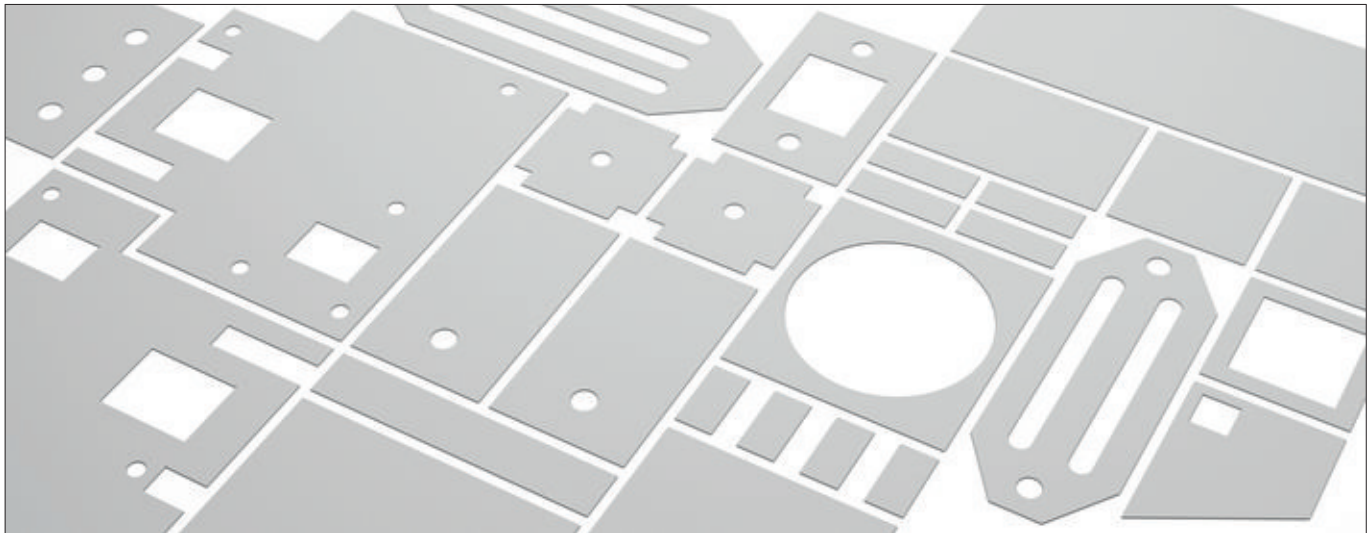
art. no.	dimensions [mm]		type of delivery	
WLFT 404 100x100	100x100		plate	
WLFT 404 100x200	100x200			
WLFT 404 200x200	200x200			
WLFT 414 100x100	100x100			
WLFT 414 100x200	100x200			
WLFT 414 200x200	200x200			
WLFT 405 100x100	100x100			
WLFT 405 100x200	100x200			
WLFT 405 200x200	200x200			
WLFT 412 100x100	100x100			
WLFT 412 100x200	100x200			
WLFT 412 200x200	200x200			
	WLFT 404	WLFT 414	WLFT 405	WLFT 412
version	insulating, double sided adhesive		non insulating, double-sided adhesive	
material thickness	0.127 mm ±0.03		0.15 mm ±0.03	0.23 mm ±0.025
material filling	polyimide (Kapton MT) 0.025mm		aluminium foil 0.05mm	aluminum mesh
glue layer	acrylate (pressure sensitive) double-sided			
colour	blue			grey
thermal conductivity	0.4 W/m·K		0.5 W/m·K	1.4 W/m·K
thermal impedance (@ 300 psi)	3.7 °C cm ² /W		3.4 °C cm ² /W	2 °C cm ² /W
holding force (overlapping)	0.86 MPa	0.69 MPa	0.93 MPa	
temperature range	-30°C... +125°C			
holding force (shear force)	Al 25°C 0.897 [MPa]/ Al 150°C 0.345 [MPa]/ Cu 25°C 0.828 [MPa]/ Cu 150°C 0.31 [MPa]/ Al₂O₃ 25°C 1.17 [MPa]/ Al₂O₃ 150°C 0.34 [MPa]	Al 25°C 1.04 [MPa]/ Al 150°C 0.104 [MPa]	Al 25°C 0.86 [MPa]/ Al 150°C 0.38 [MPa]/ Cu 25°C 1.1 [MPa]/ Cu 150°C 0.48 [MPa]/ Al₂O₃ 25°C 1.0 [MPa]/ Al₂O₃ 150°C 0.41 [MPa]	
dielectric strength	5 kV (AC)			
class of inflammability	UL 94 V-0			



- double sided adhesive layer
- optimal adhesion of different substrates
- very good thermal conductivity, electrical insulating
- easy handling due to double sided protection foil
- optimized surface moistening and excellent impact strength
- cutouts and different punchings according to customer drawing

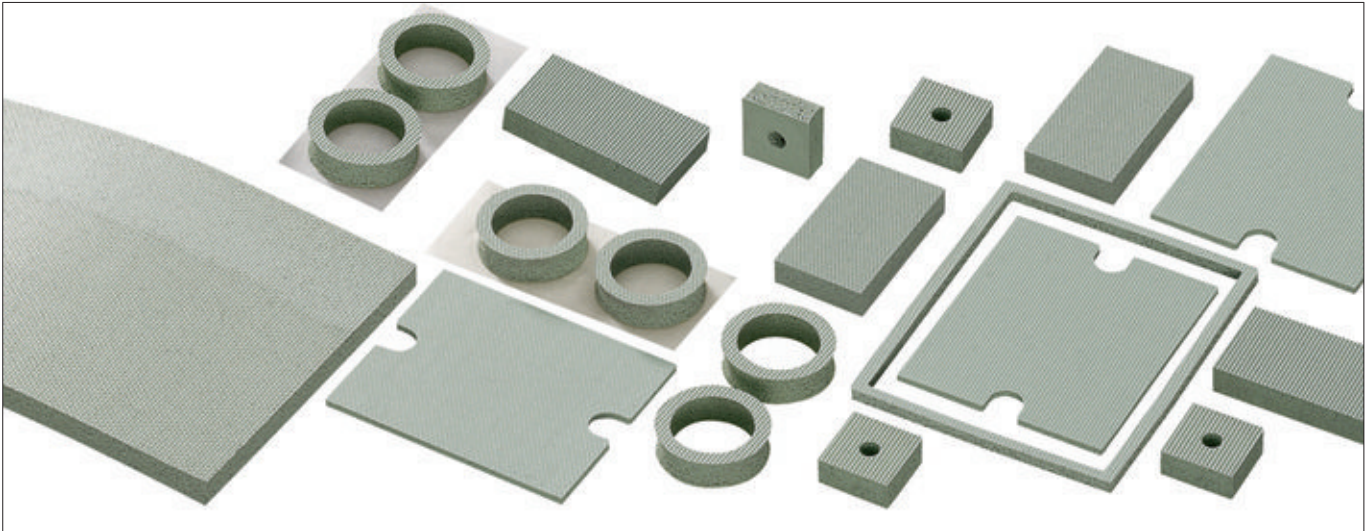
art. no.	type of delivery			
WLFT 8805	plates, usable area 300x200mm/ other dimensions upon request			
WLFT 8810				
WLFT 8815				
WLFT 8820				
	WLFT 8805	WLFT 8810	WLFT 8815	WLFT 8820
version	double sided adhesive, filled acrylic polymer			
material thickness	0.13 mm	0.25 mm	0.38 mm	0.5 mm
filling material	ceramic			
protection cover	silicone treated polyester, 37.5 - 50 μm			
colour	blue			
thermal conductivity	0.6 W/m·K			
specific thermal resistance	3.2°C cm ² /W	5.8°C cm ² /W	7.7°C cm ² /W	9.7°C cm ² /W
temperature range	permanent up to 100°C			
peel strength at RT 70°C and 72 h	5.8 N/cm	8.3 N/cm	9.8 N/cm	11.9 N/cm
volume resistance	5.2·10 ¹¹ Ω/cm	3.9·10 ¹¹ Ω/cm	3.8·10 ¹¹ Ω/cm	
dielectric strength	26 kV/mm			
class of inflammability	UL 746 C			

Thermally conductive foil both sides adhesive



- double-sided adhesive thermal conductive foil
- excellent adhesive properties on different materials
- filling material with ceramic particles
- very good thermal conductivity and technical performance
- cuts and contours according to customer's drawing specifications

art. no.	type of delivery		
WLFT 8926 02	plates, usable area 300x200mm/ other dimensions upon request		
WLFT 8926 025			
WLFT 8926 05			
	WLFT 8926 02	WLFT 8926 025	WLFT 8926 05
version	double sided adhesive, filled acrylic polymer		
material thickness	0.2 mm	0.25 mm	0.5 mm
filling material	ceramic		
protection cover	silicone treated polyester		
colour	yellowish white		
thermal conductivity	1.5 W/m·K		
specific thermal resistance	8.49 °C cm ² /W	8.74°C cm ² /W	9.7°C cm ² /W
temperature range	permanent up to 80°C		
peel strength at RT 70°C and 72 h	15 N/cm		
dielectric strength	15 kV/mm		
class of inflammability	UL 94 V-0		



- elastomer foam with closed cell structure
- good heat conductor e.g. between components, heatsinks and casing parts
- electrical insulating
- can be compressed even with a low contact pressure
- absorbs shocks and vibrations

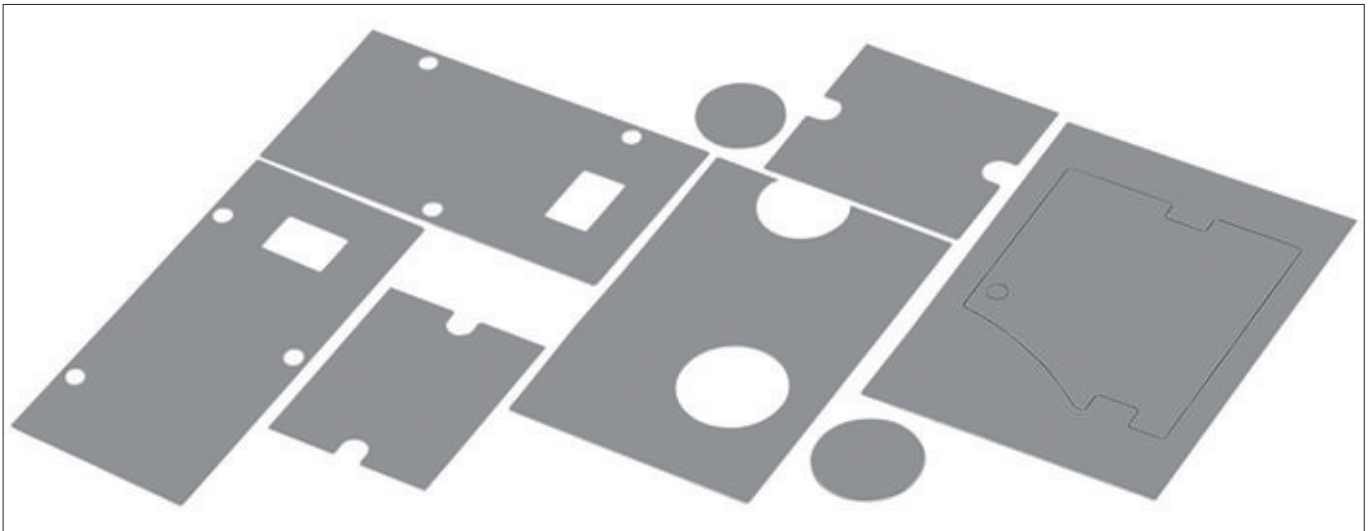
art. no.	material thickness [mm]
WSF 08	0.80 ±0.4
WSF 16	1.60 ±0.4
WSF 24	2.40 ±0.8
WSF 32	3.20 ±0.8
WSF 48	4.80 ±0.8
WSF 635	6.35 ±1.2
WSFS 635	

Thermal resistance at 3.2 mm material thickness:

compression [%]	10	30	50
contact pressure [psi]	5	20	42
R _{th} [K/W] (1 in ² x 3.2 mm)	13	9	3.5
heat conductivity [W/mK]	0.36	0.52	0.82

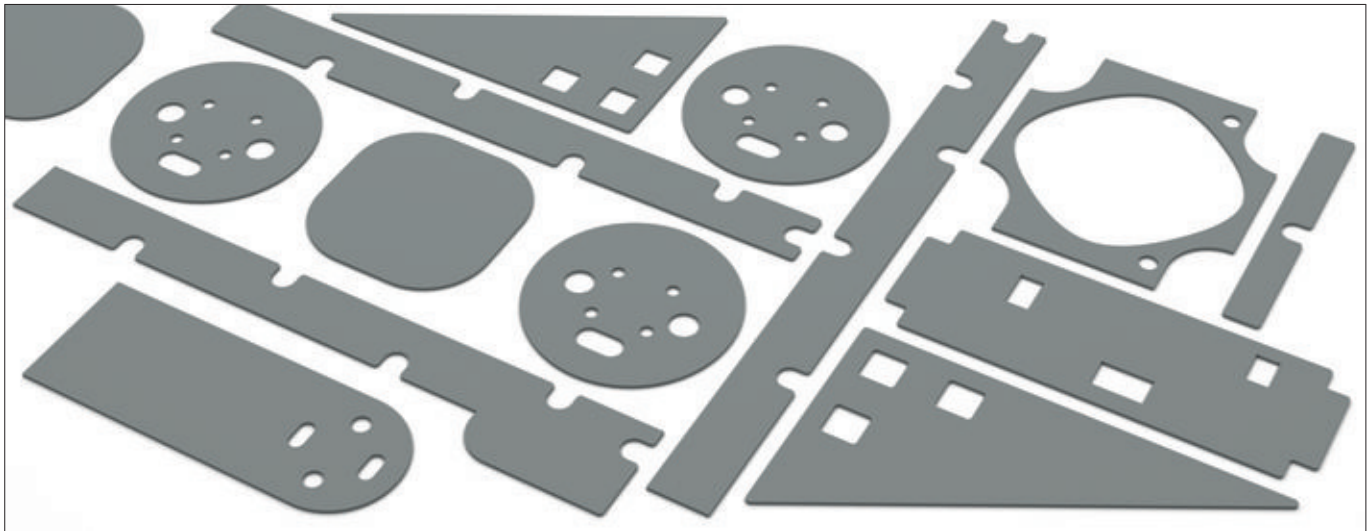
- **WSFS 635** double sided adhesive and **WSF** self-adhesive upon request
- according to NASA gas emission requirements

	WSF	WSFS 635
version	non adhesive	one-sided self-adhesive
colour	green	
density	1.105 g/cm ³	
hardness	13 Shore A	
temperature range	-62°C ... +205°C	
compression, 25%	18 psi	
elongation	150 %	
tear strength	120 psi	
dielectric strength	100 V/mm	
class of inflammability	UL 94 V-1 (at thickness ≥3.2mm)	
type of delivery	plates, usable area 914x914mm/ other dimensions upon request	



- silicone free gap-filler with good thermal characteristics
- smooth, compressible and elastic
- cut outs, punchings and modifications according to customer specification
- other material thicknesses upon request

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]	art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL F 15 10	1.0 ±0.2	1.02	6.60	GEL F 15 G 10	1.0 ±0.2	1.16	7.50
GEL F 15 15	1.5 ±0.2	1.39	9.00	GEL F 15 G 15	1.5 ±0.2	1.66	10.75
GEL F 15 20	2.0 ±0.3	1.75	11.30	GEL F 15 G 20	2.0 ±0.3	2.17	14.00
		GEL F 15				GEL F 15 G	
version		standard				polyamide film mash reinforced	
colour		light gray					
density		2.1 g/cm ³					
hardness		53 Shore 00					
thermal conductivity		1.5 W/m·K					
temperature range		-40°C... +105°C					
elongation		150 %					
volume resistance		1·10 ⁹ Ω·m					
dielectric constant		9.12 [50 Hz] / 8.55 [1 kHz] / 5.83 [1 MHz]					
dielectric loss factor		0,152 [50 Hz] / 0,135 [1 kHz] / 0,034 [1 MHz]					
dielectric strength		11 kV/mm					
class of inflammability		accordant UL 94 V-0					
type of delivery		on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request					

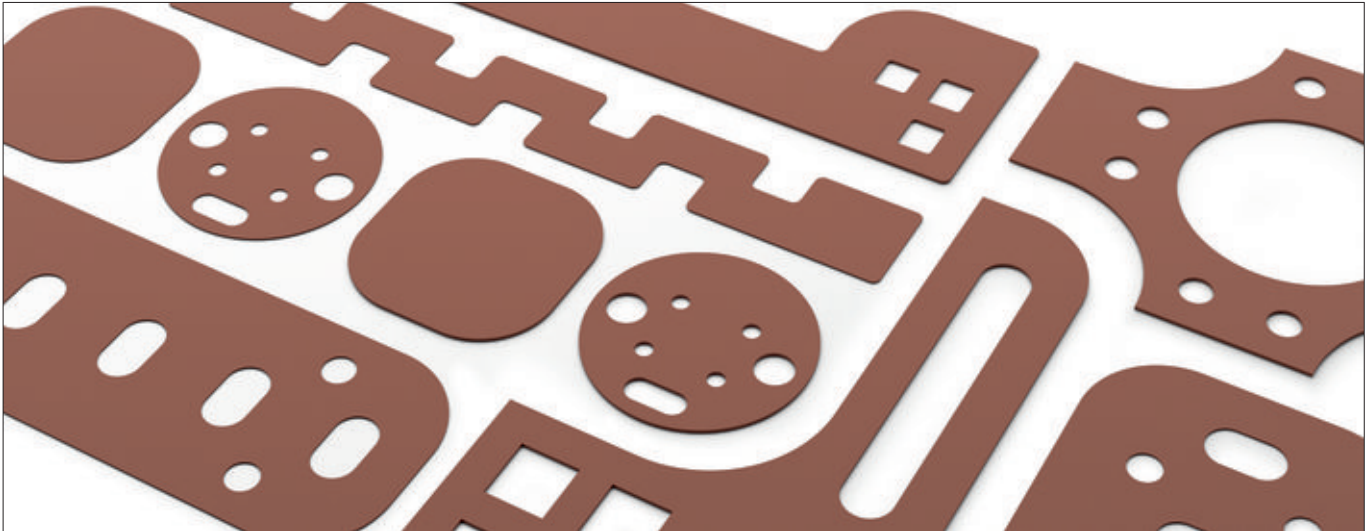


- silicone-free thermal conductive foil
- particularly suitable for silicone-free applications
- very good thermal and mechanical properties
- high electrical insulation
- cuts and contours made of sheet or roller material according to your specifications

art. no.	material thickness [mm]
WFKF 20 05	0.5
WFKF 20 10	1.0

WFKF 20	
version	silicone-free foil without glass fibre reinforcement
colour	grey
density	1.5 g/cm ³
hardness	55 - 65 Shore 00
thermal conductivity	2 W/m·K
thermal resistance	0.6 K/W
temperature range	-40°C ... +130°C
volume resistance	5.3·10 ⁹ Ω·m
dielectric constant	5.6 [1 KHz]
tensile strength	18 kN/m
dielectric strength	7 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 450x250mm/ other dimensions upon request

Thermal resistances vs. contact pressure				
pressure [psi]	0	14.50	29	43.51
thermal resistance WFKF 20 05 [K/W]	0.60	0.56	0.53	0.50
thermal resistance WFKF 20 10 [K/W]	1.31	1.20	0.98	0.89



- silicone-free thermal conductive foil
- particularly suitable for silicone-free applications
- very good thermal and mechanical properties
- high electrical insulation
- cut to size and contours according to customised drawing specifications

art. no.	material thickness [mm]
GEL F 20 05	0.5
GEL F 20 10	1.0
GEL F 20	
version	silicone-free foil without glass fibre reinforcement
colour	brown
density	1.87 g/cm ³
hardness	60 - 75 Shore 00
thermal conductivity	2 W/m·K
thermal resistance	1.2 K/W
temperature range	-40°C ... +110°C
dielectric strength	8 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 450x250mm/ other dimensions upon request



- soft and adaptable acrylic-based thermal conductive foil
- very good compensation of unevennesses and differences in components
- natural adhesive properties and high dielectric strength
- cuts and contours with cutouts according to customer drawings

art. no.	material thickness [mm]
GEL F 30 05	0.5
GEL F 30 10	1.0
GEL F 30 15	1.5
GEL F 30 ...	
version	silicone-free thermal conductive foils
colour	white-grey
density	2.1 g/cm ³
hardness	70 Shore 00
thermal conductivity	3 W/m·K
temperature range	-40°C ... +110°C
volume resistance	6·10 ⁹ Ω·m
dielectric constant	5.4 [1 GHz]
dielectric strength	12 kV/mm
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 240x300mm/ other dimensions upon request

Gel thermal conducting foils



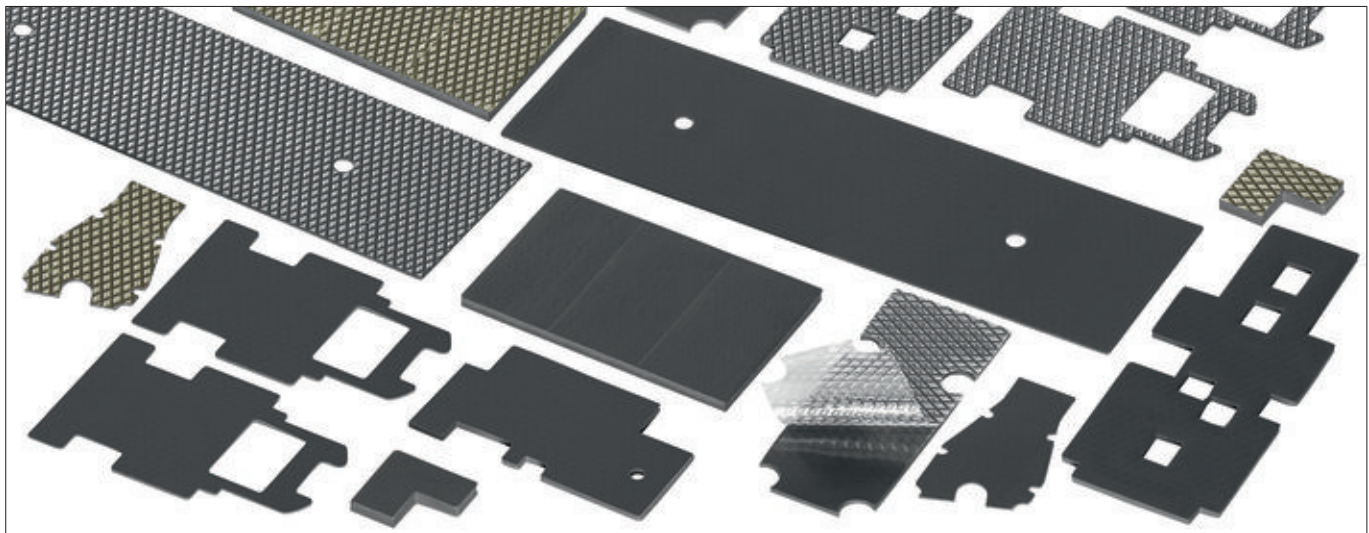
- highly thermally conductive silicone foil
- soft, elastic and compressible
- design with hardened surface on one side for better handling
- optimum compensation of air gaps and unevennesses
- customised contour parts according to drawing specifications

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]	art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 14 05	0.5 ±0.15	0.60	3.9	GEL 14 G 05	0.5 ±0.15	0.64	4.1
GEL 14 10	1.0 ±0.20	0.90	5.8	GEL 14 G 10	1.0 ±0.20	0.99	6.4
GEL 14 15	1.5 ±0.20	1.13	7.3	GEL 14 G 15	1.5 ±0.20	1.35	8.7
GEL 14 20	2.0 ±0.30	1.55	10.0	GEL 14 G 20	2.0 ±0.30	1.69	10.9
GEL 14 25	2.5 ±0.30	1.84	11.9	GEL 14 G 25	2.5 ±0.30	2.03	13.1
GEL 14 30	3.0 ±0.30	1.92	12.4	GEL 14 G 30	3.0 ±0.30	2.09	13.5
GEL 14 35	3.5 ±0.35	2.30	15.0	GEL 14 G 35	3.5 ±0.35	2.45	15.5
GEL 14 40	4.0 ±0.40	2.65	17.1	GEL 14 G 40	4.0 ±0.40	2.74	17.7
GEL 14 45	4.5 ±0.45	2.75	17.8	GEL 14 G 45	4.5 ±0.45	3.05	19.5
GEL 14 50	5.0 ±0.50	2.81	18.1	GEL 14 G 50	5.0 ±0.50	3.30	21.3

	GEL 14	GEL 14 G
version	standard	surface hardened on one side
colour	pink	
hardness	30 Shore 00	
thermal conductivity	1.4 W/m·K	
temperature range	-40°C... +150°C	
volume resistance	2,4·10 ¹¹ Ω·m	
dielectric constant	5 [50 Hz] / 4.4 [1 kHz] / 4.2 [1 MHz]	
dielectric loss factor	0.095 [50 Hz] / 0.042 [1 kHz] / 0.004 [1 MHz]	
dielectric strength	17 kV/mm	
class of inflammability	UL 94 V-0	
type of delivery	plates, usable area 300x200mm/ other dimensions upon request	

GEL 14 ... compression force [N/6,4cm²] vs. material thickness								
material thickness [mm]	0,5	1,0	1,5	2,0	2,5	3,0	4,0	5,0
compression rate 10%	109	130	116	79	57	43	32	24
compression rate 30%	392	351	240	180	128	109	87	71
compression rate 50%	752	660	523	442	317	297	216	182

GEL 14 G ... compression force [N/6,4cm²] vs. material thickness								
material thickness [mm]	0,5	1,0	1,5	2,0	2,5	3,0	4,0	5,0
compression rate 10%	106	145	144	98	64	51	38	25
compression rate 30%	524	428	258	222	165	135	105	80
compression rate 50%	867	805	580	526	406	341	260	209

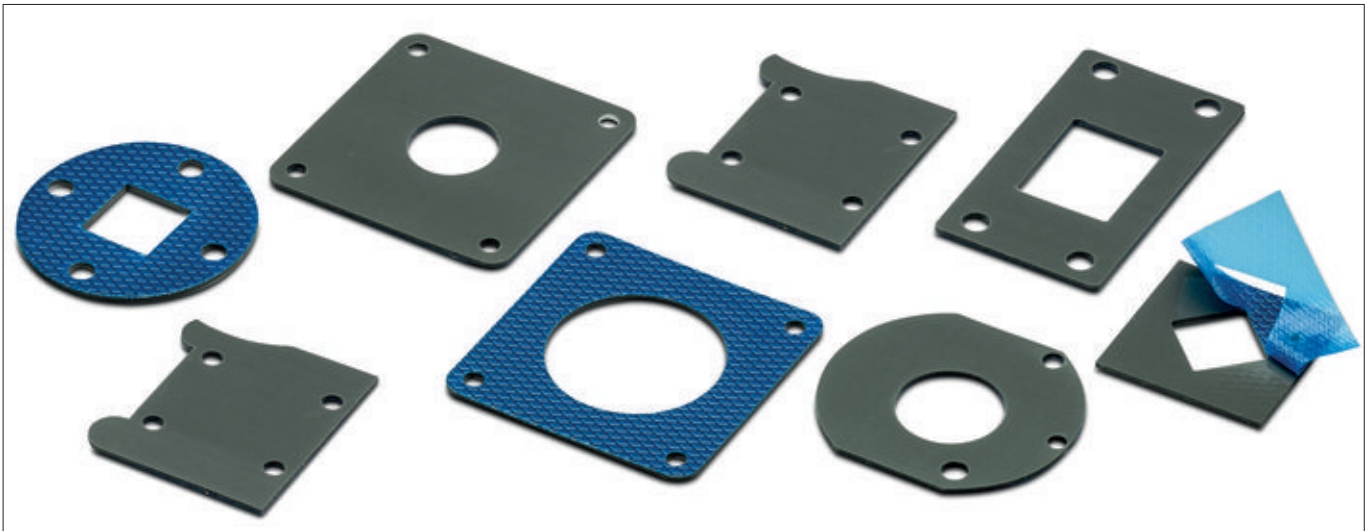


- highly heat-conductive silicoon foil
- smooth, elastic and compressible
- equals uneven surfaces very well (Gap-Filler)

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]	art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 05	0.5 ±0.1	0.69	4.45	GEL G 05	0.5 ±0.1	0.63	4.04
GEL 10	1.0 ±0.2	1.03	6.64	GEL G 1	1.0 ±0.2	1.17	7.56
GEL 15	1.5 ±0.2	1.39	8.96	GEL G 15	1.5 ±0.2	1.59	10.27
GEL 20	2.0 ±0.3	1.52	9.78	GEL G 2	2.0 ±0.3	2.07	13.33
GEL 25	2.5 ±0.3	2.10	13.58	GEL G 25	2.5 ±0.3	2.61	16.81
GEL 30	3.0 ±0.3	2.35	15.15	GEL G 3	3.0 ±0.3	2.89	18.66
GEL 35	3.5 ±0.3	2.56	16.51	GEL G 35	3.5 ±0.3	3.35	21.63
GEL 40	4.0 ±0.4	3.25	20.95	GEL G 4	4.0 ±0.4	3.56	22.96
GEL 45	4.5 ±0.4	3.38	21.82	GEL G 45	4.5 ±0.4	3.89	25.10
GEL 50	5.0 ±0.5	3.52	22.70	GEL G 5	5.0 ±0.5	4.22	27.23

	GEL	GEL G 05 - 25	GEL G 3 - 5
version	standard	polyamide film mash reinforced, adherent layer on one side	
colour	dark gray		
density	2.6 g/cm ³		
hardness	49 Shore 00		
thermal conductivity	1.5 W/m·K		
temperature range	-60°C ... +200°C		
elongation	100 %	60 %	
volume resistance	1·10 ⁶ MΩ/m		
dielectric constant	5.8 [50 Hz]/ 5.6 [1 KHz]/ 5.5 [1 MHz]		
dielectric loss factor	0.048 [50 Hz]/ 0.015 [1 KHz]/ 0.003 [1 MHz]		
dielectric strength	14 kV/mm (AC)	8 kV/mm (AC)	
class of inflammability	UL 94 V-0	UL 94 V-1	UL 94 V-0
type of delivery	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request		

Gel thermal conducting foils

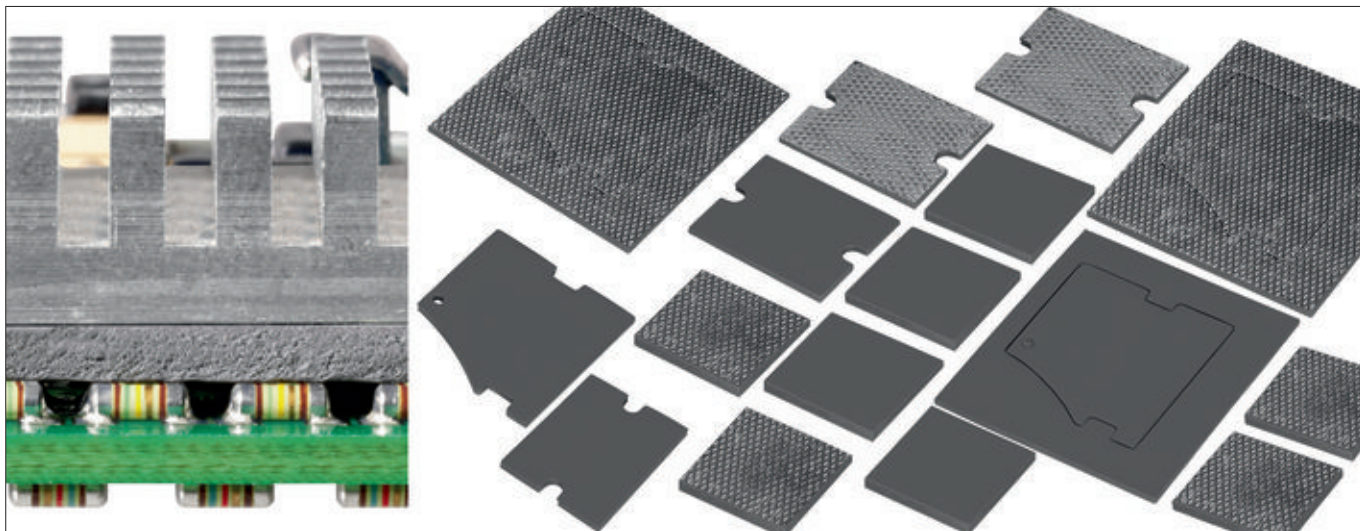


- very soft thermal conductive foil
- without any reinforcing layer
- optimal balance of bigger unevennesses
- thermal conductive foil both-sided adherent
- cuts and contours according to customer specific drawing specifications

art. no.	material thickness [mm]	art. no.	material thickness [mm]
WFG 15 05	0.508	WFG 15 25	2.540
WFG 15 10	1.016	WFG 15 30	3.175
WFG 15 15	1.524	WFG 15 40	4.064
WFG 15 20	2.032	WFG 15 50	5.080

WFG 15	
version	silicone film without reinforcement
colour	black
hardness	40 Shore 00
thermal conductivity	1.5 W/m·K
temperature range	-60°C ... +200°C
volume resistance	10 ¹¹ Ω·m
dielectric constant	5.5 [1 kHz]
heat capacity	1 J/g·K
dielectric strength	6 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 406x203mm/ other dimensions upon request

material thicknesses [mm]	0.508	1.016	1.524	2.032	2.540	3.175	4.064	5.08
thermal impedance WFG 15 [K·cm ² /W]	3	7.5	10	13.13	16.25	21.25	26.25	33.125

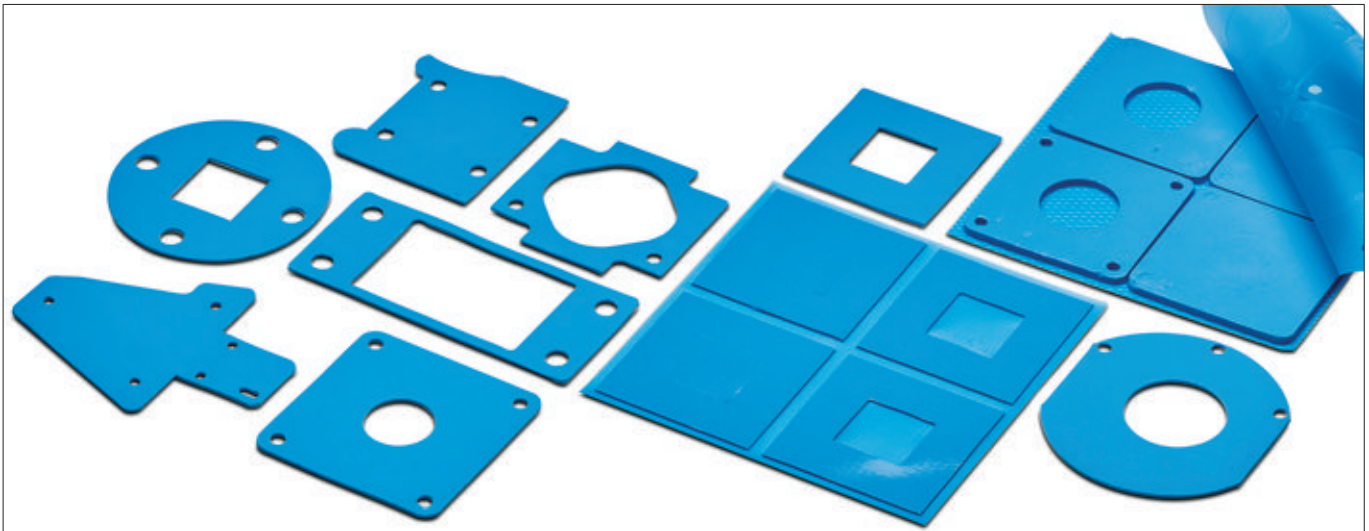


- GEL thermal conductive foils with very good thermal characteristics
- for balancing non-planarities and differences in components (gap-filler)
- soft, elastic and compressible
- customer specific cuts and punchings according to drawing

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]	art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 28 05	0.5 ±0.05	0.31	2.00	GEL 28 G 05	0.5 ±0.05	0.38	2.50
GEL 28 10	1.0 ±0.10	0.57	3.70	GEL 28 G 10	1.0 ±0.10	0.62	4.00
GEL 28 15	1.5 ±0.15	0.79	5.10	GEL 28 G 15	1.5 ±0.15	0.93	6.00
GEL 28 20	2.0 ±0.20	1.03	6.70	GEL 28 G 20	2.0 ±0.20	1.25	8.10
GEL 28 25	2.5 ±0.25	1.16	7.50	GEL 28 G 25	2.5 ±0.25	1.42	9.15
GEL 28 30	3.0 ±0.30	1.42	9.20	GEL 28 G 30	3.0 ±0.30	1.59	10.20
GEL 28 35	3.5 ±0.30	1.60	10.40	GEL 28 G 35	3.5 ±0.30	1.87	12.05
GEL 28 40	4.0 ±0.30	1.79	11.60	GEL 28 G 40	4.0 ±0.30	2.16	13.90
GEL 28 50	5.0 ±0.30	2.16	13.90	GEL 28 G 50	5.0 ±0.30	2.48	16.00

	GEL 28	GEL 28 G
version	standard	surface hardened on one side
colour	grey	
density	2.6 g/cm ³	
hardness	50 Shore 00	55 Shore 00
thermal conductivity	2.5 W/m·K	
temperature range	-40°C... +150°C	
elongation	64 %	32 %
volume resistance	1·10 ¹¹ Ω·m	
dielectric constant	6.6 [50 Hz]/6.05 [1 kHz]/5.74 [1 MHz]	
dielectric loss factor	0.0826 [50 Hz]/0.0300 [1 kHz]/0.0052 [1 MHz]	
dielectric strength	15 kV/mm	
class of inflammability	UL 94 V-0	
type of delivery	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request	

Gel thermal conducting foils

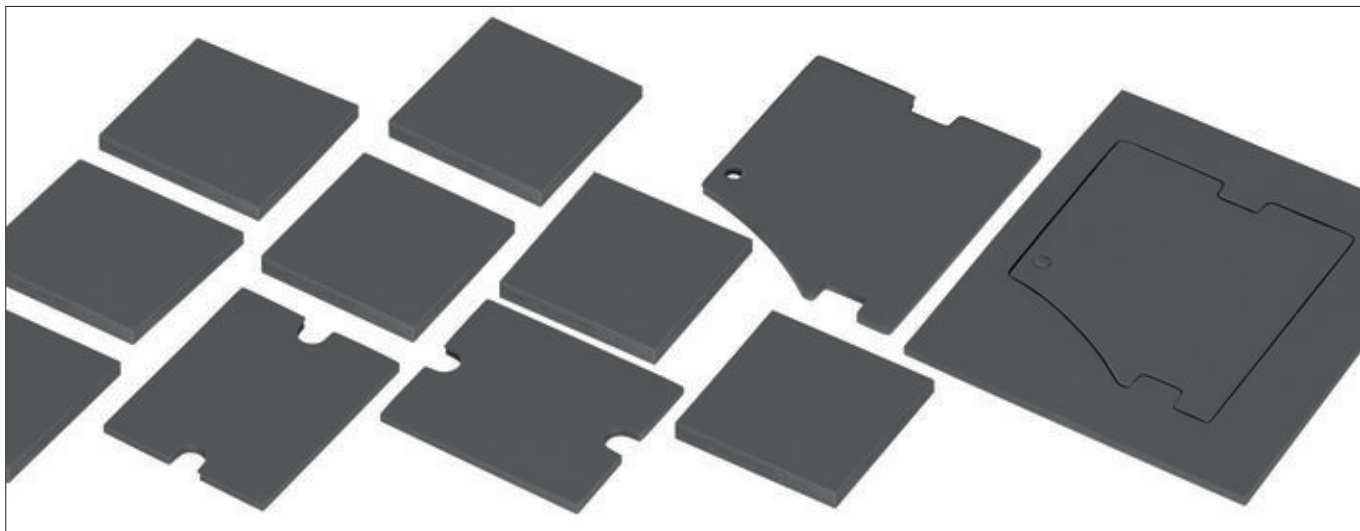


- good compressible gap filling material
- high thermal conductivity
- very good shearing and tensile strength
- double-sided natural adhesive layer
- cuts and contours according to customer specific drawing specifications

art. no.	material thickness [mm]	art. no.	material thickness [mm]
WFGH 30 05	0.508	WFGH 30 20	2.032
WFGH 30 10	1.016	WFGH 30 25	2.540
WFGH 30 15	1.524	WFGH 30 30	3.175

WFGH 30	
version	silicone foil with glass fibre reinforcement
colour	blue
hardness	15 Shore 00
thermal conductivity	3 W/m·K
temperature range	-60°C ... +200°C
volume resistance	10 ¹⁰ Ω·m
dielectric constant	6.5 [1 kHz]
heat capacity	1 J/g·K
dielectric strength	5 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 406x203mm/ other dimensions upon request

Thermal resistances vs. material thickness						
material thicknesses [mm]	0.508	1.016	1.524	2.032	2.540	3.175
thermal impedance WFGH 30 [K·cm ² /W]	1.88	3.75	5	6.88	8.13	10.93

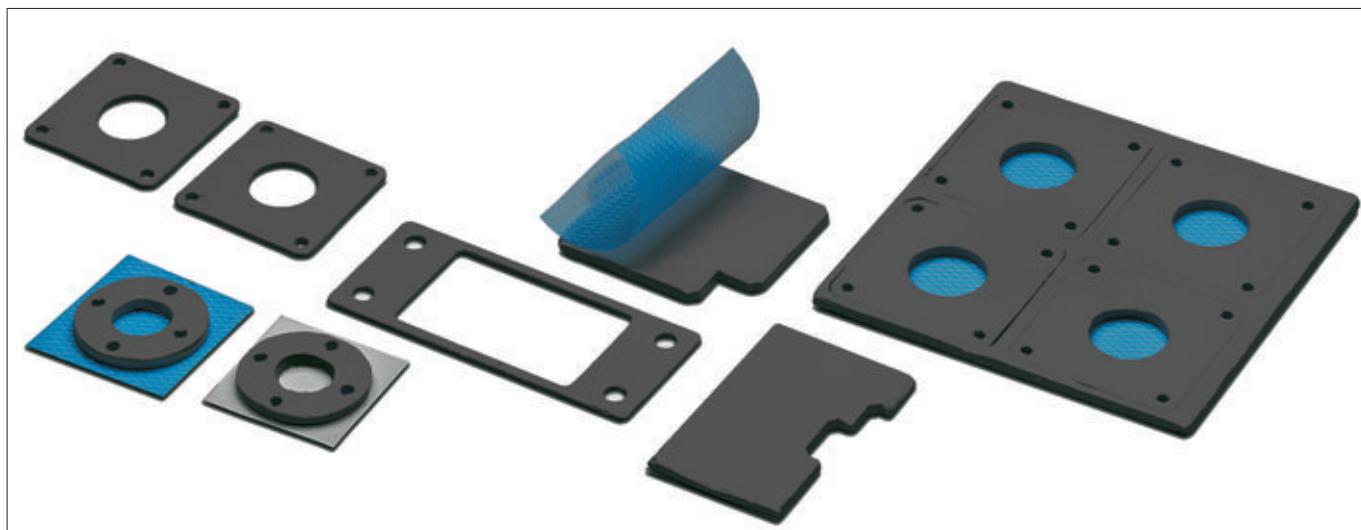


- gap filler with exceptionally good thermal conductivity and low outgassing
- especially smooth, compressible and elastic
- cut outs, punchings and modifications according to customer specification
- other material thicknesses upon request

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]	art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 45 05	0,5 ±0.15	0.28	1.80	GEL 45 G 05	0,5 ±0.15	0.22	1.40
GEL 45 10	1.0 ±0.20	0.37	2.40	GEL 45 G 10	1.0 ±0.20	0.35	2.30
GEL 45 15	1.5 ±0.20	0.46	2.90	GEL 45 G 15	1.5 ±0.20	0.45	2.90
GEL 45 20	2.0 ±0.30	0.56	3.60	GEL 45 G 20	2.0 ±0.30	0.55	3.60
GEL 45 25	2.5 ±0.30	0.68	4.40	GEL 45 G 25	2.5 ±0.30	0.62	4.00
GEL 45 30	3.0 ±0.30	0.79	5.10	GEL 45 G 30	3.0 ±0.30	0.73	4.70
GEL 45 35	3,5 ±0.35	0.87	5.65	GEL 45 G 35	3,5 ±0.35	0.83	5.35
GEL 45 40	4.0 ±0.40	0.95	6.20	GEL 45 G 40	4.0 ±0.40	0.93	6.00
GEL 45 45	4.5 ±0.45	1.04	6.80	GEL 45 G 45	4.5 ±0.45	1.00	6.45
GEL 45 50	5.0 ±0.50	1.14	7.40	GEL 45 G 50	5.0 ±0.50	1.07	6.90

	GEL 45	GEL 45 G
version	standard	surface hardened on one side
colour	grey	
density	3.2 g/cm ³	
hardness	60 Shore 00	
thermal conductivity	4.5 W/m·K	
temperature range	-40°C... +150°C	
elongation	50 %	
volume resistance	1·10 ¹¹ Ω·m	
dielectric constant	8.98 [50 Hz] / 8.63 [1 kHz] / 8.05 [1 MHz]	
dielectric loss factor	0.0249 [50 Hz] / 0.0219 [1 kHz] / 0.0068 [1 MHz]	
dielectric strength	17 kV/mm	
class of inflammability	UL 94 V-0	
type of delivery	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request	

Gel thermal conducting foils

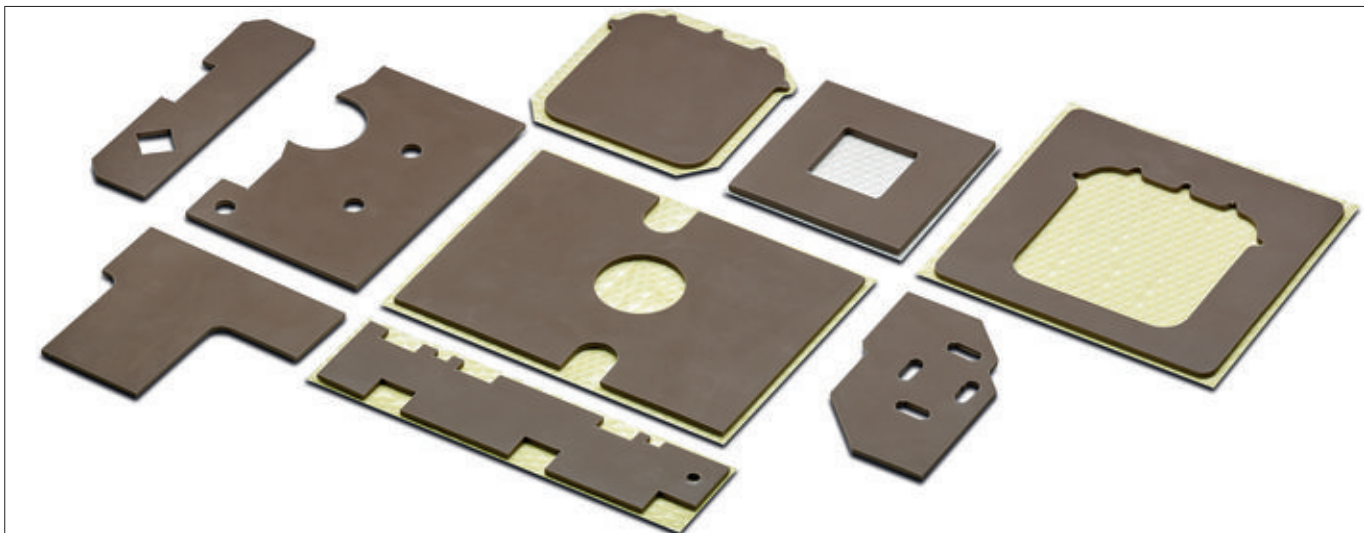


- very good compressibility
- particularly suitable for low contact pressure
- double-sided natural adhesive layer
- wide temperature range
- cut to size and contours according to customised drawing specifications

art. no.	material thickness [mm]	art. no.	material thickness [mm]
WFGH 50 05	0.508	WFGH 50 20	2.032
WFGH 50 10	1.016	WFGH 50 25	2.540
WFGH 50 15	1.524	WFGH 50 30	3.175

WFGH 50	
version	silicone foil with glass fibre reinforcement
colour	grey
hardness	35 Shore 00
thermal conductivity	5 W/m·K
temperature range	-60°C ... +200°C
volume resistance	10 ¹⁰ Ω·m
dielectric constant	8 [1 kHz]
heat capacity	1 J/g·K
dielectric strength	5 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 406x203mm/ other dimensions upon request

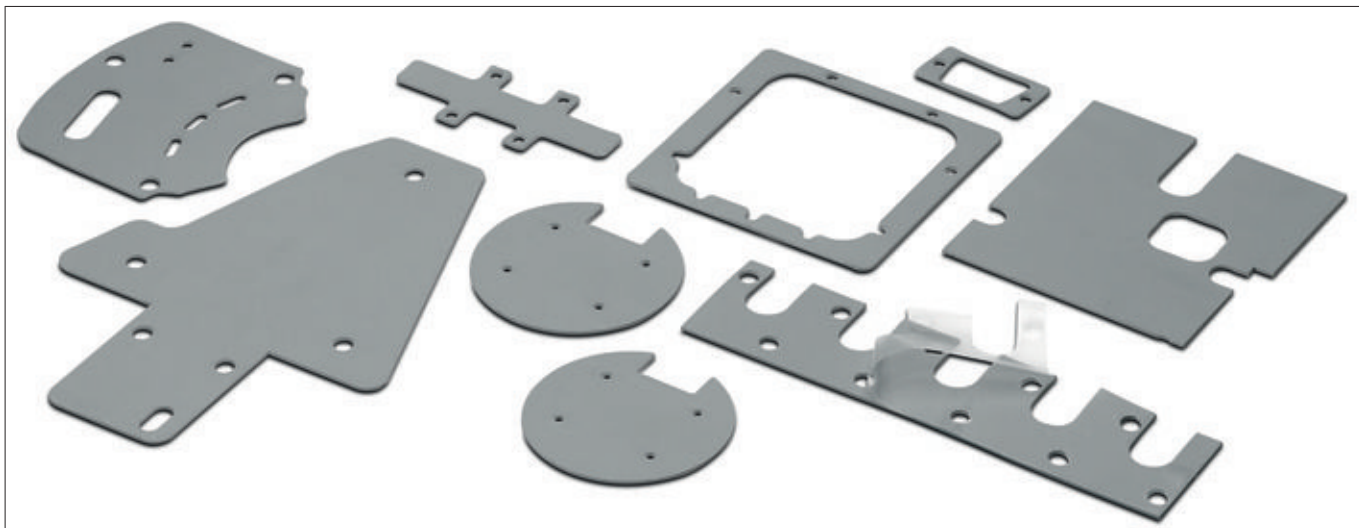
Thermal resistances vs. material thickness						
material thicknesses [mm]	0.508	1.016	1.524	2.032	2.540	3.175
thermal impedance WFGH 50 [K·cm ² /W]	1.25	2.5	3.75	5.18	6.25	8.13



- GEL silicone foils with especially high thermal conductivity
- balances non-planarities and differences in components (Gap filler)
- soft, elastic and compressible
- cuts, punchings and special designs according to customer specifications

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]	art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 60 05	0.5 ±0.1	0.21	1.30	GEL 60 G 05	0.5 ±0.1	0.27	1.68
GEL 60 10	1.0 ±0.2	0.32	2.11	GEL 60 G 10	1.0 ±0.2	0.45	2.80
GEL 60 15	1.5 ±0.2	0.53	3.45	GEL 60 G 15	1.5 ±0.2	0.60	3.72
GEL 60 20	2.0 ±0.3	0.64	3.97	GEL 60 G 20	2.0 ±0.3	0.75	4.65
GEL 60 25	2.5 ±0.3	0.72	4.67	GEL 60 G 25	2.5 ±0.3	0.90	5.58
		GEL 60				GEL 60 G	
version		standard				polyamide film mash reinforced	
colour		dark reddish grey					
density		3.2 g/cm ³					
hardness		52 Shore 00					
thermal conductivity		6 W/m·K					
temperature range		-60°C ... +200°C					
elongation		80 %					
volume resistance		1,3·10 ¹² Ω·m					
dielectric constant		6.4 [50 Hz]/6.4 [1 kHz]/6.4 [1 MHz]					
dielectric loss factor		0.035 [50 Hz]/0.005 [1 kHz]/0.001 [1 MHz]					
dielectric strength		13 kV/mm					
class of inflammability		UL 94 V-0					
type of delivery		on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request					

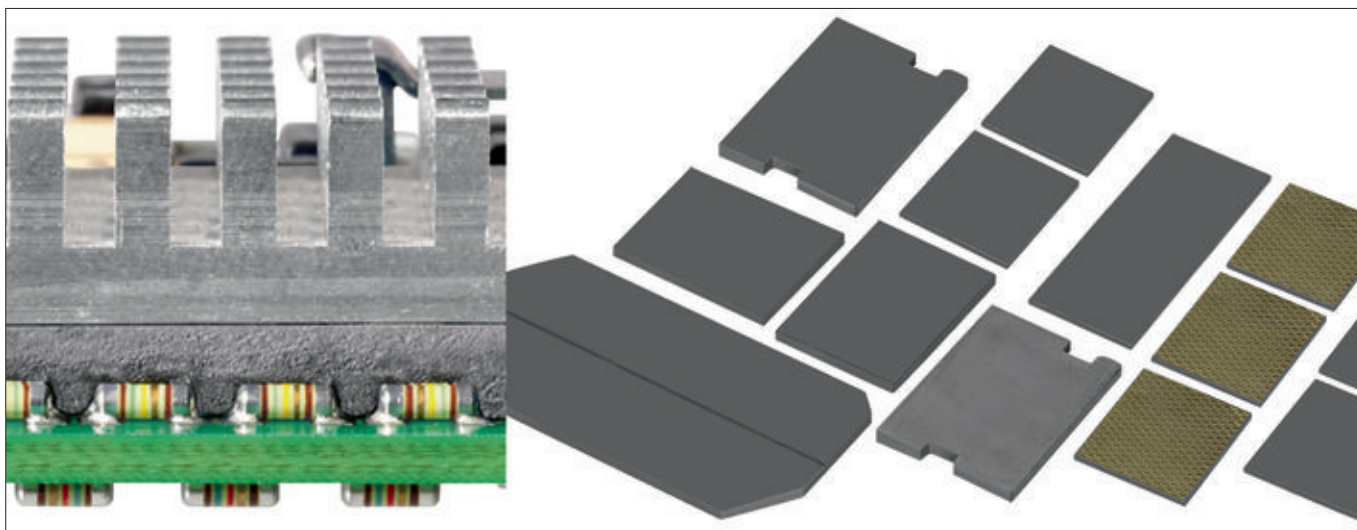
Gel thermal conducting foils



- high heat conducting silicone foil as a gap-filler
- very good compression with high dielectric strength
- optimal for balancing big unevennesses or production tolerances
- customer specific cuts according to drawing
- other material compositions and thicknesses upon request

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]	art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 80 10	1.0 ±0.15	0.17	1.10	GEL 80 G 05	0.5 ±0.10	0.12	0.77
GEL 80 15	1.5 ±0.20	0.26	1.68	GEL 80 G 10	1.0 ±0.15	0.19	1.22
GEL 80 20	2.0 ±0.30	0.36	2.32	GEL 80 G 15	1.5 ±0.20	0.28	1.81
GEL 80 25	2.5 ±0.30	0.45	2.91	GEL 80 G 20	2.0 ±0.30	0.38	2.45
GEL 80 30	3.0 ±0.30	0.57	3.68	GEL 80 G 25	2.5 ±0.30	0.47	3.01
GEL 80 G 03	0.3 ±0.06	0.09	0.58	GEL 80 G 30	3.0 ±0.30	0.59	3.49

	GEL 80	GEL 80 G
version	standard	surface hardened on one side
colour	light gray	
density	3.3 g/cm ³	
hardness	75 Shore 00	
thermal conductivity	13 W/m·K	
temperature range	-40°C... +150°C	
elongation	50 %	
volume resistance	1·10 ¹¹ Ω·m	
dielectric constant	9.54 [50 Hz] / 8.82 [1 kHz] / 7.92 [1 MHz]	
dielectric loss factor	0,063 [50 Hz] / 0,044 [1 kHz] / 0,014 [1 MHz]	
dielectric strength	15 kV/mm	
class of inflammability	UL 94 V-0	
type of delivery	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request	

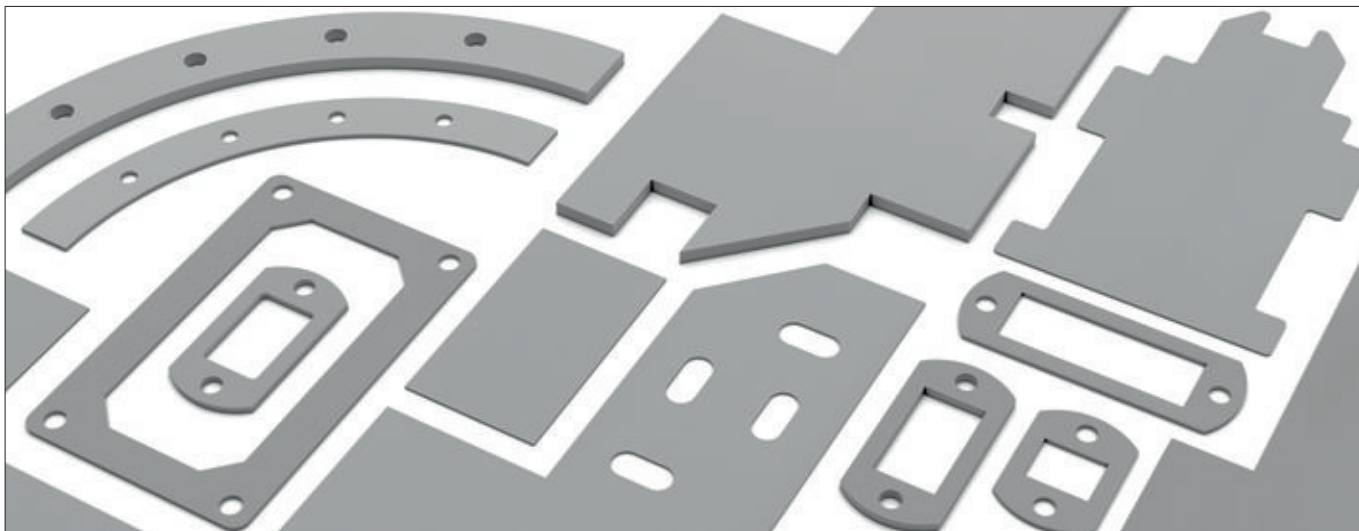


- specially soft design
- levels smallest air gaps and unevennesses
- cuts and contours with cutouts according to customer's specifications

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 28 S 10	1.0 ±0.15	0.42	2.7
GEL 28 S 15	1.5 ±0.20	0.60	3.9
GEL 28 S 20	2.0 ±0.30	0.76	4.9
GEL 28 S 25	2.5 ±0.30	0.90	5.8
GEL 28 S 30	3.0 ±0.30	1.02	6.6
GEL 28 S 35	3.5 ±0.35	1.15	7.4
GEL 28 S 40	4.0 ±0.40	1.27	8.2
GEL 28 S 45	4.5 ±0.45	1.45	9.4
GEL 28 S 50	5.0 ±0.50	1.64	10.6

GEL 28 S	
version	standard
colour	grey
density	2.6 g/cm ³
hardness	9 ASKER C
thermal conductivity	2.5 W/m·K
temperature range	-40°C... +150°C
volume resistance	1·10 ¹¹ Ω·m
dielectric constant	7.21 [50 Hz] / 6.73 [1 kHz] / 6.25 [1 MHz]
dielectric loss factor	0.059 [50 Hz] / 0.031 [1 kHz] / 0.007 [1 MHz]
dielectric strength	18 kV/mm
class of inflammability	UL 94 V-0
type of delivery	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request

Gel thermal conductive foils for extreme compression

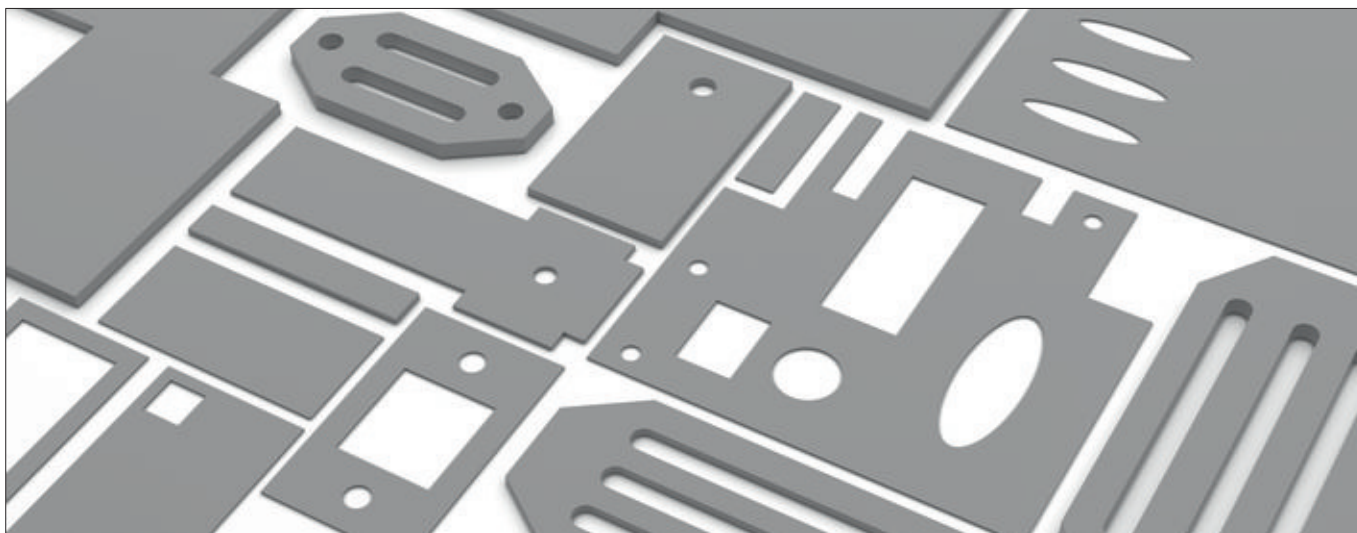


- very soft silicone-based thermal conductive material
- double side adhesive surface
- good chemical and ageing resistance
- other material thicknesses on request
- cuts and contours according to customised drawing specifications

art. no.	material thickness [mm]
GEL 30 S 05	0.5
GEL 30 S 10	1.0
GEL 30 S 15	1.5
GEL 30 S 20	2.0
GEL 30 S 25	2.5
GEL 30 S 30	3.0
GEL 30 S 35	3.5
GEL 30 S 40	4.0

GEL 30 S	
version	silicone foil, protective film on both sides
colour	grey
hardness	7 Shore A
thermal conductivity	3 W/m·K
temperature range	-60°C ... +200°C
elongation	450 %
tear strength	0.7 N/mm ²
dielectric strength	1 kV/mm
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 305x305mm/ other dimensions upon request

Thermal resistances vs. contact pressure					
pressure [psi]	10	20	30	40	50
thermal impedance GEL 30 S 30 [K·cm ² /W]	16,1	16,0	14,2	13,7	13,0



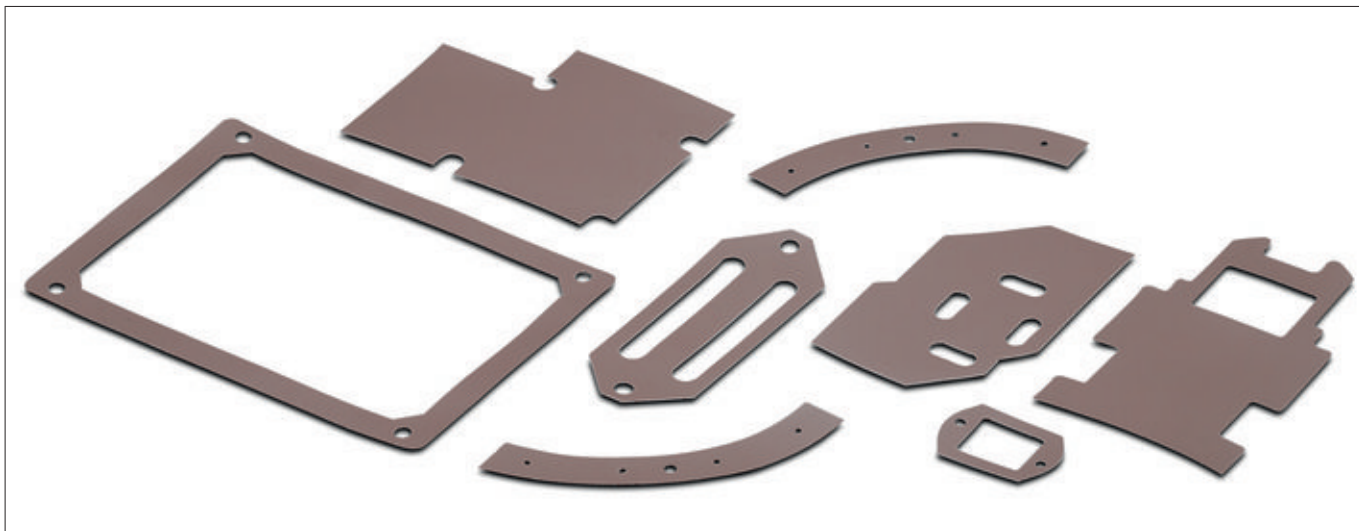
- very soft silicone foil with good compressibility
- mounting facilitation due to adherent surfaces
- very good compensation of larger unevennesses
- low contact pressure to reduce thermal transfer resistances
- shaped parts and material cuts according to your specifications

art. no.	material thickness [mm]
GEL 50 S 05	0.5
GEL 50 S 10	1.0
GEL 50 S 15	1.5
GEL 50 S 20	2.0
GEL 50 S 25	2.5
GEL 50 S 30	3.0
GEL 50 S 35	3.5
GEL 50 S 40	4.0

GEL 50 S	
version	silicone foil, protective film on both sides
colour	grey
hardness	20 Shore A
thermal conductivity	5 W/m·K
temperature range	-60°C ... +200°C
elongation	250 %
tear strength	0.34 N/mm ²
dielectric strength	2 kV/mm
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 305x305mm/ other dimensions upon request

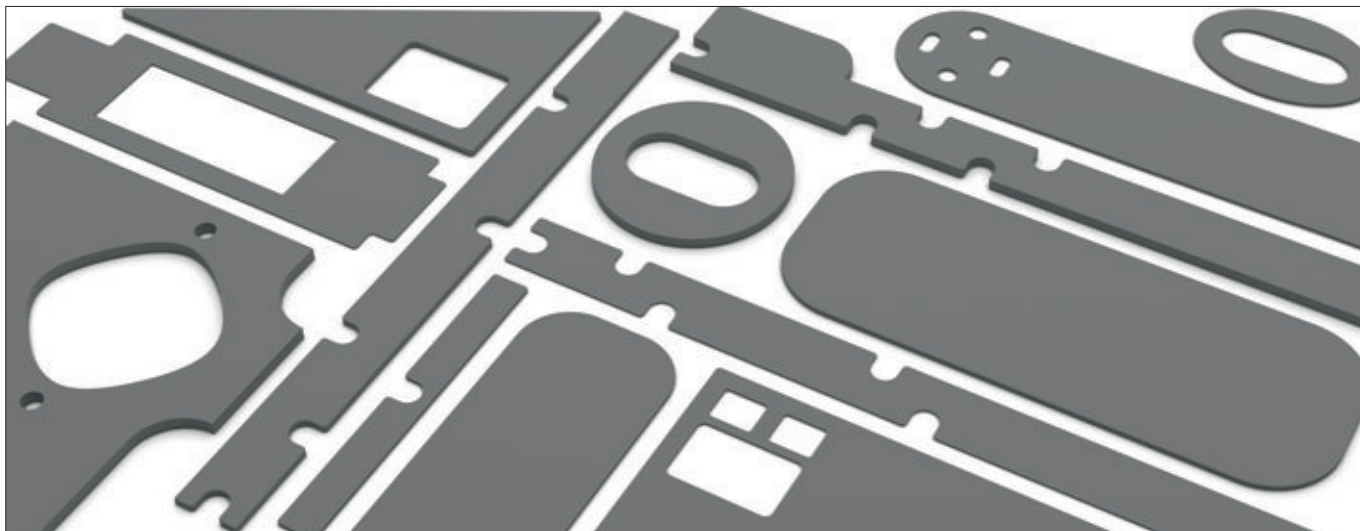
Thermal resistances vs. contact pressure					
pressure [psi]	10	20	30	40	50
thermal impedance GEL 50 S 20 [K·cm ² /W]	8.2	8	7.6	7.3	7

Gel thermal conductive foils for extreme compression



- very soft and compressible thermal conductive foil
- simple compensation of bigger differences in components
- double-sided adhesive surfaces with protective foil
- excellent dielectric strength
- drawing parts acc. to customer's specification upon request

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 60 S 15	1.5 +0.5/ -0.0	0.45	2.9
GEL 60 S 20	2.0 +0.7/ -0.0	0.52	3.3
GEL 60 S 25	2.5 +0.7/ -0.0	0.67	4.3
GEL 60 S			
version	standard with double-sided adhesive surface		
colour	dark gray		
density	3.2 g/cm ³		
thermal conductivity	6 W/m·K		
temperature range	-40°C... +150°C		
volume resistance	1·10 ¹² Ω·m		
dielectric constant	7.37 [50 Hz] / 7.31 [1 kHz] / 7.34 [1 MHz]		
dielectric loss factor	0,0101 [50 Hz] / 0,0022 [1 kHz] / 0,0007 [1 MHz]		
dielectric strength	13 kV/mm		
class of inflammability	UL 94 V-0		
type of delivery	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request		



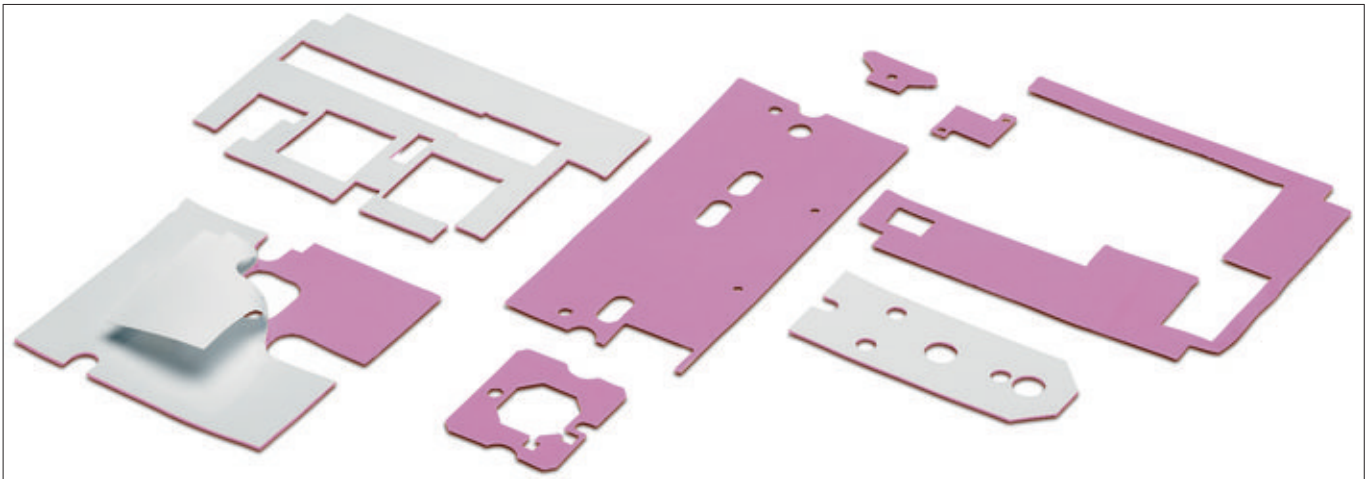
- very adaptable gel thermal conductive foil
- high thermal conductivity and application temperature range
- very good compression with light contact pressure
- other sheet dimensions and material thicknesses on request
- individual moulded parts according to customer drawing

art. no.	material thickness [mm]
GEL 70 S 05	0.5
GEL 70 S 10	1.0
GEL 70 S 15	1.5
GEL 70 S 20	2.0
GEL 70 S 25	2.5
GEL 70 S 30	3.0
GEL 70 S 35	3.5
GEL 70 S 40	4.0

GEL 70 S	
version	silicone foil, protective film on both sides
colour	dark gray
hardness	10 Shore A
thermal conductivity	7 W/m·K
temperature range	-60°C ... +200°C
elongation	40 %
tear strength	0.34 N/mm ²
dielectric strength	6 kV/mm
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 305x305mm/ other dimensions upon request

Thermal resistances vs. contact pressure					
pressure [psi]	10	20	30	40	50
thermal impedance GEL 70 S 20 [K·cm ² /W]	5.3	5	4.6	4.2	3.9

Gel thermal conductive foils for extreme compression



- extremely strong compressible gap-filler thermal conductive foil
- very high efficiency in connection with very high thermal conductivity
- little force for material compression
- perfectly suitable for balancing smallest unevennesses
- cuts and contours according to customer drawing

art. no.	material thickness [mm]	R _{th} (100 kPa) [°C in ² /W]	R _{th} (100 kPa) [°C cm ² /W]
GEL 130 S 05	0.5 ±0.10	0.08	0.5
GEL 130 S 10	1.0 ±0.15	0.17	1.1
GEL 130 S 15	1.5 ±0.25	0.23	1.5
GEL 130 S 20	2.0 ±0.35	0.28	1.8

GEL 130 S	
version	standard with double-sided adhesive surface
colour	red
density	3.3 g/cm ³
thermal conductivity	8 W/m·K
temperature range	-40°C... +150°C
volume resistance	3·10 ¹¹ Ω·m
dielectric constant	12,1 [50 Hz] / 9,6 [1 kHz] / 8,6 [1 MHz]
dielectric loss factor	0,533 [50 Hz] / 0,093 [1 kHz] / 0,015 [1 MHz]
dielectric strength	10 kV/mm
class of inflammability	UL 94 V-0
type of delivery	on both sides covered with protective foil/ plates, usable area 300x200mm/ other dimensions upon request



- two-part fluid gap filling material
- high dimensional stability after mounting
- automatic dispensation
- optimum balance of roughness and unevennesses
- to be stored at 25 °C room temperature, vertical standing with opening pointing downwards
- other delivery forms and container sizes upon request
- more package sizes and container types upon request
- store cool and dry

art. no.	basin	contents of delivery
GEL S 18	cartridge	1x 50 ml cartridge / 3x mixer GEL M 18
GEL S 18		
version	two-part fluid gap filling material/ silicone	
colour	white (A/B)	
density	2.7 g/cm ³	
hardness	50 Shore 00	
thermal conductivity	1.8 W/m·K	
mixture proportion	1:1	
viscosity	25 Pa·s	
temperature range	-60°C ... +200°C	
volume resistance	10 ¹⁰ Ω·m	
dielectric constant	6.4 [1 kHz]	
heat capacity	1 J/g·K	
dielectric strength	400 V	
durability	6 months @ 25°C	
working life at room temperature	60 min @ 25°C	
hardening time	300 min @ 25°C / 10 min @ 100°C	
class of inflammability	UL 94 V-0	
type of delivery	cartridge with additional mixers	

Accessories

art. no.	contents of delivery
GEL M 18	10x mixer für 50 ml cartridge (packing unit 10 pieces)
WLK P	1x applicator gun for 50 ml cartridge



- two-component liquid gap filler material
- ceramic highly filled silicone elastomers and gels
- high heat dissipation and good insulation properties with low viscosity
- automatic dispensing option
- storage at 25 °C room temperature, vertically upright with the opening facing down
- other delivery forms and container sizes on request
- store in a cool, dry place

art. no.	basin	contents of delivery		
GEL S 20	cartridge	1x 50 ml cartridge / 3x mixer GEL M 50		
GEL S 30				
GEL S 40				
	GEL S 20	GEL S 30	GEL S 40	
version	two-part fluid gap filling material/ silicone			
colour	yellow	green	lila	
density	2.3 g/cm ³	2.94 g/cm ³	3.05 g/cm ³	
hardness	45 - 60 Shore 00	65 - 85 Shore 00		
thermal conductivity	1.8 W/m·K	3 W/m·K	4.3 W/m·K	
mixture proportion	1:1			
viscosity	45-70 Pa·s	50-80 Pa·s	75-110 Pa·s	
temperature range	-40°C... +200°C			
heat capacity	1 J/g·K			
dielectric strength	20 kV/mm	12 kV/mm	10 kV/mm	
durability	6 months @ 25°C			
working life at room temperature	20 min @ 25 °C			
hardening time	60 min @ 25 °C			
class of inflammability	UL 94 V-0			
type of delivery	cartridge with additional mixers			

Accessories

art. no.	contents of delivery
GEL M 50	10x mixer für 50 ml cartridge (packing unit 10 pieces)
WLK P	1x applicator gun for 50 ml cartridge



- fully curing one-component system
- very good thermal conductivity
- thicker and thinner layer thicknesses possible
- no bleeding, small compression force necessary
- automatic dispensable
- more package sizes and container types upon request
- store cool and dry

art. no.	basin	contents of delivery
GEL S 35 10	syringe	1x 10 ml syringe
GEL S 35	cartridge	1x 30 ml cartridge
GEL S 35		
version	one-part fluid gap filling material/ silicone	
colour	pink	
density	3.2 g/cm ³	
thermal conductivity	3.5 W/m·K	
temperature range	-55°C ... +200°C	
volume resistance	10 ¹² Ω·m	
dielectric constant	7 [100 kHz]	
heat capacity	1 J/g·K	
dielectric strength	8 kV/mm	
durability	18 months	
class of inflammability	UL 94 V-0	
type of delivery	syringe/ cartridge	

Kapton insulator washers

- very low thermal resistance
- optimised heat conductivity
- best mechanical characteristics
- polyimide-carrier foil with silicone-free phase changing thermal conductive layer completely coated on both sides
- clean processing, no abrasion of the coating
- stacked foils do not stick together
- good resistance against cleaning agents
- no cold flow
- low pressure force necessary, thus particularly applicable for spring-fixing of semiconductors
- cuttings and special versions according to customer's requirements
- the thermal details refer to an area of 1 inch² (6.45 cm²)

art. no. KAP 1 P suitable for pre-cut parts (plate)	art. no. KAP 247 O TO 248/ TO 218/ TO 247	art. no. KAP 218 O TO 218	art. no. KAP 220 O TO 220	art. no. KAP 218 TO 248/ TO 218/ TO 247
art. no. KAP 220 G TO 220	art. no. KAP 220 K TO 220	art. no. KAP 3 K TO 3		
		KAP 1 P		KAP
material	polyimide-carrier foil with silicone-free phase changing thermal conductive layer completely coated on both sides			
phase change temperature	52 °C			
thermal resistance	0.15 K/W [at 1 inch ² ; = 6.45 cm ² ; = TO 3 (KAP 3)]			
temperature range	-40°C... +150°C			
thermal conductivity	0.45 W/m·K (substrate)			
insulation resistance	10 ¹⁴ Ω			
material thickness	0.077mm (substrate 0.05mm)			
elongation	30 %			
dielectric strength	7.8 kV			
class of inflammability	UL 94 V-0			
type of delivery	plate		cut	

art. no. GS 220 C TO 220	art. no. GS 218 TO 218	art. no. GS 3 P SL TOP 3	art. no. GS 66 P TO 66	art. no. GS 220 4 TO 220
art. no. GS 220 P TO 220	art. no. GS 32 P SOT 32	art. no. GS 3 P TOP 3	art. no. GS 3 TO 3	
GS				
material	muskovit			
material thickness	0.05 mm			
thermal resistance (GS 3)	0.4 K/W			
dielectric strength	5 kV			
insulation resistance	3·10 ¹⁷ Ω·cm			

Aluminium oxide wafers

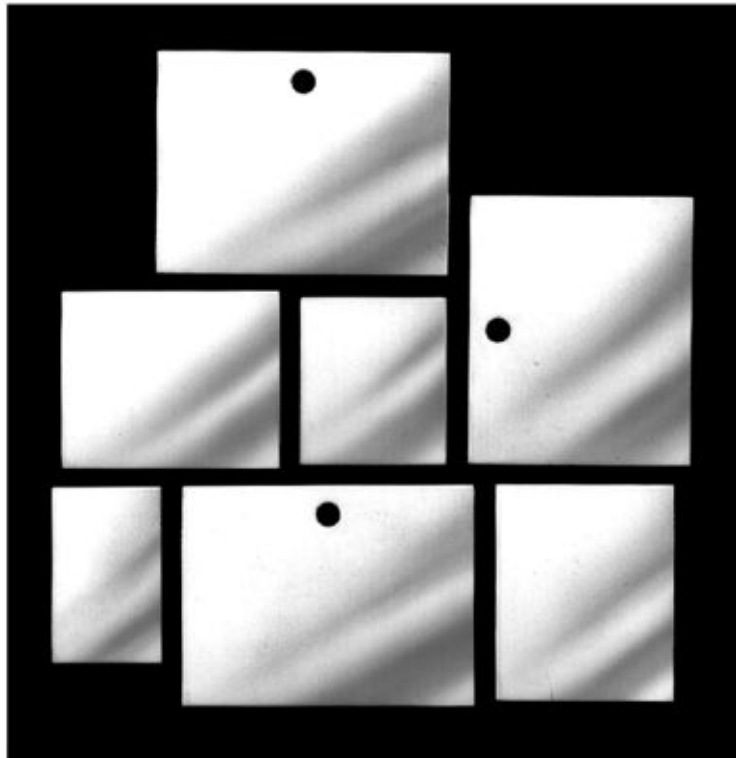
- other thicknesses and versions on request

± = thickness; □ = flatness

art. no. AOS 247 ±1 mm □0.02 mm	art. no. AOS 218 247 ±3 mm □0.02 mm	art. no. AOS 218 247 1 ±1.5 mm □0.02 mm	art. no. AOS 3 P 2 ±1 mm □0.02 mm	art. no. AOS 3 P SL ±1.5 mm □0.02 mm
art. no. AOS 220 3 ±1.6 mm □0.02 mm	art. no. AOS 220 SL ±4.5 mm □0.02 mm	art. no. AOS 220 4 ±1.5 mm □0.02 mm	art. no. AOS 220 ±1.5 mm □0.02 mm	art. no. AOS 32 ±1.5 mm □0.02 mm
art. no. AOS 127 ±3 mm □0.02 mm	art. no. AOS 3 P ±1.5 mm □0.02 mm	art. no. AOS 5 ±1.5 mm □0.02 mm	art. no. AOS 93 ±2.3 mm □0.02 mm	art. no. AOS 18 ±1.5 mm □0.02 mm
art. no. AOS 3 ±3 mm □0.02 mm	art. no. AOS 66 ±2.5 mm □0.02 mm			
AOS				
material	Al ₂ O ₃ - ceramics			
specific electrical resistance	>10 ¹⁴ Ω/cm			
thermal conductivity	25 W/m·K			
dielectric constant	9			
linear expansion coefficient	~8·10 ⁻⁶ /K			
thermal resistance	0.3 K/W [at 1 inch ² ; = 6.45 cm ² ; = TO 3 (AOS 3 G)]			
dielectric strength	10 kV/mm			

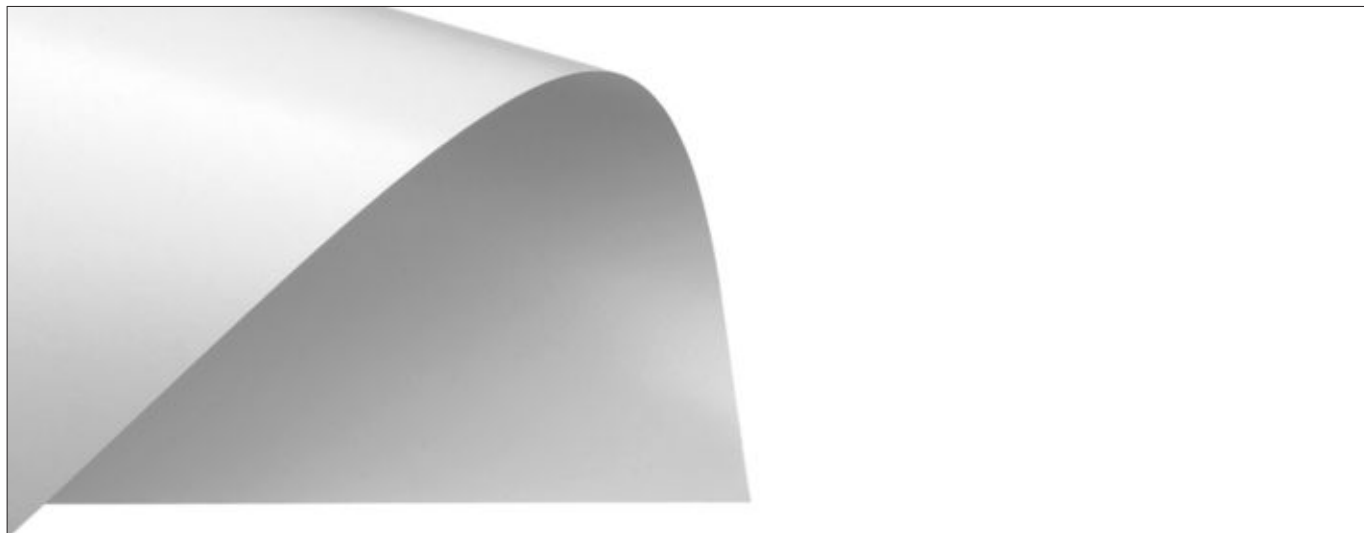
Aluminium oxide wafers according to customer's instructions

- laser-cut versions with outer dimensions and cutouts according to customer's requirements
- other plate dimensions upon request



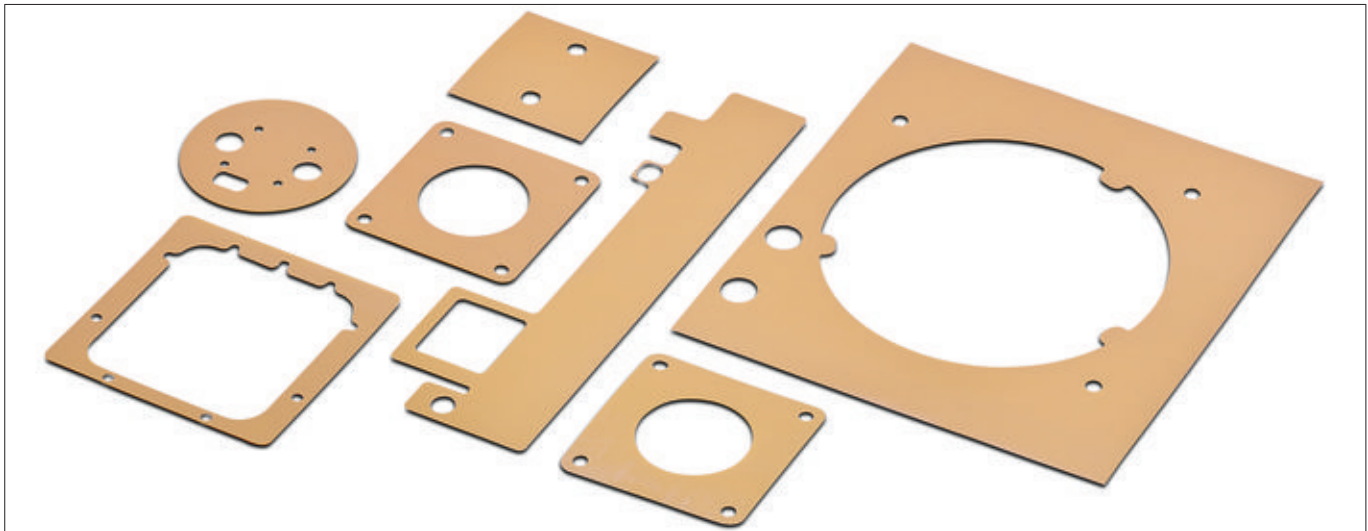
material thickness [mm]	outer dimensions [mm]
0.250	106,6x106,6
0.300	
0.400	114.3x114.3
0.500	106,6x106,6/ 160x113
0.635	106,6x106,6/ 160x113/ 180x113
0.800	114.3x114.3/ 160x113/ 165x114
1.000	114.3x114.3/ 160x113/ 165x114/ 180x130
1.270	114.3x114.3
1.500	114.3x114.3/ 290x100
2.000	114.3x114.3
2.540	

Phase Change thermal interface material



- strapless (free standing film) changing condition thermal conductive material as a foil
- material with phase changing temperature at 48 °C or 52 °C
- best thermal conductivity, above the phase change temperature the material flows in all gaps of the impinged device and heatsink
- thixotropic, therefore no migration of the material away from the moistened surface
- no influence on the thermal conductivity due to thermal cycles
- only low contact pressure necessary, as it is no elastomer and therefore ideally suitable for clamp mounting of the devices
- not electrically conductive, but no insulator
- self-adhesive properties, also suitable for large surfaces
- no toxic ingredients
- customised cuts upon request
- with double-sided protective film

art. no.	material thickness [mm]		
FSF 30 P	0.120 ±0.025		
FSF 52 P	0.127 ±0.025		
FSF 20 P	0.200 ±0.025		
	FSF 30 P	FSF 52 P	FSF 20 P
colour	grey	white	
density	2.4 g/cm ³	2 g/cm ³	2.9 g/cm ³
phase change temperature	50 °C	52 °C	48 °C
thermal conductivity	3 W/m·K	0.9 W/m·K	2 W/m·K
thermal resistance (1 in², TO 3) at contact pressure of	0.1 K/W 0.031 N/mm ²	0.03 K/W 0.031 N/mm ²	0.08 K/W 0.031 N/mm ²
temperature range	≤ +150°C	≤ +200°C	≤ +150°C
adhesive holding force	0.6 N/mm ²	0.35 N/mm ²	0.6 N/mm ²
dielectric constant	5.2 [1 kHz] / 4.8 [1 MHz]	3.8 [1 kHz] 3.4 [1 MHz]	4.8 [1 kHz] / 4.4 [1 MHz]
class of inflammability	UL 94 V-0		
type of delivery	plates, usable area 400x300mm/ other dimen- sions upon request	plates, usable area 343x330mm/ other dimen- sions upon request	plates, usable area 400x300mm/ other dimen- sions upon request



- phase change material on a polyimide basis
- very good thermal properties
- one-sided adhesive layer eases the mounting
- particularly suitable for the application of spring clips
- cuts and contours upon customised drawing specifications

art. no.	material thickness [mm]
FSF 15 P 011	0.114
FSF 15 P 012	0.127
FSF 15 P 014	0.140
FSF 15 P	
version	electrically insulating phase change material with polyimide reinforcement and one-sided adhesive layer
colour	gold
phase change temperature	52 °C
thermal conductivity	1.5 W/m·K
temperature range	-40°C... +150°C
elongation	40 %
volume resistance	10 ¹² Ω·m
dielectric constant	4.5 [1 kHz]
tear strength	7,000 psi
dielectric strength	5 kV
class of inflammability	UL 94 V-0
type of delivery	rolled goods, roll width 266mm/ cuttings on customer's requirement

Thermal resistances vs. contact pressure / surface TO 220					
pressure [psi]	10	25	50	100	200
thermal resistance FSF 15 P 011 [K/W]	1.20	1.15	1.11	1.06	1.00
thermal resistance FSF 15 P 012 [K/W]	1.47	1.41	1.37	1.33	1.29
thermal resistance FSF 15 P 014 [K/W]	1.59	1.48	1.43	1.38	1.35
thermal impedance FSF 15 P 011 [K-cm ² /W]	1.31	1.25	1.19	1.13	1.06
thermal impedance FSF 15 P 012 [K-cm ² /W]	1.44	1.38	1.31	1.25	1.19
thermal impedance FSF 15 P 014 [K-cm ² /W]	1.75	1.69	1.63	1.56	1.50

Phase Change thermal interface material



- phase change material on a polyimide basis
- very good thermal properties
- easy handling and high dielectric strength
- particularly suitable for the application of spring clips
- cuts and contours upon customised drawing specifications

art. no.	material thickness [mm]
FSF 16 P 010	0.102
FSF 16 P 011	0.114
FSF 16 P 012	0.127
FSF 16 P	
version	electrically insulating phase change material with polyimide reinforcement
colour	green
phase change temperature	55 °C
thermal conductivity	1.6 W/m·K
temperature range	-40°C... +150°C
elongation	40 %
volume resistance	10 ¹² Ω·m
dielectric constant	4.5 [1 kHz]
tear strength	7,000 psi
dielectric strength	5 kV
class of inflammability	UL 94 V-0
type of delivery	plates, usable area 300x275mm/ other dimensions upon request

Thermal resistances vs. contact pressure					
pressure [psi]	10	25	50	100	200
thermal resistance FSF 16 P 010 [K/W]	0.95	0.94	0.92	0.91	0.90
thermal resistance FSF 16 P 011 [K/W]	1.19	1.17	1.16	1.14	1.12
thermal resistance FSF 16 P 012 [K/W]	1.38	1.37	1.35	1.33	1.32
thermal impedance FSF 16 P 010 [K-cm ² /W]	0.81	0.81	0.75	0.75	0.75
thermal impedance FSF 16 P 011 [K-cm ² /W]	1.06	1.00	1.00	1.00	0.93
thermal impedance FSF 16 P 012 [K-cm ² /W]	1.18	1.18	1.18	1.12	1.12

Silicon thermal transfer compound

– thermal conductive paste used to reduce the thermal transmission resistance between semiconductor and heatsink



art. no.	basin	delivery quantity [g]
WLP 004	box	4
WLP 035		35
WLP 500		500
WLP 300 S	cartridge (310 ml)	300
WLP 500 S		500

Silicone-free thermal transfer compound

– thermal conductive paste used to reduce the thermal transmission resistance between semiconductor and heatsink



art. no.	basin	delivery quantity [ml]	delivery quantity [g]
WLPF 05	syringe	2	—
WLPF 10		5	
WLPF 20		10	
WLPF 300 S	cartridge (310 ml)	—	300

	WLP	WLPF
composition	silicone oil, inorganic filling material	silicone free synthetic liquid, metal oxide filling
specific electrical resistance	$>10^{12} \Omega/\text{cm}$	
flashpoint	none (DIN 53213)	
drop point	$>260^\circ\text{C}$	
thermal resistance	no bleeding at (4 h/200°C)	
acid number	$< 0.01 \text{ mg KOH/g}$	
consistence	pastey	
colour	white	white-grey
density	1.1 g/cm^3	
thermal conductivity	$0.61 \text{ W/m}\cdot\text{K}$	$0.5 \text{ W/m}\cdot\text{K}$
temperature range	$-40^\circ\text{C} \dots +250^\circ\text{C}$	$-40^\circ\text{C} \dots +150^\circ\text{C}$
solubility in water	insoluble	
oil separation (thickener)		$\leq 2\%$ (40°C / 168h)
flow pressure at 20°C (thickener)		$\leq 200 \text{ mbar}$
kinetic viscosity (base oil)		ca. $90 \text{ mm}^2/\text{s}$ (40°C) ca. $13 \text{ mm}^2/\text{s}$ (100°C)



Silicone-free thermal transfer compound

– thermal conductive paste used to reduce the thermal transmission resistance between semiconductor and heatsink

art. no.	basin	delivery quantity [ml]	delivery quantity [g]
WLPF 07 05	syringe	2	—
WLPF 07 10		5	
WLPF 07 20		10	
WLPF 07 50		20	
WLPF 07 300 S	cartridge (310 ml)	—	300
WLPF 07			
composition	silicone free synthetic liquid, metal oxide filling		
consistance	pastey		
colour	white-grey		
density	1.9 g/cm ³		
thermal conductivity	0,7 W/m·K		
temperature range	-40°C... +150°C		
oil separation (thickener)	≤ 2% (40°C / 168h)		
flow pressure at 20°C (thickener)	≤ 300 mbar		
kinetic viscosity (base oil)	ca. 100 mm ² /s (40°C) ca. 14 mm ² /s (100°C)		

Thermal conductive paste

Ceramic filled, silicone-free thermal conductive paste with high thermal conductivity

- suitable especially for silicone-sensitive applications
- no drying out, hardening or melting of the thermal conductive paste
- high long-term stability
- further package sizes, container types such as cans, cartridge, etc. upon request



art. no.	basin	delivery quantity [ml]
WLPK 5	syringe	5
WLPK 10		10
WLPK		
composition	silicone-free, synthetic fluid ceramic filled	
consistance	pastey	
colour	silver	
density	1.4 g/cm ³	
thermal conductivity	10 W/m·K	
temperature range	-60°C ... +150°C	
dielectric strength	not applicable, because conducting	
solubility in water	insoluble	

Thermally conductive adhesive

- thermally conductive, electrically non-conductive adhesive
- two part epoxy resin adhesive, metaloxide filled
- fully replaces mechanical fastenings
- excellent function and application characteristics
- **to be stored at a cool and dark place**

WLK 5



WLK 10



art. no.	composition	art. no.	composition
WLK 5	5 g resin/0.5 g hardener	WLK 10	10 g resin/1 g hardener

WLK 30



WLK 120



art. no.	composition	art. no.	composition
WLK 30	30 g resin/3 g hardener	WLK 120	120 g resin/12 g hardener

WLK	
thermal conductivity	0.836 W/m·K
specific thermal resistance	1.2 m·K/W
temperature range	-56°C... +149°C
hardening time	20°C approx. 16-24h / 25°C approx. 8 h / 120°C approx. 20 min
volume resistance	10 ¹⁶ Ω/cm
glue layer	Epoxid
mixture proportion	10:1

- solvent-free and thermal conductive two part adhesive
- epoxy based filled with aluminium oxide
- composition of hardener and resin (1:1) with statical mixing tube
- lockability of the container via Luer-Lock System
- good usage and working properties
- more package sizes and container types upon request
- store cool and dry



art. no.	basin	contents of delivery
WLK DK 4	syringe	1x 4 ml syringe / 3x mixer WLK M4
WLK DK 10		1x 10 ml syringe / 3x mixer WLK M4
WLK DK 50	cartridge	1x 50 ml cartridge / 3x mixer WLK M 50
WLK DK		
thermal conductivity	1 W/m·K	
specific thermal resistance	118°C cm/W	
temperature range	-50°C... +145°C	
working life at room temperature	approx. 30 min	
hardening time	60°C approx. 4 h/25°C approx. 16 h	
volume resistance	8·10 ¹¹ Ω/cm	
glue layer	Epoxid	
mixture proportion	1:1	

Accessories

art. no.	contents of delivery
WLK M 4	10x mixer für 4 & 10 ml syringe (packing unit 10 pieces)
WLK M 50	10x mixer für 50 ml cartridge (packing unit 10 pieces)
WLK P	1x applicator gun for 50 ml cartridge

Thermally conductive adhesive

- space networking thermal conductive glue made on silicone basis
- very good thermal conductivity
- mixing in ration 1:1 with static mixing tube
- hardening will be proceeded at room temperature
- wide range of temperatures
- store cool, dark and dry



art. no.	basin	contents of delivery
WLK SK 50	cartridge	1x 50 ml cartridge / 3x mixer WLK SK M
WLK SK 50		
version	2-component silicone thermal adhesive	
colour	violet	
density	2.8 g/cm ³	
hardness	65 Shore A	
thermal conductivity	2 W/m-K	
temperature range	-60°C... +180°C	
working life at room temperature	approx. 30 min	
hardening time	25°C approx. 8 h / 50°C approx. 4 h / 85°C approx. 1 h	
volume resistance	10 ¹¹ Ω·m	
dielectric constant	6.9 [1 KHz]	
heat capacity	1 J/g·K	
dielectric strength	10.8 kV/mm	
Scherfestigkeit bei RT	1.4 MPa	
class of inflammability	UL 94 V-0	

Accessories

art. no.	contents of delivery
WLK SK M	10x mixer für 50 ml cartridge (packing unit 10 pieces)
WLK P	1x applicator gun for 50 ml cartridge

Terms and conditions of business

1. General provisions

1.1. The present General Terms and Conditions (GTC) apply to all of our business relationships with our customers ("Purchaser"). The GTC only apply if the Purchaser is an entrepreneur (§ 14 of the German Civil Code), a legal entity of public law or a special fund under public law.

The GTC particularly apply for contracts about the sale and/or the delivery of transportable objects ("Goods"), regardless of whether we manufacture the Goods ourselves or buy them in from suppliers (§§ 433, 651 of the German Civil Code). Unless otherwise agreed, the GTC apply, in the version valid at the time of the Purchaser's order or in the version last transmitted to them, as a framework agreement for similar future contracts, without us having to refer to them each time.

1.2. Our GTC apply exclusively. Deviating, contradicting or additional General Terms and Conditions of the Purchaser are only part of the contract if we have expressly authorised their validity. This approval requirement applies in any case, also if we make deliveries to the Purchaser without reserve, in full knowledge of their Terms and Conditions. Individual, isolated agreements with the Purchaser (including ancillary agreements, additions and changes) always take priority over these GTC. The content of this type of agreement, subject to counterevidence, is to be determined according to a written contract or our written confirmation.

1.3. Legally relevant declarations and announcements of the Purchaser with regards to the contract (for example deadline agreements, defect notifications, withdrawal or reduction) are to be submitted in writing, i.e. in written or text form (for example letter, e-mail, fax). Legal form provisions and other certificates, especially in case of doubts about the legitimation of the declaring party, remain unaffected.

1.4. References to the validity of legal provisions are only for clarification purposes. The legal provisions therefore apply even if there is no reference, unless they have been modified directly in these GTC or expressly excluded.

2. Quotations and orders

Our quotations shall be subject to change without notice and are non-binding. This applies also to information contained in price lists, leaflets etc. Delivery dates stated in our quotations or given to the purchaser by any other means are approximate, and we shall endeavour to keep to them. Delays in delivery shall give us no right to claims, unless we have explicitly confirmed such delivery dates and an adequate period of grace granted to us has expired. Orders shall only be binding on us when they have been explicitly confirmed in writing, regardless of the form in which they have been placed with us. Statements made in catalogues are simple descriptions of goods and under no circumstances do they constitute warranted qualities. Furthermore, the characteristics of our samples cannot be regarded as warranted characteristics.

3. Prices

Prices shall be valid only when confirmed by us in writing. They are exclusive of VAT at the current rate and incidentals such as postage and packing, freight, insurance etc., as of storage. If delivery is made more than 3 months after the date of order, we shall be entitled to invoice the price valid at the date of despatch, even though different prices were initially confirmed. The price valid at the date of despatch shall also apply if the order was confirmed without prices being stated. When an order on call is placed, partial deliveries shall be invoiced at the price valid at the date of despatch. Any request by the purchaser for subsequent modifications shall entitle us to amend prices.

4. Conditions of payment

The invoiced sum is to be paid net within 30 days of date of invoice and delivery. If the purchaser is in default with any payment, we are entitled to claim interest for such default at the normal rate of interest charged for current accounts. If we are able to prove that we have incurred greater losses as a result of the delay, we shall be entitled to claim compensation for such damages. We are however entitled at any time, in the context of an ongoing business relationship, to execute a delivery in full or in part only against an advance deposit. We shall declare a corresponding reserve at the latest at the confirmation of the contract.

5. Set-off, right to retention

Only claims which have been recognised by us or have become legally binding may be offset against our invoices. Any right to a retention to be exercised by the purchaser in connection with our claims is explicitly excluded. In case of defects in the delivery, the rights of the Purchaser remain unaffected, particularly with regards to point 10.3. of these GTC.

6. Delivery

The delivery is performed from the storage, wherever the place of fulfilment for the delivery and any subsequent fulfilment may be. Upon request by the Purchaser, the Goods will be sent to a different place of their choice (shipped purchase). Delivery of our goods is explicitly made on behalf of and at the risk of the purchaser. The risk shall pass over to the purchaser when the ordered goods leave our premises. The same applies if goods are collected in our premises from the point in time at which we notify the purchaser that they are ready for collection. Unless we have received instructions to the contrary from the purchaser, we shall decide at our discretion on the most economical delivery method without assuming any liability for the chosen means of delivery.

7. Specially manufactured goods

Components made according to a sample or a drawing or by special request must be taken over and paid for, unless they have a defect we are answerable for and which makes the components completely unfit for the purchaser's purposes. If their fitness for the purchaser's purposes is only reduced, the purchaser may request a reduction of payment but the contract shall not be cancelled.

8. Quantities

We are entitled to supply quantities which are above or below the ordered quantities by up to 10%. Such deviations are usual in this trade and the deliveries are deemed as being in compliance with the contract. If delivery quantities fall below the ordered quantities there shall be no right to subsequent delivery of the missing quantity.

9. Reservation of proprietary rights

9.1. All goods supplied shall remain our property until all current and future claims resulting from the Purchase contract and the business relationship with the purchaser (secured claims) have been paid in full. The purchaser is entitled to dispose of the purchased goods in the ordinary course of business transactions. Reservation of proprietary rights also applies to products resulting from processing, mixing up or combining our goods, in which case we are considered as manufacturers. In the case where our goods are processed, mixed up or combined with goods of third parties, and the proprietary rights of such third parties remain in force, we are entitled to co-ownership according to the proportion of the amount invoiced for such processed goods. In such cases such rights to co-ownership shall be safeguarded by the purchaser.

9.2. The purchaser shall transfer to us, as a security, his claims against third parties resulting from the re-sale of our goods in full or in the proportion of our co-ownership (see subparagraph 9.1). He is entitled to collect the amount of such claims on our behalf until revoked or until cessation of his payments made to us. The purchaser is not entitled to assign these claims to third parties.

9.3. The purchaser is not entitled to mortgage or transfer the goods which are subject to reservation by way of security.

9.4. The purchaser shall advise us immediately at any seizure of our goods or of any infringement of our rights by third parties.

9.5. In case of a default in payment or a deterioration in the financial situation, we are entitled to request immediate handing over of the goods which are subject to reservation. Any time limited claims shall immediately become due.

9.6. If the value of the securities exceeds our claims by more than 20%, securities to a corresponding amount will be released by us on request at our discretion.

9.7. The extended retention of title (9.1.) does not apply to prepayment orders that have been paid in full.

10. Warranty

10.1. We expressly point out that all information and data is given to the best of our knowledge and belief. The user is solely responsible for the proper use of our products and he should check their suitability for the intended application. Fischer Elektronik do not assume any warranty, whether expressed or implied, for the suitability, function or merchantability of their products in specific or general applications, and they cannot be held liable for accidental or consequential damage due to non-observance of the above.

10.2. Claims for defects can only be considered if the purchaser has complied with their obligation to check goods and submit a complaint as per Sections 377, 381 of the German Commercial Code [HGB]. If goods have a defect attributable to us, we are obliged to effect a cure, excluding the purchaser's right to withdraw from the contract or to reduce the purchase price

(reduction), unless we are entitled to refuse to effect a cure by virtue of legal regulations. The purchaser shall grant us an adequate period of grace for effecting a cure. A cure may at our discretion be an elimination of the defect (rectification) or the supply of new products. We are entitled to determine the cure owed according to the payment of the purchase price due by the Purchaser. The Purchaser, however, is entitled to retain a part of the purchase price that is proportionate to the defect. The expenses incurred for the verification and cure, particularly transport, road, work and materials costs (not: expansion and installation costs) are borne by us, if there is indeed a defect. Otherwise, we can require that the Purchaser bear the costs arising from the unjustified defect rectification request (particularly examination and transport costs), unless the Purchaser could not have been aware that the defect rectification was unnecessary.

10.3. If rectification of the defect has failed, the purchaser shall be entitled to request a reduction in the purchase price (abatement) or to withdraw from the contract. Rectification shall be deemed to have failed after the second vain attempt, unless further attempts are reasonable in view of the object of the contract and can be reasonably imposed on the purchaser.

10.4. The purchaser's right to put forward further claims for damages shall remain unaffected by this.

10.5. The purchaser's warranty claims shall be subject to a time limit of 12 months from the delivery of the goods to the purchaser, unless we have fraudulently concealed the defect. In this case, the legal regulations shall apply.

10.6. The purchaser's claims for damages shall be subject to a time limit of 12 months from the delivery of the goods. This does not apply if we, our legal representatives or other vicarious agents are responsible for death, personal injury or physical harm, or if we or our legal representatives have been grossly negligent, or if our vicarious agents have acted with intent.

10.7. Contractual penalties which have been agreed between our customers and their customers cannot be imposed upon us unless we have been notified of them and have agreed to them in writing prior to accepting an order.

10.8. If it becomes apparent (by the opening of an application for an insolvency procedure for example) after the conclusion of the contract that our claims to the purchase price are endangered due to lacking payment capacities of the Purchaser, we will then be entitled to refuse the delivery and – after a possible period of notice – to withdraw from the contract in accordance with the legal provisions (§ 321 of the German Civil Code). For contracts about the manufacturing of specific items (making to specification), we can declare the withdrawal immediately; the legal regulations about the dispensability of giving a period of notice remain unaffected.

11. Withdrawal

When delivery in accordance with the contract is not possible for reasons beyond our control, we are entitled to withdraw from the contract. Such withdrawal shall not entitle the purchaser to assert any right against us.

12. Export clause

We are not obliged to reimburse damages arising from delays in delivery or it being completely impossible to deliver as a result of statutory or official export restrictions, unless we act with intent or gross negligence suffered by the Customer or other persons. The Customer's duty to pay the agreed remuneration shall not be affected by disruptions in our performance as a result of export restrictions. We shall be entitled to withdraw from the contract if, after the contract is signed, our performance is disrupted as a result of export restrictions.

13. Place of performance and jurisdiction, applicable law

13.1. The place of performance and the place of venue for deliveries and payments and for any litigation arising between us and the purchaser shall be the headquarters of our company.

13.2. The relationship between the contractual parties shall be regulated solely in accordance with the law in force in the Federal Republic of Germany. The regulations of international uniform law, particularly the UN CISG, shall not apply.

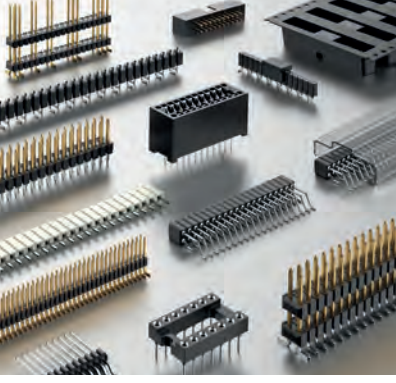
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Fischer Elektronik GmbH & Co. KG

Nottebohmstraße 28 · 58511 Lüdenscheid

GERMANY

Phone +49 2351 435-0

Fax +49 2351 45754

info@fischerelektronik.de

www.fischerelektronik.de/en

