



# PIEPLow & BRANDT

## Product Catalog

## Your partner for surface treatment

We support and supply the optical and glass processing industry with our products since 1963. Our main fields are:

- Fine- and precision optics
- Flat glass processing
- Electronics and semiconductor industry
- Ophthalmic lens industry
- Metal and ceramic processing

The following pages will give you an overview of our high-quality products.

You prefer a permanent contact person and personal customer support?

Our sales team is available to answer all your questions about surface treatment. Together we will develop individual and optimal solutions to support and/or optimize your processes.

## Your direct link to our sales team

### Robert Schwartz

Telefon: +49 (41 93) 88 0 84 13

Robert.Schwartz@Pieplow-Brandt.com

### André Meins

Telefon: +49 (41 93) 88 0 84 11

Andre.Meins@Pieplow-Brandt.com





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## ABRASIVES

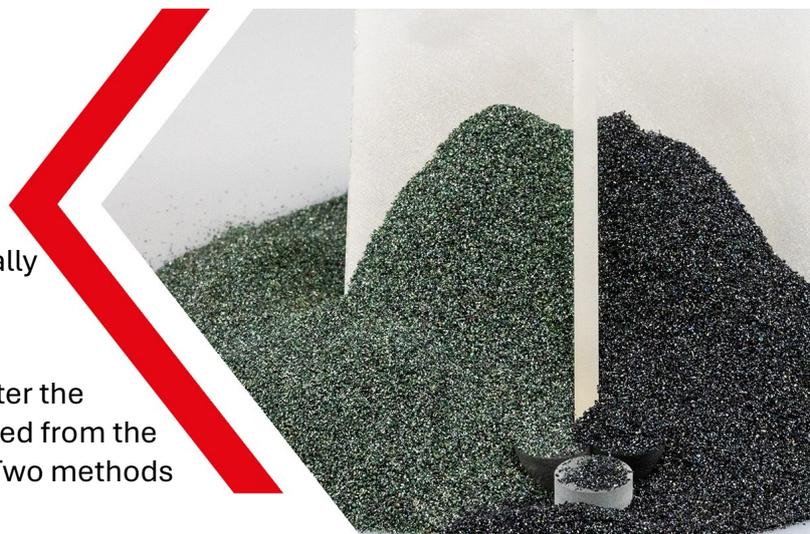
- SILICON CARBIDE
- ABRALOX
- Microgrit WCA
- PLAKOR
- BORON CARBIDE



## SILICON CARBIDE BW+ SILICON CARBIDE GW+

Silicon Carbide is one of the group of carbides associated chemical compound made of silicon and carbon. It is a hard, sharp-edged material, which consists of sand and coal made in electrically heated furnaces at 2.400°C.

The porosity of silicon carbide is increased by the addition of saw chips during the firing process. After the firing process is completed, the material is removed from the ovens in large chunks, ground up and classified. Two methods are used for classification:



Grading by means of vibratory sifter = MACRO GRAIN

Grading by means of sedimentation = MICRO GRAIN

Finally, the Silicon Carbide is subjected to a chemical treatment in order to obtain the highest level of purity. Our silicon carbide is available in two different qualities:

- Silicon Carbide BW+ (black)
- Silicon Carbide GW+ (green)

### Available Grain Sizes

Macro Grain		Micro Grain	
F60	260 µm	F230	53 ± 3 µm
F80	185 µm	F240	44,5 ± 2 µm
F100	129 µm	F280	36,5 ± 1,5 µm
F120	109 µm	F320	29,2 ± 1,5 µm
F150	82 µm	F360	22,8 ± 1,5 µm
F180	69 µm	F400	17,3 ± 1 µm
F220	58 µm	F500	12,8 ± 1 µm
		F600	9,3 ± 1 µm
		F800	6,5 ± 1 µm
		F1000	4,5 ± 0,5 µm
		F1200	3,0 ± 0,5 µm

## Technical Data

Silicon Carbide BW+		Silicon Carbide GW+	
Color:	black	Color:	green
Knoop hardness:	2.300	Knoop hardness:	2.450
Mohs hardness:	9	Mohs hardness:	9
Spec. gravity:	3,20 g / cm <sup>3</sup>	Spec. gravity:	3,20 g / cm <sup>3</sup>
Shape:	friable with sharp edges	Shape:	friable with sharp edges

## Chemical Analysis

Silicon Carbide BW+		Silicon Carbide GW+	
SiC:	98,60 %	SiC:	99,00 %
SiO <sub>2</sub> :	0,25 %	SiO <sub>2</sub> :	0,34 %
Si:	0,15 %	Si:	0,27 %
Fe <sub>2</sub> O <sub>3</sub> :	0,05 %	Fe <sub>2</sub> O <sub>3</sub> :	0,05 %
C:	0,15 %	Al:	0,04 %
		C:	0,30 %

## Application

Our SILICON CARBIDE is primarily used for lapping applications of glass, metals and ceramics, as well as for sawing oscillating crystals.

Other possible uses are as a component for abrasives on various substrates, in grinding wheels, grinding pastes or in refractory materials.

## Packing

25 kg carton

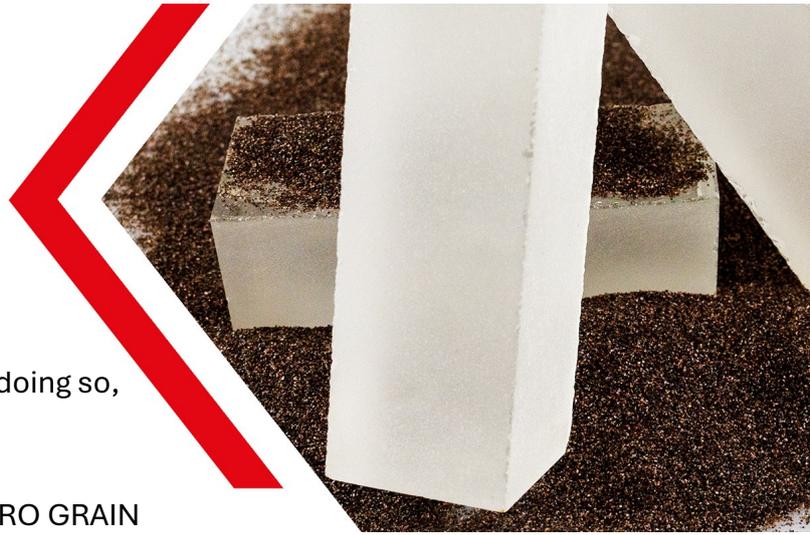
1 kg plastic bag

## ABRALOX

The essential raw material for our ABRALOX aluminum oxide (normal corundum) is a mixture of gibbsite, boehmite and diaspore and some other iron oxides.

The Bayer process results from these materials Aluminum hydroxide. In big pressure vessels, the water is removed from the material. The resulting aluminum oxide is then ground and classified. In doing so, two different methods are being used:

- grading by means of vibratory sifter = MACRO GRAIN
- grading by means of sedimentation = MICRO GRAIN



Different follow-up treatments, e.g. removing of iron particles by magnets, calcinating etc., make different grades available for applications.

- ABRALOX E
- ABRALOX Optical Grade

ABRALOX Optical Grade is produced in accordance with F.E.P.A. available in following grains:

Macro Grain		Micro Grain	
F60	260 µm	F230	53 ± 3 µm
F80	185 µm	F240	44,5 ± 2 µm
F100	129 µm	F280	36,5 ± 1,5 µm
F120	109 µm	F320	29,2 ± 1,5 µm
F150	82 µm	F360	22,8 ± 1,5 µm
F180	69 µm	F400	17,3 ± 1 µm
F220	58 µm	F500	12,8 ± 1 µm
		F600	9,3 ± 1 µm
		F800	6,5 ± 1 µm
		F1000	4,5 ± 0,5 µm
		F1200	3,0 ± 0,5 µm

## Technical Data

ABRALOX E	ABRALOX Optical Grade
Aluminium oxide powder (Al <sub>2</sub> O <sub>3</sub> ) Color: brown PH-value: 7,5-10 Mohs hardness: 9,0 Knoop hardness: 2090 Spec. gravity : 3,92 Particle shape: blocky, sharp-edged	Aluminium oxide powder (Al <sub>2</sub> O <sub>3</sub> ) Color: brown PH value: 7,5-10 Mohs hardness: 9,0 Knoop hardness: 2090 Spec. gravity : 3,84 Particle shape: blocky

ABRALOX E	ABRALOX Optical Grade
Al <sub>2</sub> O <sub>3</sub> : 95,96 % TiO <sub>2</sub> : 2,50 % SiO <sub>2</sub> : 0,85 % Fe <sub>2</sub> O <sub>3</sub> : 0,20 % Other oxides: 0,40 %	Al <sub>2</sub> O <sub>3</sub> : 96,00 % TiO <sub>2</sub> : 3,00 % SiO <sub>2</sub> : 0,54 % Fe <sub>2</sub> O <sub>3</sub> : 0,17 % ZrO <sub>2</sub> : 0,18 % CaO: 0,11 %

## Chemical Analysis

## Application

Abralox is being used primarily for lapping applications of glass, crystals, as well as various metals and ceramics. Other possible uses are as a component for abrasives on various substrates, in grinding wheels, grinding pastes or in refractory materials.

## Packing

25 kg cardboard box

1 kg plastic bag

## MICROGRIT WCA

The Microgrit WCA is a Aluminum oxide abrasive with special flat grain shape. It was particularly developed for critical surface processing applications.

Microgrit WCA stands out from the rest conventional abrasives with a higher removal rate, a significantly better surface quality and a long service life.

The production of Microgrit WCA is subject to the strictest quality controls. Permanent analysis during the production process and the outgoing inspection ensure that the quality is within very narrow tolerances. In this way, a product is created that meets the highest standards.

In addition to the regular untreated version, Microgrit WCA is also available with a "Suspension Treatment", which has a positive effect on the settling behavior when used in water- or oil-based suspensions.



### Available Types and Grain Sizes

Type	94% min	D50-value	3% max
WCA 1	0,21	1,77-2,25	6,23
WCA 3	0,25	2,97-3,85	9,52
WCA 5	0,54	3,72-4,74	11,40
WCA 9	1,36	5,60-6,75	13,47
WCA 12	1,90	7,05-8,50	17,60
WCA 15	3,96	9,06-11,13	21,36
WCA 20	4,76	12,40-14,66	30,11
WCA 25	7,37	16,92-20,60	41,00
WCA 30	10,30	23,67-27,45	52,77
WCA 40	13,65	31,70-37,60	62,30
WCA 50	16,12	42,81-52,50	102,00

Technical Data	Chemical Analysis
Aluminium oxide powder (Al <sub>2</sub> O <sub>3</sub> )	Al <sub>2</sub> O <sub>3</sub> 99,60 %
Color: white (fine corundum)	SiO <sub>2</sub> 0,02 %
PH value: 8,5	Fe <sub>2</sub> O <sub>3</sub> 0,03 %
Mohs hardness: 9,0	Na <sub>2</sub> O 0,40 %
Spez. gravity: 3,8	CaO 0,05 %
L.O.I: < 0,35	
Crystal structure: hexagonal platelet-shaped grains)	

## Application

Microgrit WCA is used as a preliminary and fine grinding agent in precision optics, laser optics, in the mirror industry, in the processing of spectacle lenses and the surface treatment of a wide variety of ceramics and crystals. Alternative applications are the sawing of oscillating crystals, the deburring, lapping and polishing of various metals as well as the use in semiconductor and silicon processing.

## Packing

20 kg carton

1 kg carton

## PLAKOR

PLAKOR is an aluminum oxide powder. Each Plakor particle is a discrete crystal of alumina having a purity of over 99%. Plakor crystal have a smooth surface and a distinctive platelet shape with an aspect ratio of 5:1.

Each Plakor particle has an exceptional resistance to fracturing which gives it an unparalleled advantage over typical fused aluminium oxides.

Uniform size and quality of particle integrity prevent random scratching or damage to the workpiece. PLAKOR is manufactured in a time proven high tech process that offers performance, dependability and consistency. This hydraulic process offers one of the most repeatable batch to batch consistencies in the abrasive industry.



### Available Types and Grains

In addition to the regular untreated version, PLAKOR is also available with a "Suspension Treatment", which has a positive effect on the settling behavior when used in water- or oil-based suspensions.

Type	94% Min	D50-Wert	3% Max
PLAKOR 3	0,5	3,5-5,5	12
PLAKOR 6	1,5	5,8-7,8	14
PLAKOR 9	2,5	8,5-11	24
PLAKOR 12	4,0	12,5-15,5	26,5
PLAKOR 15	6,5	16,5-19	34,5
PLAKOR 20	7,5	22,5-25,5	53,5
PLAKOR 25	9,5	26,0-30,0	60,0
PLAKOR 30	10,5	30,5-38,5	63,5
PLAKOR 40	15,5	41,5-53,5	103

Technica Data		Chemical Analysis	
Aluminium oxide powder (Al <sub>2</sub> O <sub>3</sub> )		Al <sub>2</sub> O <sub>3</sub>	99,20 %
Color:	white	SiO <sub>2</sub>	0,03 %
PH value:	7,5-10	Fe <sub>2</sub> O <sub>3</sub>	0,02 %
Mohs hardness:	9,0	Na <sub>2</sub> O	0,60 %
Knoop hardness:	1800-2200	CaO	0,05 %
Spec. gravity :	3,95		
L.O.I.:	< 3,5		
Particle shape:	disc-like		

## Advantages of using Plakor

PLAKOR is used in the surface treatment of optical glasses, fused silica as well as various of hard crystals and metals. It can also be used in piezo electronics and in the processing of semiconductor materials.

The platelet crystal shape causes orientation parallel to the lapping plate and the work surface; pressure is thereby distributed uniformly over a larger surface of the abrasives and work surface. This allows for more stock removal and less subsurface damage as well as prolonged abrasive life.

## Application in Surface Finishing

- Precision Optics
- Piezo-Electronics
- Precision Bearings
- Minerals
- Optical Glass - Quartz
- Semiconductor Materials
- Buffing Compounds
- Ferrous & Non ferrous Metals
- Germanium
- Gallium Arsenide
- Stainless Steels

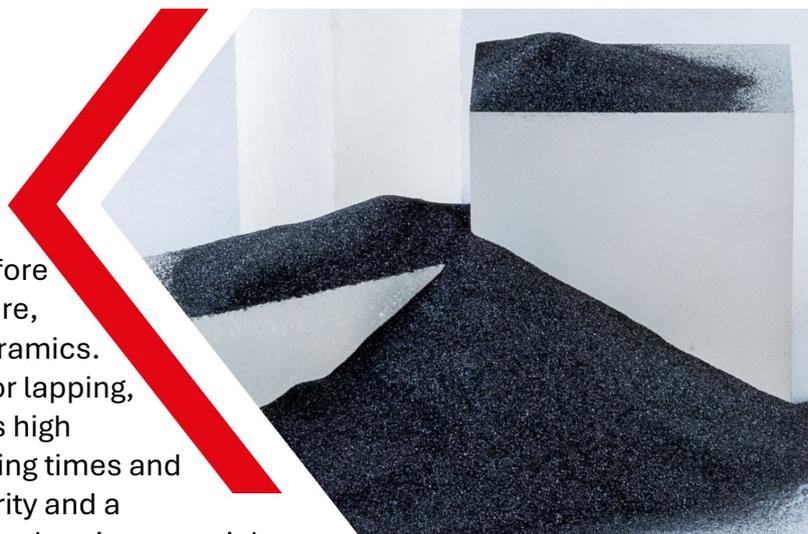
## Packing

- 25 kg carton
- 1 kg plastic bag

## BORON CARBIDE

Boron carbide is a non-oxide ceramic which hardness and durability roughly compared to diamond.

Boron carbide has a slightly higher hardness compared to silicon carbide and is suitable therefore for processing very hard materials such as sapphire, hard metals, synthetic gemstones and various ceramics. As a loose grain, boron carbide is typically used for lapping, drilling and sawing applications and excels by its high removal rate which corresponds to short processing times and a particularly long service life. Due to the high purity and a narrow particle size distribution, boron carbide as a lapping material enables a high and a constant surface quality.



### Available grain sizes

Macro Grain		Micro Grain	
F60	260 µm	F230	53 ± 3 µm
F80	185 µm	F240	44,5 ± 2 µm
F100	129 µm	F280	36,5 ± 1,5 µm
F120	109 µm	F320	29,2 ± 1,5 µm
F150	82 µm	F360	22,8 ± 1,5 µm
F180	69 µm	F400	17,3 ± 1 µm
F220	58 µm	F500	12,8 ± 1 µm
		F600	9,3 ± 1 µm
		F800	6,5 ± 1 µm
		F1000	4,5 ± 0,5 µm
		F1200	3,0 ± 0,5 µm

### Packing

20 kg carton

1 kg plastic bag



## POLISHING COMPOUND - CERIUM OXIDE

- SUPOSIL FP-Series
- SUPOSIL OV-Series
- SUPOSIL OF-Series
- CEROX 1650/ 1663
- SUPOSIL SR
- SUPOSIL Polishing Slurries
- Opaline
- CERI APC-10 ST
- SUPOSIL Nano Polish



## SUPOSIL FP-K / FP-F

The products of the SUPOSIL FP series are our latest polishing compounds for bevel and edge processing.

These white polishing powders based on cerium oxide are suitable for the use with spiral wheels made of synthetic felt. Even at very high polishing speeds, SUPOSIL FP series does not result in any loss of quality.

Both polishing compounds provide very good suspension behaviour and can be further customised if required. Both the machine as well as the processed product, can be easily cleaned afterwards.



### Technical Data

SUPOSIL FP-K		SUPOSIL FP-F	
TREO:	at least 60 %	TREO:	at least 99 %
Density:	1,1 - 1,5 g / cm <sup>3</sup>	Density:	1,1 - 1,5 g / cm <sup>3</sup>
Average Grain Size:	2,5 µm (± 0,4 µm) Sedigraph	Average Grain Size:	2,5 µm (± 0,4 µm) Sedigraph
PH-value:	6,5 (± 1)	PH value:	6,5 (± 1)
Colour:	white	Colour:	white

### Recommended Suspension Thickness

Edge polishing: recommended suspension thickness : 30 – 55 g/l.  
(3-5° Baumé)

Polishing straight facets: recommended suspension thickness : 30 – 55 g/l.  
(3-5° Baumé)

The optimum values must be determined empirically in each case under operating conditions.

### Packing

25 kg carton (small quantities on request)

## SUPOSIL OV 60 / OV 70 / OV 80 / OV 90

The cerium oxide based polishing powders of our Suposil OV series are suitable for a variety of different applications and processes. They can be used in both brush and circulating lubrication.

SUPOSIL OV 60, 70 and 80 are suitable for use as pre- and fine polishing agents in micro, plan and round optics.

SUPOSIL OV 90 was developed for processing with particularly high pressure for pre- and final polishing.

Depending on the application all Suposil OV products can be used in connection with our polishing pitches, polishing felts and polyurethane polishing pads of the LP and FP series.



### Technical Data

	SUPOSIL OV 60	SUPOSIL OV 70	SUPOSIL OV 80	SUPOSIL OV 90
<b>TREO</b>	> 60 %	> 70 %	> 80 %	> 90 %
<b>Average Grain Size</b>	2,0 µm (± 0,4 µm)	1,55 µm (± 0,4 µm)	1,55 µm (± 0,4 µm)	1,3 µm (± 0,4 µm)
<b>PH value</b>	7,5 (± 1)	7,5 (± 1)	7,5 (± 1)	7,5 (± 1)

### Recommended Suspension Thickness

When using polishing compounds in precision optics, we recommend a starting concentration of 40 -100 g / litre (circulation system) or 150-250 g / litre (brush lubrication).

The optimum values must be determined empirically under operating conditions.

### Packing

25 kg carton (small quantities on request)

## SUPOSIL OF 90 / OF 95

The high-purity cerium oxide polishing compounds of the SUPOSIL OF series can be used for fine processing of glass, crystals and ceramic components.

SUPOSIL OF 90 / OF 95 is mainly used in micro-, precision and laser optics. Both products can be applied by brush lubrication as well as in circulation systems.

Depending on the application SUPOSIL OF 90 / OF 95 can be used in combination with our polishing pitches, polishing felts and polyurethane polishing pads of the LP and FP series.



### Technical Data

	SUPOSIL OF 90	SUPOSIL OF 95
<b>TREO</b>	> 95 %	> 99 %
<b>Average Grain Size</b>	0,80 µm (± 0,2 µm)	0,40 µm (± 0,2 µm)
<b>PH value</b>	7,5 (± 1)	7,5 (± 1)

### Recommended suspension thickness

When using polishing agents in precision optics, we recommend a starting concentration of 40-100 g / litre (circulation system) or 150-250 g / litre (brush lubrication). The optimum values must be determined empirically under operating conditions.

### Packing

25 kg carton (small quantities on request)

## CEROX 1650 / 1663

Cerox 1650 / 1663 are cerium oxide polishing compounds in powder form. It has particularly been developed to achieve a very good surface quality by using high polishing rates.

These polishing compounds are very well suited for pre- as well as fine polishing for micro-, plan- and round optic applications.

Cerox 1650 / 1663 can be used on synchro speed polishing machines and polishing machines with circulating systems.

It is characterized by good settling properties, a long service life and a high degree of cleanliness. Depending on the application all Cerox products can be used in conjunction with our polishing pitches, polishing felts and polyurethane polishing pads of the LP and FP series.



### Technical Information

CEROX 1650		CEROX 1663	
TREO:	over 90 %	TREO:	over 90 %
Average particle size $d_{50}$ :	1 - 2 $\mu\text{m}$	Average particle size $d_{50}$ :	1 - 2 $\mu\text{m}$
PH-value:	7 - 8	PH-value:	7 - 8
Color:	white	Color:	white
Without settling agents		With settling agents	

### Recommended Concentration

Brush lubrication: as required  
 Circulation system: 50 - 100 g / l

The optimal values shall be found experientially during operating conditions

### Packing

20 kg carton (small quantities on request)

## OPALINE

OPALINE is a high purity cerium oxide polishing compound. It was developed specifically for fine polishing applications in the micro, plan and round optics of both, hard and soft glasses, fused silica, glass ceramics and certain crystals.

OPALINE is suitable for the circulation systems as well as brush lubrication. To improve the settling behaviour we recommend EVERFLO suspension treatment for using in circulation systems.

Depending on the application Opaline can be used in combination with our polishing pitches, polishing felts and polyurethane polishing pads of the LP and FP series.



### Technical Information

TREO:	≥ 99 %
CeO <sub>2</sub> /TREO:	≥ 99 %
Average particle size d <sub>50</sub> :	0,5 - 1,0 μm
PH-value of the aqueous suspension:	7 - 8
Color:	white

### Recommended Concentration

Brush lubrication:	as required
Circulation system:	50 - 100 g / l

The optimal values shall be found experientially during operating conditions.

### Packing

20 kg pail

## CERI APC 10-ST

CERI APC-10 ST is a high-purity cerium oxide polishing agent in powder form. It can be used for fine polishing applications of hard glass, various crystals and ceramics. The main areas of application are precision, laser and micro optics.

APC 10-ST can be used with brush lubrication as well as in circulation systems.

Depending on the application of APC 10-ST we recommend our polishing pitches, polishing felts and polyurethane polishing pads of the LP and FP series for best results.



## Technical Information

TREO:	minimum 99 %
CeO <sub>2</sub> / TREO:	minimum 99 %
Average size, d <sub>50</sub> :	< 1,0 µm
pH-value:	5 - 6
Color:	white

## Recommended Concentration

Brush lubrication:	150 - 250 g / l
Circulation system:	50 - 100 g / l

The optimal values shall be found experientially during operating conditions

## Packing

25 kg pail

## SUPOSIL POLISHING SLURRY

Our water-based SUPOSIL polishing slurries based on cerium oxide have been especially developed for the use in fine- and precision optics.

The SUPOSIL polishing dispersions fulfill the highest demands on surface quality and have unique characteristics for a wide range of applications in the optical field. SUPOSIL polishing slurries are supplied as premixed ready-to-use polishing dispersion.

Depending on the application the SUPOSIL Polishing slurries can be used in conjunction with our polishing pitches, polishing felts and polyurethane polishing pads of the LP and FP series.



### Technical Data

	SUPOSIL 500	SUPOSIL 750	SUPOSIL 900
<b>TREO</b>	99%	99%	99%
<b>D50 value</b>	0,50 µm	0,75 µm	0,90 µm
<b>D90 value</b>	< 3,50 µm	< 5,00 µm	< 6,00 µm
<b>PH value</b>	7 - 9	7 - 9	7 - 9
<b>Colour</b>	white	white	white

### Recommended Concentration

If necessary, the slurry can be further diluted with very soft water or deionised water.

The optimum values must be determined empirically under operating conditions.

### Packing

1 gallon

4 gallons per carton

## SUPOSIL VP

SUPOSIL VP is a water-based polishing slurry based on cerium oxide, which was specially developed for the pre-polishing process in fine and precision optics.

With its high removal rate, our SUPOSIL VP polishing slurry fulfill highest standards of cleanliness and has very good properties for a wide range of applications in optical processing.



### Technical Data

Percentage cerium oxide:	> 85 %
Total share of rare earth elements:	> 95 %
Average single grain size:	2,50 µm (Malvern Mastersizer 3000)
Max. Grain size (90% smaller than:)	< 8,0 µm
PH - level:	7 - 9
Colour:	brown

### Recommended Concentration

The slurry has a solid content of approx. 40 percent. Depending on the application we recommend a dilution. The optimum values must be determined empirically under operating conditions.

### Packing

- 1 gallon
- 4 gallons per carton

## SUPOSIL MP

SUPOSIL MP is a water-based polishing slurry based on cerium oxide that has been specially developed for the pre-polishing and fine polishing process in fine and precision optics.

SUPOSIL MP polishing slurry meets highest standards of cleanliness and has excellent properties for a wide range of applications in optical processing.



### Technical Data

Percentage cerium oxide:	> 90 %
Total share of rare earth elements:	> 95 %
Average single grain size:	1,30 $\mu\text{m}$ (Malvern Mastersizer 3000)
Max. Grain size (90% smaller than:)	< 5,0 $\mu\text{m}$
PH - level:	7 - 9
Colour:	white

### Recommended Concentration

The slurry has a solid content of approx. 40 %. Depending on the application we recommend a dilution. The optimum values must be determined empirically under operating conditions.

### Packing

1 gallon  
4 gallons per carton

## SUPOSIL FP

SUPOSIL FP is a water-based polishing slurry based on cerium oxide that has been specially developed for the fine polishing process in fine and precision optics.

SUPOSIL FP polishing slurry meets the highest standards of cleanliness and has unique properties for a wide range of applications in optical precision processing.



### Technical Data

Percentage cerium oxide:	> 99 %
Total share of rare earth elements:	> 99 %
Average single grain size:	0,50 µm (Malvern Mastersizer 3000)
Max. Grain size (90% smaller than:)	< 4,0 µm
PH - level:	7 - 9
Colour:	white

### Recommended Concentration

The slurry has a solid content of approx. 40 %. Depending on the application we recommend a dilution. The optimum values must be determined empirically under operating conditions.

### Packing

- 1 gallon
- 4 gallons per carton

## SUPOSIL Nano Polish

SUPOSIL Nano Polish is a nanostructured finish polishing agent in dispersed form.

It is characterised by a high degree of purity and a small grain size. The use on optical glass and on all related substrates enables very low surface roughness.

Recommended applications includes the processing of photomasks, lithography, semiconductor industry and precision optics.

Advantages of using the SUPOSIL Nano polishing dispersion is consistent quality due to strictly controlled grain distribution curves, no formation of agglomerates, high chemical purity and reproducible removal rates.



### Technical Data

TREO:	>99,90%
Average grain size:	50 - 60 nm/ 100 - 120 nm (d50)
pH value:	7-8
Color:	weiß

### Recommended Suspension Thickness

Suposil Nano Polish is adjusted read for use and is available in 2, 4, 5 or 10 %.

If necessary the ready-to-use slurry can be further diluted with deionised water.

The ideal concentration must be determined empirically under operating conditions.

### Packing

- 1 litre plastic can
- 5 litre plastic can
- 25 litre canister



## POLISHING COMPOUND - ALUMINUM OXIDE

- SEPP H-12 Polishing Powder
- SEPP Polishing Powder
- ALUPOX Polishing Slurry
- ALUPOX H-12 Polishing Slurry



## SEPP H-12 POLISHING POWDER

SEPP H-12 is a highly pure, nano-structured  $\alpha$ -aluminum oxide that can be easily dispersed in water without foaming.

The special structure of the secondary particles in SEPP H-12, combined with the small size of the primary particles, enables high removal rates and results in very high surface qualities at the end of the polishing process.

Possible fields of application are the processing of infrared optics, silicon carbide, silicon, germanium, cadmium sulphite, single crystal materials, fiber optics, aluminium, lead, copper and various metals and alloys.



### Technical Data

Crystalline phase:	Alpha
Hardness according to Mohs:	9
PH-value (in dist. water):	~ 4 - 5
Crystal size:	10 – 120 nm
D50-value:	~ 190 nm (dispersed in a water, 20 sec. ultrasonic)
D90-value:	~ 450 nm (dispersed in a water, 20 sec. ultrasonic)

### Typical Chemical Analysis

Aluminum oxide:	> 99,90 %	Sodium:	< 0,050 %
Iron :	< 0,013 %	Silicon:	< 0,010 %
Calcium:	< 20 ppm	Magnesium:	< 20 ppm
Calium:	< 30 ppm	Heavy Metals:	< 30 ppm

### Packing

1 kg plastic bag  
5 kg plastic bag  
20 kg carton

## SEPP POLISHING POWDER

Our aluminium oxide series SEPP for precision polishing has a very high purity (min. 99.98% aluminium oxide).

By changing the parameters during the calcination process well-graded alpha and gamma products are achieved. It has proved to be an advantage that, compared to other products, the SEPP series is free of agglomerates. In case of existing agglomerates after calcinations the SEPP products undergo a special treatment resulting in a very high purity and a controlled particle size distribution.

Our SEPP aluminium oxide series particularly meets the requirements for high-grade surface polishing. The properties of the particles, the high grade of de-agglomeration and the special strictly controlled hardness provide a surface free of any scratches.

Aluminium oxides of the SEPP series can be applied among others for: infra-red optics (silicon, germanium, cadmium sulphide), single-crystal materials, fibre optics, smooth materials (aluminium, lead, copper), hard-metal alloys, cast-iron, alloys, ferrites, precision ball bearings.



### Technical Data

Type	SEPP 0.05	SEPP 0.3	SEPP 1.0
Grain shape	Cubic	Hexagonal	Hexagonal
Crystalline phase	Gamma	Alpha	Alpha
Hardness according to Mohs	8	9	9
PH - Value	7-8	7-8	7-8
D20 - Value (Sedigraph)	0,1 µm	0,2 µm	0,35 µm
D50 - Value (Sedigraph)	0,3 µm	0,4 µm	0,6 µm
D90 - Value (Sedigraph)	0,8 µm	1 µm	1,4 µm

## Typical Chemical Analysis

**SEPP** polishing powders are available in different grades of purity, grain shapes and hardnesses. Our standard product contains 99.98% aluminium oxide. The following impurities can occur:

Element	Content in ppm	Element	Content in ppm
Fe	2	K	22
Na	13	Ca	3
Si	13	Mg, Ti, Cr, Mn	< 1
Ni, Cu, Zn	< 1		

If higher purity is requested please contact us.

## Packing

1 kg pack  
5 kg pack  
20 kg carton

## ALUPOX POLISHING SLURRIES

The polishing slurries of the Alupox series are high-purity  $\alpha$ -aluminum oxide, available in various grain sizes.

Alupox products are used for a wide range of different applications where high demands are required in terms of cleanliness and surface quality.

The single slurries differ only in the grain size. The ready-to-use slurry can be further diluted with soft or distilled water if necessary. For optimum polishing results, a dilution of 1:5 should not be exceeded.



### Technical Data

Characteristics:	white slurry
Crystal phase:	Alpha
Mohs Hardness:	9
PH - value (in dist. water):	approx. 6 - 8
D50 - value:	0,05, 0,3, 0,5, 1,0, 2,0, 4,0, 6,0, 8,0 $\mu\text{m}$
Recommended polishing pads:	POLYCON 100, SYNTEX 65, VELVETEEN, Polishing Pitch

### Typical Chemical Analysis

Aluminum oxide:	> 99,90 %	Calcium	< 20 ppm
Sodium:	< 0,050 %	Magnesium:	< 20 ppm
Iron	< 0,010 %	Potassium:	< 20 ppm
Silicon:	< 0,010 %	Heavy Metals:	< 15 ppm

### Packing

- 1 kg plastic can
- 5 kg plastic can

## ALUPOX H-12 POLISHING SLURRY

Alupox H-12 is a high-purity, nano-structured  $\alpha$ -alumina suspension. Alupox products are always used when the highest demands on cleanliness and surface quality are required.

The ready-to-use polishing suspension can optionally be further diluted with soft water or with demineralized water. For optimal polishing results, a dilution of 1: 5 should not be exceeded.

Our precision aluminum oxide polishing suspensions from the Alupox range are extremely well suited for polishing where the highest quality is important. Areas of application in which our precision aluminum oxide suspensions are being used: metal processing (aluminum, stainless steels aso.), infrared optics, (silicon, germanium, cadmium sulfide, zinc sulfide, barium fluoride etc.), fiber optics, sapphire processing, ceramic and glass ceramic processing, plastics (PMMA, PC, ACRYL) and paints



### Technical Data

Characteristics	white slurry
Crystal:	Alpha
Mohs hardness:	9
PH - value (in dest. water):	~ 4 - 6
Crystal size:	10 – 150 nm
Particle size distribution dispersed in water	(x-Ray disc centrifuge): (20 sec. ultrasonic):
d50:	0,2 – 0,35 $\mu\text{m}$
d90:	< 4 $\mu\text{m}$
recommended polishing pad:	Polycon 100, Syntex 65, Velveteen, polishing pitch

### Packaging

- 1 kg plastic can
- 5 kg plastic can



## POLISHING COMPOUND - CMP

- COSISOL PB-Series
- SEPP PSA



## CosiSol PB-25 / PB-75 POLISHING SLURRY

CosiSol PB-25 / PB-75 are colloidal silicon dioxide polishing dispersions, developed for processing of crystals where highest surface qualities are required. This is achieved by the good physical characteristics of the base particles, such as low friability, high density and high surface expansion.

Due to the high solid content this product can be diluted many times over.

With the ever-growing market for crystal processing this polishing agent offers the next generation of processing for particularly demanding materials.

CosiSol PB-25 / PB-75 were developed to ensure particularly high removal rates on substrates made of sapphire, YAG crystals, silicon carbides and other hard as well as soft materials.

Due to the long service life of this product, the high removal rates and the polishing results are consistent over many polishing cycles and offer a controlled and cost-effective polishing process.



### Technical Data

PB-25		PB-75	
Colloidal silicon dioxide polishing suspension		Colloidal silicon dioxide polishing suspension	
Average grain size:	25 nm	Average grain size:	75 nm
Solids content:	40 %	Solids content:	50 %
PH value:	8,8 - 9,5	PH value:	9,8 - 10,5

### Recommendation for use:

For diluting of the dispersion only high-quality deionized water should be used.

To achieve optimal results, we recommend stirring the diluted slurry for approx. 10 - 20 minutes before use in order to obtain a polishing dispersion that is as homogeneous as possible.

To avoid the formation of scratches, the ready-mixed slurry should be filtered regularly.  
The ideal storage temperature is between 10°C and 25°C.

Recommended polish carriers are polyurethanes and synthetic felts from our C series.

## **Packaging**

1 gallon

4 gallons in a carton

## SEPP PSA POLISHING SLURRY

SEPP PSA is a ready-to-use colloidal aluminium oxide slurry, specially developed for the processing of sapphire (C-Plane) and YAG crystals. SEPP PSA is characterised compared to other colloidal silica products by an up to 4-times higher removal rate.

The significantly improved settling behaviour and the higher viscosity of the new formulation also allow it to be used in double-sided polishing processes. In addition to its use in sapphire processing, SEPP PSA is also suitable for pre-polishing and fine polishing of hard crystals such as Yttrium Aluminium Garnet (YAG), silicon carbide and various single-crystal materials, fibre optics, hard metal alloys and ceramics.



### Technical Data

Characteristics:	white dispersion
Crystalline phase:	alpha
Hardness according to Mohs:	9
pH - level (in distilled water):	12 – 13,0
Average grain size (d50)	0,20 – 0,35 µm

The SEPP PSA is a ready to use slurry which doesn't have to be diluted however for certain application it can be further diluted down to 1:3 (the ideal dilution should be optimised for each individual process)

Surface quality achievable:	0,15 - 0,30 nm
Recommended polish carrier:	polyurethane, Polycon 100 synthetic felt SF-5 C-45 or C-90

### Packaging

- 1 kg plastic can
- 5 kg plastic can
- 25 kg plastic container



## POLISHING PADS

- Polyurethane foils, LP Series
- Polyurethane foils, FP Series
- SYNTEX, VELVETEEN
- POLYCON
- Synthetic Felt SF-5
- Natural Felt



## POLYURETHANE, LP SERIES

Polishing pads made of LP polyurethane are ideal for polishing of optical components, spectacle lenses and other crystals and ceramics.

The material is characterised by its porous microcellular structure consisting of millions of pores. Some of the following types are impregnated with zirconium or cerium oxide.

However, polishing applications cannot be done without the use of polishing compounds made of zirconium oxide, aluminum oxide or cerium oxide for surface finishing.

For fine grinding applications with silicon carbide, aluminium oxide or MICROGRIT WCA/PLAKOR we recommend to use only unfilled polyurethanes.



### Available Types

Type	Filler	Specific weight / ft <sup>3</sup>	Hardness according to Durometer
LP-13	cerium oxide	19 - 22 lb.	16
LP-26	zirconium oxide	30 - 42 lb.	37
GR-35	zirconium oxide	34 - 42 lb.	37
LP-46	zirconium oxide	20 - 30 lb.	25
LP-57	unfilled	30 - 40 lb.	35
LP-66	cerium oxide	22 - 32 lb.	25
LP-77	cerium oxide	22 - 32 lb.	25
LP-87	unfilled	46 - 53 lb.	47
LP-88	cerium oxide	65 - 75 lb.	65

(Other types upon request)

## Application

Polishing pads made of polyurethane lead to a considerable reduction of polishing times. High temperatures and rotational speeds does not pose a particular challenge for the material. The material is characterised by a service life that is about ten times longer compared to polishing pitches and other polish carriers. External influences such as temperature or moisture have no effect on the polishing film. Softening of the material occurs in water or at temperatures above 121 °C.

We recommend our Tizon Polishing Pad Adhesive for attaching the polishing layer to the tool carrier. Alternatively, the material can also be supplied with a self-adhesive, magnetic or stainless steel backside.

When applying to tool carriers with a radius, we recommend heating the carrier beforehand and cutting the film slightly according to the curvature so that the material adheres more easily. Our polishing films can also be customised in various flower patterns (convex/concave) for the use with larger radii and polishing trays.

With conventional machines at 300 rpm, a pressure of approx. 13-14 kp / cm<sup>2</sup> is specified for each lens. If you now increase the speed to 600 rpm and maintain the pressure at 13-14 kg/cm<sup>2</sup>, you only gain approx. 5 % of the polishing time. However, if the speed is increased to 850 rpm and the pressure to 25 kp / cm<sup>2</sup>, the polishing time is reduced by approx. 50 %. To achieve ideal results with polyurethane, it is recommended to increase the pressure at higher speeds.

## Dimensions and Thicknesses

Polyurethane is available as a standard sheets of 580 mm x 1400 mm and as discs. The standard diameters are: 4', 6', 8', 10', 12', 14', 16', 18', 20' and 24'.

The standard thicknesses are:

**plain and PS:** 0,51 mm 0,81 mm 1,02 mm 1,27 mm 1,52 mm 2,03 mm 2,54 mm  
3,18 mm

**Plain only:** 3,81 mm 3,96 mm 4,06 mm 4,75 mm 6,35 mm 9,53 mm 12,7 mm  
25,4 mm (not all types are available in 25.4 mm)

## POLYURETHANE, FP SERIES

Polishing pads made of FP polyurethane are a good alternative to the already available LP polishing types. They can be used as well for polishing of optical components such as spectacle lenses and other crystals and ceramics.

The material is also characterised by its porous microcellular structure consisting of millions of pores. Some of the following types are impregnated with cerium oxide and some are unfilled.

However, polishing applications cannot be done without the use of polishing compounds made of zirconium oxide, cerium oxide or aluminum oxide for surface finishing. For fine grinding applications with silicon carbide, aluminium oxide or MICROGRIT WCA slurries we recommend to use only unfilled polyurethanes.



### Available Types

Type	Filler	Density	Hardness by Durometer
FPC 40	Ceriumoxyd	0,40	A 80
FPC 45	Ceriumoxyd	0,45	A 80
FPC 50	Ceriumoxyd	0,55	A 90
FPC 60	Ceriumoxyd	0,67	A 92
FPU 55	unfilled	0,55	A 95
FPU 60	unfilled	0,60	D 55

(Other types on request)

### Dimensions and Thicknesses

The FP series polishing pads are available in a wide range of different dimensions (sheets and discs) and thicknesses. On request, all polishing films can be provided with a self-adhesive backing and different grooves.

## SYNTEX/VELVETEEN

Syntex polishing pads are used for a wide range of different polishing applications. They consist of a synthetic fiber cloths and are available with and without a self-adhesive backing.

Velveteen polishing cloths consist of a flocked material, which is mainly used for ultra-fine polishing and for the production of spectacle lenses. Like our Syntex polishing pads, Velveteen is also available in a self-adhesive version and without adhesive backing.

Both polishing cloths can be used in conjunction with cerium oxide, aluminum oxide, and diamond slurries. They are ideal for polishing various types of glass and plastics as well as different metal and steel alloys.



Type	SYNTEX 65 NE	SYNTEX 65 BD
Thickness without adhesive backing	0,50 mm	0,70 mm
Thickness with adhesive backing	0,85 mm	1,0 mm

Type	Velveteen blue
Thickness without adhesive backing	1,00 mm
Thickness with adhesive backing	1,20 mm

(Further types on request)

### Available Dimensions

Syntex and Velveteen polishing cloths are available in sheets (640 x 960 mm) and in discs with a diameter up to 36“.

### Packing

1 sheet  
10 discs

## POLYCON

With the POLYCON polishing cloths, we have added a series of well-matched black polishing cloths, specially designed for pre-, and final polishing for critical surface finishing application.

POLYCON 100 is suitable for a wide range of application such as semiconductor substrates (silicon, silicon carbide, galliumarsenide, GGG, lithium carbonate, artificial sapphire, ...), photomasks, optical glass for liquid crystals, various metals and ceramics.

POLYCON 205P can also be used in the processing of memory plates made of aluminium and nickel substrates.



### Available Types

POLYCON 80/100	POLYCON 205P (grooved)
For the final polish application Available hardness grade: A Available in thickness: 0.81mm, 1.27mm	For pre- and final polishing application Available hardness grade: A Available in thickness: 1.27mm
Sold per meter, width approx.: POLYCON 100: 1,380 mm POLYCON 80: 500 mm in sheets: POLYCON 100: 1,380 x 1,000 mm (Plain + PS) POLYCON 80: 1.000 x 500 mm (Plain + PS) in discs available in various diameters	Sold in sheets: POLYCON 205P: 1.380 x 1.000 mm (Plain + PS) in discs available in various diameters

### Packing

1 sheet  
10 discs

## SYNTHETIC FELT SF-5

Increasing automation in the polishing process, as well as stricter quality controls, have raised the need for more efficient polishing tools. The polishing materials of type SF-5 fulfil the risen requirements.

The products of the SF-5 series consist of a synthetic fibre matrix impregnated with synthetic resin. The structure of the material is designed in such a way that a certain pore structure ensures that lubricants, grinding oils and abrasives as well as the polishing agents are absorbed.

Using SF-5 synthetic felt improves your productivity: The material has an excellent service life, which is longer compared to natural-based felt products.



### Technical Data

Natural felt products are subject to relatively large fluctuations. The synthetic felts type SF-5 have a comparatively narrower classification as far as the available densities and hardnesses are concerned.

Density and hardness are determined by the strength of the fibre used and the degree of impregnation. Fibre thickness and degree of impregnation have a significant influence on the polishing behaviour and overall result. The following versions are available:

<b>B-Grade (fine fibres)</b>	B-25 very soft	B-45 soft	B-60 medium	B-75 medium
<b>C-Grade</b>	C-35 very soft	C-45 soft	C-60 medium	C-90 hard
<b>D-Grade (coarse fibres)</b>	D-45 medium	D-60 medium	D-75 hard	D-90 hard

### Dimensions and thicknesses

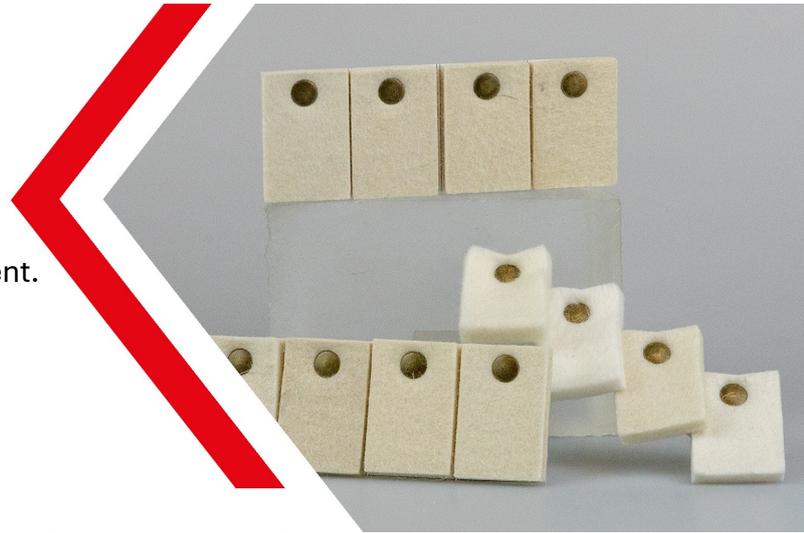
SF-5 is available in the form of sheets, discs, rings, segments and tools. The available dimensions vary depending on the selected type.

## NATURAL FELT

According to DIN 61205, fulled felts are "surfaces and body structures made of feltable fibres to which other fibres can be mixed in".

They consist of nonwoven fibres that solidify through by moisture, heat, pressure and movement.

The main component of "fulled felt" is wool.



### Available Hardness and Thickness

The felt is categorised into a specific hardness group in accordance with DIN 61200.

The following hardnesses are available:

- specific weight 0,52
- specific weight 0,56
- specific weight 0,60
- specific weight 0,68
- specific weight 0,75

Usually, the natural felts have a thickness of between 3 mm - 15 mm (depending on the type).

### Packing

Available in sheets, dimensions of approx. 1,200 mm x 600 mm (deviations possible)

Available in discs, dimensions of 5 - 40"

The specific weight is calculated using the formula:  $\text{g/cm}^2$  - weight in kg = specific weight x thickness in mm.



## **POLISHING PITCH**

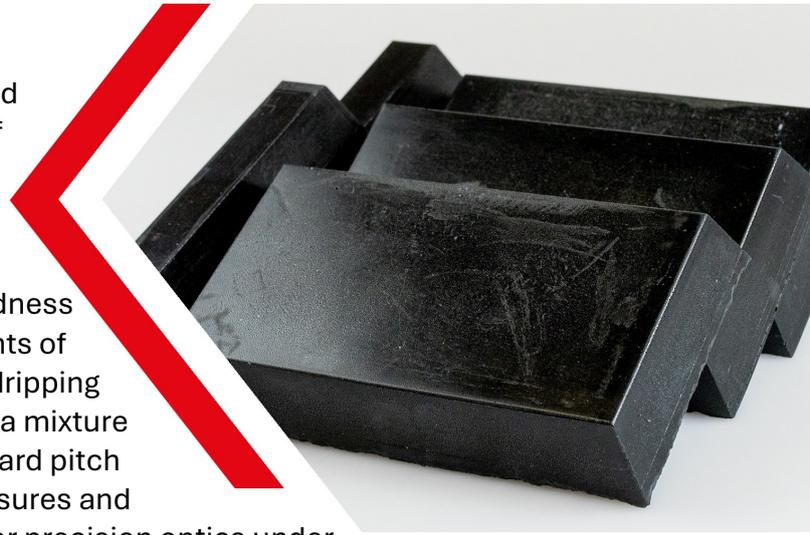
- Polishing Pitch
- GUGOLZ Polishing Pitch



## POLISHING PITCH

Our polishing pitches are special mixtures of wood pitches in various degrees of viscosity (degrees of hardness), which are applied to a polishing tool as a polishing agent carrier in the high-performance optics manufacturing.

Depending on the composition all degrees of hardness can be set from very soft to very hard, in increments of 1°. The polishing pitches are applied by pouring, dripping or melting onto a polishing dish in pure form or in a mixture with reinforcing agents (wood flour, felt flakes). Hard pitch types are suitable for pre-polishing at higher pressures and rotational speeds, while the soft types are used for precision optics under gentle working conditions.



### Technical Data

Standard Hardness <sup>1</sup>	Soft	Medium	Hard
	23	32	42
Further Hardness Grades	17, 18, 19, 20, 21, 22	24, 25, 26, 27, 28, 29, 30, 31	33, 34, 35, 36, 37, 38, 39, 40, 41, 43
Solubility	acetone		

<sup>1</sup> According to the former CZ standard, hardness is defined as the temperature at which a needle with a base area of 1 mm<sup>2</sup> penetrates 2 mm deep in 10 seconds under a load of 1 kg/10N.

### Packing

Plate shapes                    85 x 25 x 160 mm  
 aluminium trays            22 x 12,8 x 3,3 cm

## GUGOLZ POLISHING PITCH

GUGOLZ polishing pitches are special mixtures of natural resins and bitumen, which are applied to a polishing tool as a polishing agent carrier used in high-performance optics manufacturing.

GUGOLZ polishing pitches are available in five different viscosity grades (degrees of hardness). These polishing pitches are applied by pouring, dripping or melting onto a polishing dish in pure form or mixed with enhancers (wood flour, felt flakes, polishing powder).

Hard pitch types and those with intensifiers are suitable for pre-polishing at higher pressures and rotational speeds, while the soft types are used for precision optics under gentle working conditions.



### Technical data

Default Hardness	Soft	Medium	Hard
	55	64, 73	82, 91
Solubility	Aceton		

### Packing

1 kg cardboard drum





## DIAMOND PRODUCTS

- Lapping and Polishing Films
- Diamond Slurries and Pastes
- Diamonpowder
- Diamond Saw Blades, Diamond Drills
- Dressing and Sharpening Tools
- Diamantpellets
- SurLap Läpping Pad



## LAPPING AND POLISHING FILM

Lapping and polishing films were developed as an alternative to conventional lapping and grinding processes in order to achieve the best possible results in terms of material removal rate and surface quality.

This enables a simple, clean and efficient grinding process. Our lapping and polishing films are available in various carrier media, grain sizes and dimensions for a wide variety of applications.

The lapping and polishing films are suitable for the surface treatment of mounted and unmounted glass fibers as well as for chamfering of glass or certain crystals. It can be used on all conventional polishing and lapping machines and are optionally available with or without an adhesive backing.



### Technical Data

Available layer: diamond, aluminum oxide, silicon carbide

Available dimensions: disc size 1"- 16", "  
sheet size up to 400 x 400mm

Available grit sizes: diamond: 0,5, 1, 3, 5, 9 $\mu$ m  
aluminum oxide: 5, 10, 20 $\mu$ m  
silicon carbide: 5, 15, 30 $\mu$ m  
(other grit sizes on request)

coolant: water, coolant concentrate 0.5-1,0%

### Packing

10 pcs

100 pcs

## DIAMOND SLURRIES

Our diamond slurries of types PE and PO are suitable for demanding, high-precision lapping and polishing applications. Due to the typical characteristics of the material, such as extreme hardness, very high thermal conductivity, the very low coefficient of friction and high electrical resistance our diamond slurries are suitable for a wide range of applications in surface treatment.

Specific cleaning processes and quality checks guarantee a high product purity and reliable, consistent application results.

Our diamond slurries are available ready for use in oil-based (PO) and ethylene glycol (PE)-based form.

The high stability of polycrystalline diamond allows a working pressure that is around three times higher compared to monocrystalline diamond, resulting in a significantly increased material removal rate.

The surface's micro-rough finish enables very short processing times to be realised even when polishing at low pressure.

In addition to the processing of zinc selenide, zinc sulphide, germanium, silicon, calcium fluoride and magnesium fluoride, our diamond slurries can also be used in various other processes related to glass, metal, crystal and ceramic processing. Depending on the material to be processed, our polishing pitches, polyurethane pads of the LP and FP series and synthetic felts from the C-grade series are suitable as polishing carriers.



### Available Concentrations

Our PE and PO diamond slurries are available in 2 different concentrations:

medium	PE-S / PO-S
high	PE-H / PO-H

### Packing

1 litre plastic bottle

5 litre plastic can

## DIAMOND POWDER

Diamond powders are suitable for demanding high precision lapping and polishing tasks of various materials. Significant advantages of using diamond powder are the extreme hardness of the particles, high thermal conductivity, high electrical resistance and the low coefficient of friction.

Specific grinding and cleaning processes during the manufacturing process guarantee a consistently and reliably high product purity.

Diamond powders can be used in crystal, metal, ceramic and glass processing and cover a wide range of different applications.



### Available Qualities

Natural diamond - This is a diamond micropowder that is obtained from natural diamonds and is preferably used in the manufacture of electroplated diamond tools.

Monocrystalline industrial diamond - (single crystal) can be produced synthetically in large quantities and is widely used in industrial technology in many grinding, lapping and polishing processes. The diamond has a monocrystalline lattice structure, the slip planes are orientated parallel to the optical axis. Under pressure, the monocrystalline diamond grain breaks along the parallel split lines.

Polycrystalline diamond - (multicrystal) is composed of a large number of tiny diamond grains. Under load, small corners and edges break out of the diamond grain so that new, sharp cutting edges are constantly created (self-sharpening effect). This enables high removal rates in combination with very fine surfaces. Polycrystalline diamond powder is suitable for machining particularly very hard materials such as ceramics, sapphire or hard metals.

## Available grain sizes

Grain size	D50 value (in $\mu\text{m}$ )	D95 value (in $\mu\text{m}$ )
0-0.10	0.040 - 0.060	0.15
0-0.15	0.060 - 0.090	0.20
0-0.20	0.070 - 0.110	0.25
0-0.25	0.105 - 0.145	0.33
0.25-0.5	0.310 - 0.390	0.70
0.25-0.75	0.450 - 0.550	0.90
0.5-1.00	0.650 - 0.770	1.30
0.75-1.25	0.950 - 1.050	1.70
1.00-2.00	1.350 - 1.490	2.30
1.50-2.50	1.900 - 2.100	3.00
1.50-3.00	2.270 - 2.510	3.50
2.25-3.5	2.700 - 2.980	4.10
3.00-5.00	3.820 - 4.220	5.80
6-10	7.700 - 8.500	10.9
8-12	9.120 - 10.08	12.9
20-30	23.70 - 26.30	32.5

(Other grain sizes on request)

## Packing

50 ct.

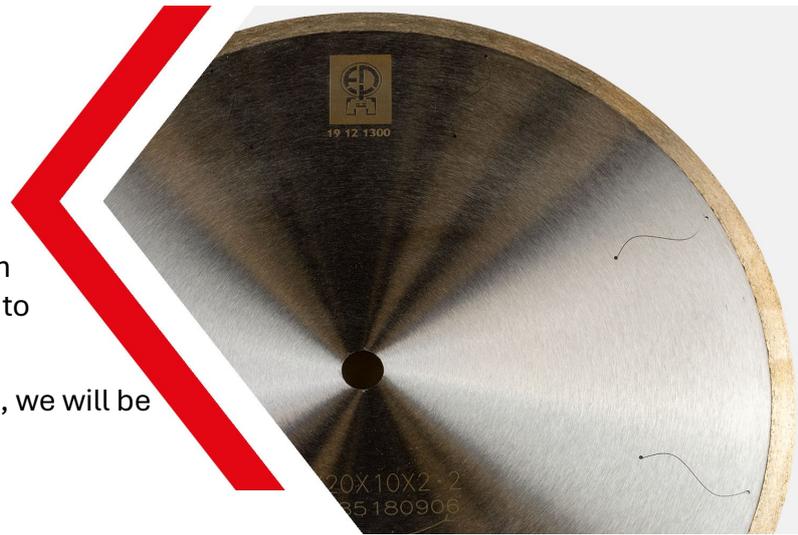
100 ct.

## DIAMOND SAW BLADES

Our diamond saw blades are suitable for cutting various types of glass, ceramics, crystals and gemstones and are available either with closed or segmented bonding types.

Depending on the type of material and application we can offer you individual solutions customised to your specifications.

If you need assistance with the selection of a tool, we will be happy to help you.



## DIAMOND DRILLS

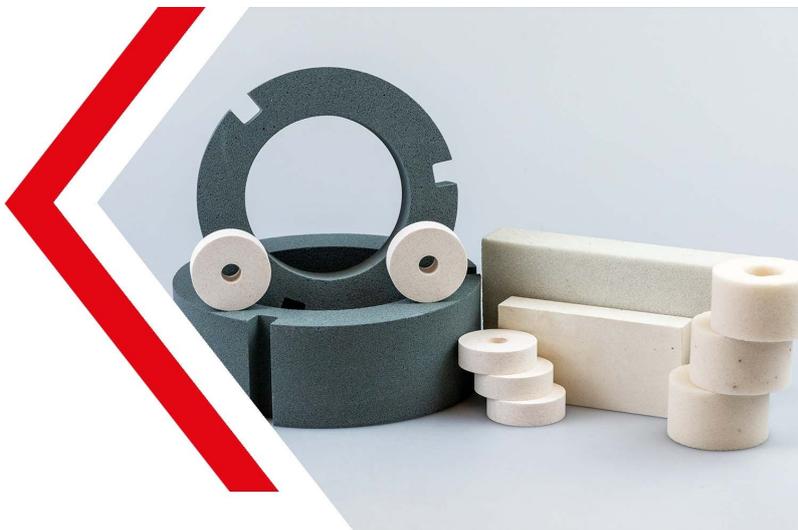
Diamond drills are suitable for the conventional processing of glass, ceramics or crystals. In addition to the usual standard dimensions, we also support our customers in the construction of individual tools according to customised specifications, adapted to the respective applications and materials to be machined.

Our drill bits have a standard length of 75/95 mm and a cutting depth of 25 mm. Other lengths and other cutting depths are available upon request. The thickness of the drill bit is 1 mm and has a grain size of 181 µm. Other specifications are available by enquiry.



## DRESSING AND SHARPENING TOOLS

Our sharpening tools made of silicon carbide or aluminium oxide are suitable for dressing and sharpening a wide variety of diamond and CBN wheels. All sharpening rings and dressing stones can be customised to your individual dimensions and specifications.



## DIAMOND PELLETS

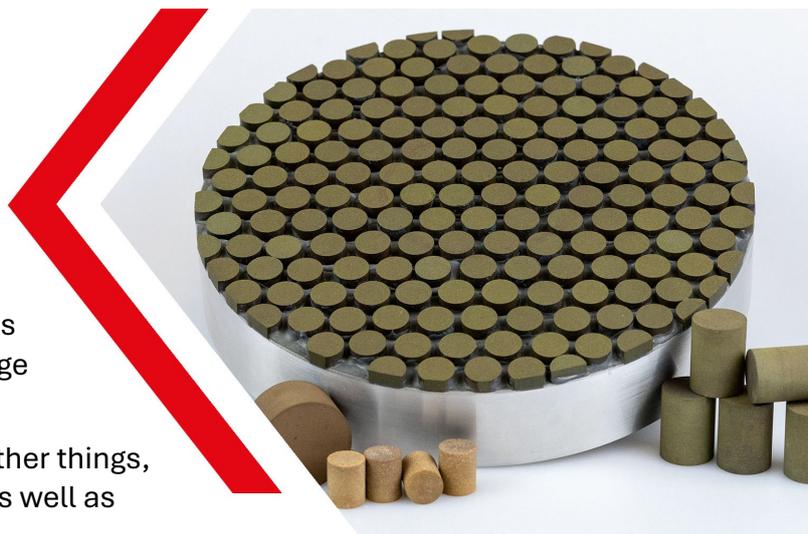
Diamond pellets have established themselves in the fine processing of surfaces compared to conventional machining with loose grit.

These tools are characterised by high material removal rates at low pressure and long tool life.

They enable gentle processing of various materials with very little subsurface damage and reduce edge chipping significantly.

Our diamond pellet tools are suitable, amongst other things, for processing various types of glass and metal, as well as ceramics.

We recommend our TC-13 RS and TC 950 cooling lubricant as an ideal solution, depending on which type of diamond pellet bond is being used.



### Available Types, Diameters and Concentrations

Depending on the application, our diamond pellet discs are available with a synthetic resin, metal, ceramic or hybrid bond.

Diameter:	4 mm to 36 mm
Thickness:	2 mm to 30 mm
Grain sizes:	2 $\mu\text{m}$ to 525 $\mu\text{m}$ (others upon request)
Standard concentrations:	C35 to C100
Shapes:	round, square, hexagonal

## Technical Data

Approximate removal rate of the tools (synthetic resin bond) on various materials (single-sided machining)

<u>Pellet type</u>	<u>Float glass</u>	<u>Float glass</u>
	<u>Ablation rate (in <math>\mu\text{m}/\text{min}</math>)</u>	<u>Average surface roughness Ra (<math>\mu\text{m}</math>)</u>
DM-100	1000	0,60 - 0,80
DM-50	600	0,40 - 0,50
DM-28	180	0,30 - 0,35
DM-20	120	0,20 - 0,25
DM-10	15	0,05 - 0,10
DM-7	7	0,05

<u>Pellet type</u>	<u>N-BK7</u>	<u>N-BK-7</u>
	<u>Ablation rate (in <math>\mu\text{m}/\text{min}</math>)</u>	<u>Average surface roughness Ra (<math>\mu\text{m}</math>)</u>
DM-100	1000	0,60 - 0,80
DM-50	600	0,40 - 0,50
DM-28	180	0,10 - 0,20
DM-20	120	0,07 - 0,10
DM-10	15	0,04 - 0,05
DM-7	7	0,03

<u>Pellet type</u>	<u>Quartz glass</u>	<u>Quartz glass</u>
	<u>Ablation rate (in <math>\mu\text{m}/\text{min}</math>)</u>	<u>Average surface roughness Ra (<math>\mu\text{m}</math>)</u>
DM-100	1000	0,60 - 0,80
DM-50	600	0,40 - 0,50
DM-28	180	0,10 - 0,15
DM-20	120	0,04 - 0,06

Our tools are distinguished by a special resin bond. They enable gentle processing of various materials. The process therefore offers clear advantages over conventional grinding with metal-bonded tools or lapping with loose grain. It enables an environmentally friendly process, as the cooling lubricant used is pure water with a biodegradable cooling lubricant concentrate of only 1.5 %. Cleaning the parts after processing is completely unproblematic.

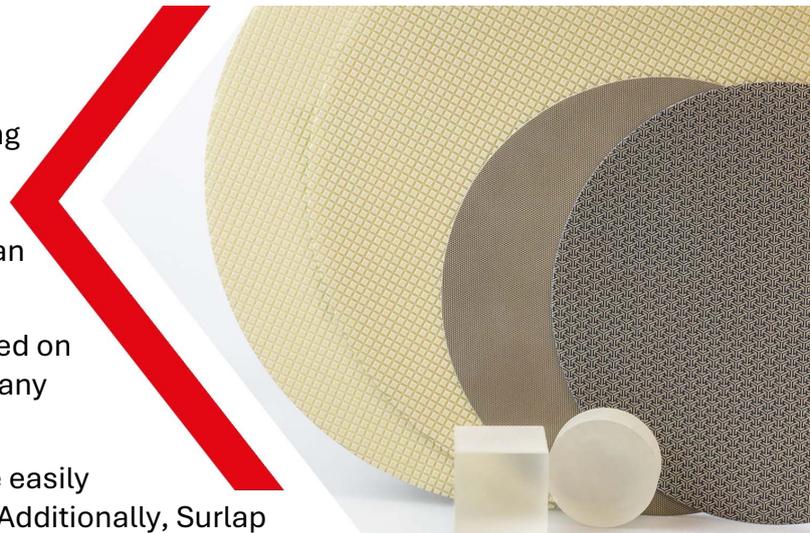
## SURLAP LAPPING PADS

Introducing the Surlap diamond lapping pad, a revolutionary alternative to conventional grinding and lapping processes. Surlap lapping pads are designed to deliver superior results in both removal rates and surface quality, ensuring a clean and efficient grinding process.

Their versatile compatibility allows them to be used on existing grinding and polishing machines without any modifications, providing a seamless transition.

With a strong adhesive backside, the pads can be easily attached to any lapping and polishing machines. Additionally, Surlap lapping pads can be used for a wide range of applications, making them ideal for processing surfaces of various materials, including metals, ceramics, optical glass, and crystals.

Upgrade your grinding and lapping processes with Surlap and experience the difference in your surface processing tasks.



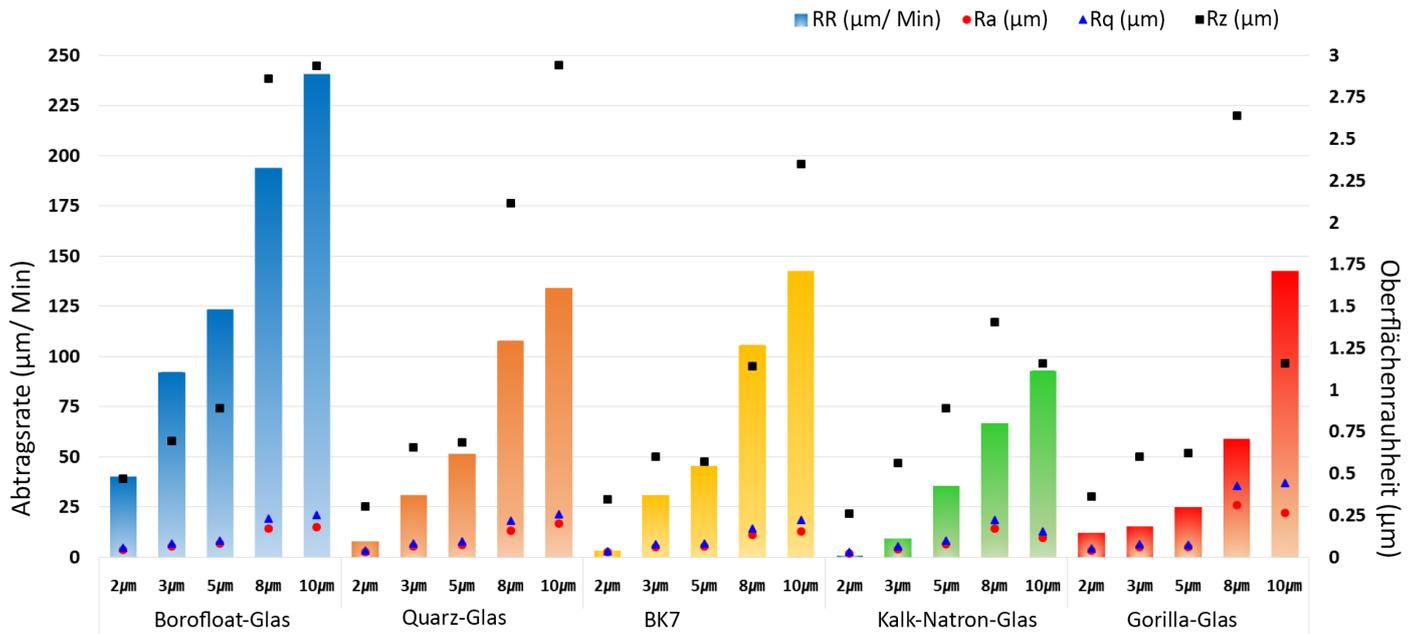
### Technical Data

	Resin Bond	Metal Bond
<b>Available Diameter</b>	200/ 250/ 300/ 350/ 400 mm Other diameters from 4" - 48" on request.	200/ 250/ 300/ 350/ 400mm other diameters available on request.
<b>Available Grain Size</b>	1 / 3/ 5/ 9/ 10/ 15/ 30/ 45/ 64/ 125 µm other particle sizes available on request.	3/ 9/ 20/ 40/ 74/ 125 µm other particle sizes available on request.
<b>Cooling Lubricant</b>	recommended coolant lubricant: TC13-RS	

### Packing

1 pcs.  
10 pcs

## Removal rates - Resin bond



Substrat	Borofloat-Glas				Quartz-glass			
	RR (µm)	Ra (µm)	RQ (µm)	Rz (µm)	RR (µm)	Ra (µm)	RQ (µm)	Rz (µm)
2µm	40.18	0.042	0.056	0.467	7.91	0.029	0.038	0.301
3µm	92.32	0.062	0.081	0.696	30.95	0.063	0.081	0.657
5µm	123.45	0.08	0.098	0.891	51.43	0.073	0.094	0.684
8µm	193.92	0.171	0.23	2.862	107.767	0.156	0.217	2.115
10µm	240.73	0.181	0.252	2.937	134.187	0.2	0.257	2.941
	BK7				Soda-lime glass			
2µm	3.34	0.032	0.033	0.347	0.826	0.023	0.03	0.261
3µm	30.746	0.059	0.077	0.599	9.253	0.048	0.064	0.561
5µm	45.31	0.064	0.082	0.569	35.51	0.076	0.096	0.888
8µm	105.6	0.131	0.171	1.139	66.72	0.172	0.22	1.405
10µm	142.413	0.155	0.223	2.348	93.046	0.117	0.152	1.156
	Gorilla Glass				Testing conditions			
2µm	12.18	0.362	0.051	0.362	Pressure: 0.40 kgf/cm <sup>2</sup> (2nd pressure)			
3µm	15.29	0.599	0.075	0.599	(2.5kg kgf/cm <sup>2</sup> 3rd pressure)			
5µm	24.89	0.622	0.074	0.622	bei 50 U/ min			
8µm	59.03	2.639	0.425	2.639	Downforce pressure: 2.1 kgf/cm <sup>2</sup> bei 30 U/ min			
10µm	60.57	1.156	0.442	1.156	Processing time: 3 Minuten			
					24°C temperature, 3% solution coolant			



## **BLOCKING PITCHES**

- Raw Materials
- MKS Cementing Foil
- Synthetic Resin MKS
- Synthetic Resin CK
- Rosin based Blocking Pitches
- Shellac based Blocking Pitches
- Wax based Blocking Pitches



## RAW MATERIALS

### Colophonium

Balsam resin, type WW

Available as flaked (flakes) and chopped (chunks)

Melting temperature: 72° - 82°C

Available in 25 kg bags, other quantities on request.

### Beeswax

Purified quality

Melting temperature: 65° - 70°C

Available in 25 kg bags, other quantities on request.

### Flake shellac

Flake shellac is a hard natural resin with higher internal elasticity. Decolourised and dewaxed qualities are available. Toxicologically and physiologically harmless.

Melting temperature: 65° - 85°C

Available in 25 kg bags or in 1 kg plastic bags (other quantities on request).

### Paraffin wax

White wax distilled from mineral oil, solid at 20°C, liquid above the solidification point.

Solidification point: 53° - 55°C

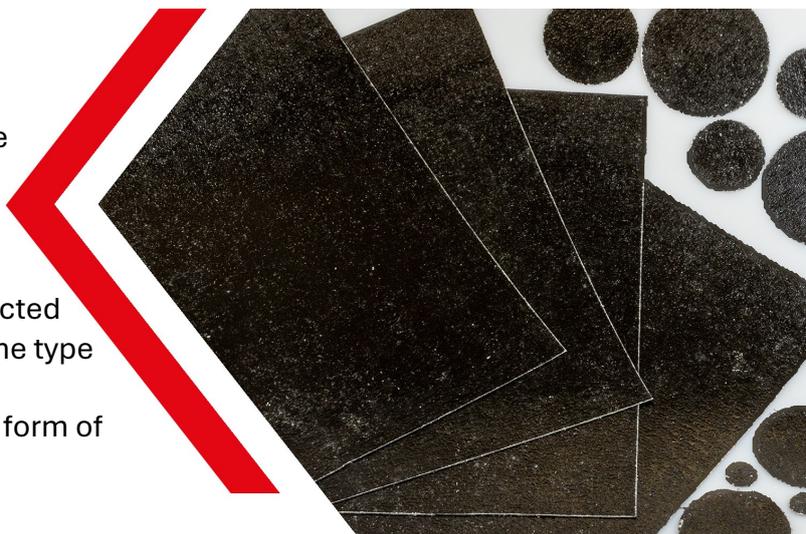
Available in aluminium trays Dimensions: 22 x 12.8 x 3.3 cm.



## MKS CEMENTING FOIL

MKS cementing foil consists of a special fabric impregnated with melting adhesive and is suitable for the low-tension bonding of lenses, prisms and other optical components onto carrier elements for surface treatment.

Surfaces that have already been treated are protected from damage by the mastic layer. Depending on the type of optical components to be processed, the MKS cementing foil is available per meter, per roll or in form of round discs.



### Technical Data

Hardness (1):	39 ± 1
Solubility (3):	A, S
Durability:	resistant to parex and petroleum
Used material:	Special fabric, black
Fabric thickness:	0,25 ± 0,05mm
Total thickness of the cementing foil:	0,60 mm ± 0,15 mm / 0,80 ± 0,15 mm
Processing temperature in °C:	80 – 100

### Packing

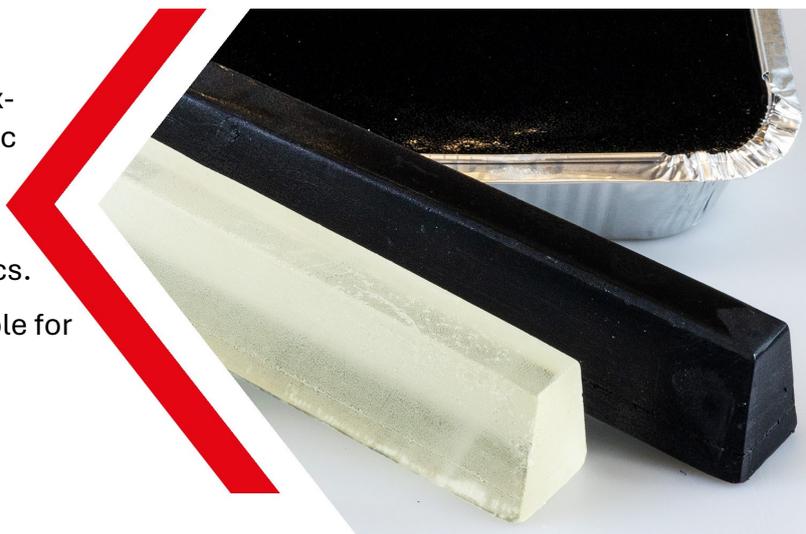
On 15 m or 25 m roll, approx. 500 mm wide  
As cementing pads in diameters from 7 - 457 mm

## SYNTHETIC RESIN TYPE MKS

The MKS synthetic resin is a petroleum- and parex-resistant blocking pitch based on various synthetic resins.

MKS is a universal adhesive that can be used for a variety of applications in fine and precision optics.

Due to its low acid content, the MKS is also suitable for use with fog-sensitive glasses.



### Technical Data

Type	Hardness	Softening Point in °C	Solubility	Specific Characteristics
MKS black or colorless	36 ± 1 39 ± 1 42 ± 1	66 68 70	Acetone, Ethanol	Resistant to Parex, Petroleum and coolant concentrates

### Please Note

MKS blocking pitch should always be processed under a fume hood, as unpleasant smelling vapors are generated during production-related heating.

Prolonged heating above 180°C should be avoided, otherwise thermal decomposition may occur.

### Packing

Sticks	25 x 25 x 160 mm
Bars	85 x 25 x 160 mm
Aluminum trays	128 x 33 x 220 mm

Other dimensions on request.

## SYNTHETIC RESIN ADHESIVE CK

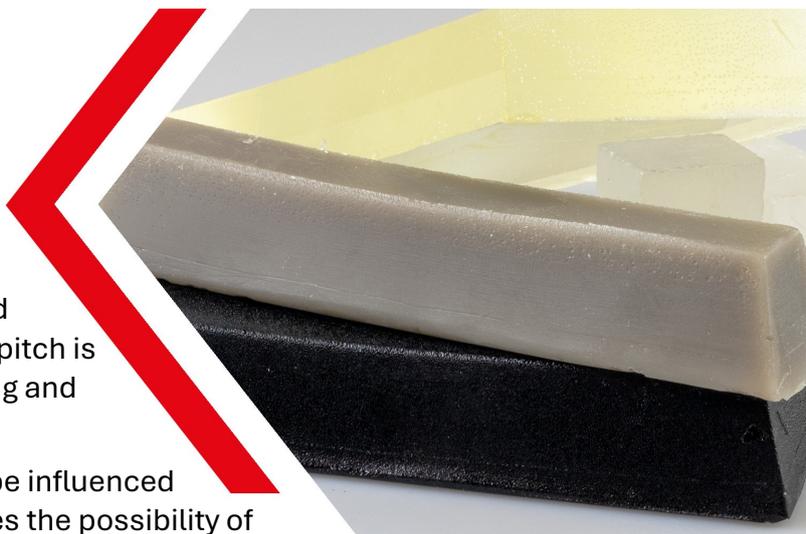
The synthetic resin adhesive of the CK blocking pitches are designed for low-tension bonding of various materials to be used wherever high adhesive strength is required.

They are resistant to acidic and alkaline grinding and polishing suspensions as well as water-based and mineral cutting oils. The unfilled CK blocking pitch is also used for holding workpieces for superfinishing and for CNC applications.

The internal strength of the blocking pitches can be influenced by the choice of the filler. This significantly reduces the possibility of the cemented parts shifting when the temperature increases during the machining process. By using a filler with a low expansion coefficient, it is possible to achieve absolutely low-tension bonding.

These blocking pitches are also suitable for use in ceramic and wafer processing. Due to their chemical composition, they are also appropriate for fog-sensitive glasses.

Another advantage of these synthetic adhesives is that they can be removed without leaving any residues within a very short time.



### Technical Data

Type	Hardness	Softening Point in °C	Solubility	Specific Characteristics
CK	36 ± 1 39 ± 1 41 ± 1	66 68 70	acetone alcohol	For ceramic and wafer processing, also available coloured in black.
CK 2	36 ± 1 39 ± 1 41 ± 1	68 70 72		For absolutely low-tension bonding of optics. Filler: firm
CK 4/5	36 ± 1 39 ± 1 41 ± 1	66 68 70		For absolutely tension-free bonding of optics. Filler: soft

## Important Note

Blocking pitches of type CK should always be processed under an extractor hood, as unpleasant-odored vapours are produced during production-related heating. Avoid prolonged heating above 180°C, as otherwise thermal decomposition may occur.

CK blocking pitches can only be used once.

## Packing

Sticks	25 x 25 x 160 mm
Bars	85 x 25 x 160 mm
Aluminium trays	128 x 33 x 220 mm

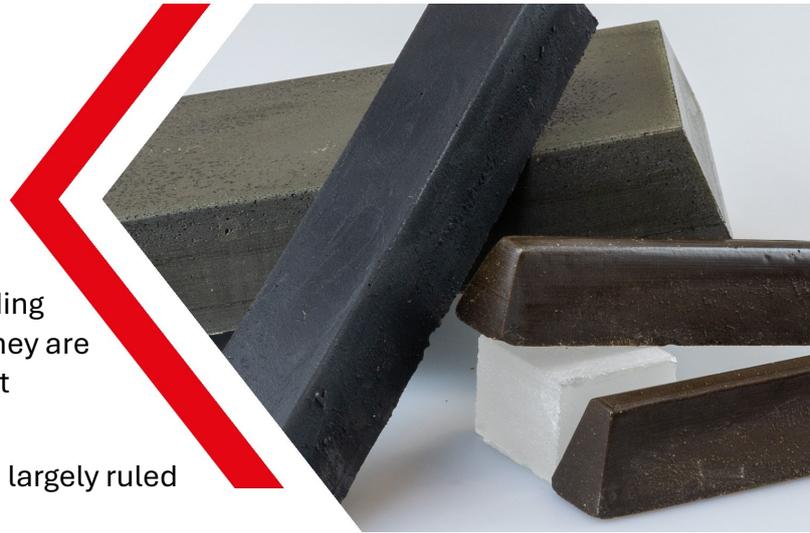
## ROSIN BASED BLOCKING PITCHES

Rosin based blocking pitches consist primarily of colophonium, maleic resin, natural plasticisers and a mineral filler. They are low-melting raw adhesives for low-tension bonding of optical parts.

Rosin based blocking pitches offer very high bonding strength at low softening temperatures. Mainly, they are used for bonding of plane optical parts on support structures and grid surfaces.

Due to their low softening point, distortion can be largely ruled out.

B III is available in various hardnesses. The B III, as well as the AKP 101 and AKP 104, are very well suited for temporary cementing in the production of small series, for small corrections and for blocking.



### Technical Data

Type	Hardness	Softening Point in °C	Solubility	Specific Characteristics
A	26 ± 1	65	BDG, NMP	
B I	31 ± 1	62	A, A/S, BDG, NMP	
B III	39 ± 1	75	A, BDG, NMP	Contains fillers for extra stability.
	41 ± 1	75		
	43 ± 1	75		
B III / OF	41 ± 1	75	S, BDG, NMP	
AKP 101	41 ± 1	80	A, BDG, NMP	Contains fillers for extra stability.
AKP 104	50 ± 1	78	A, A/S, BDG, NMP	

NOTE: Rosin adhesives should not be used directly with an open flame, as they are highly flammable!

### Packing

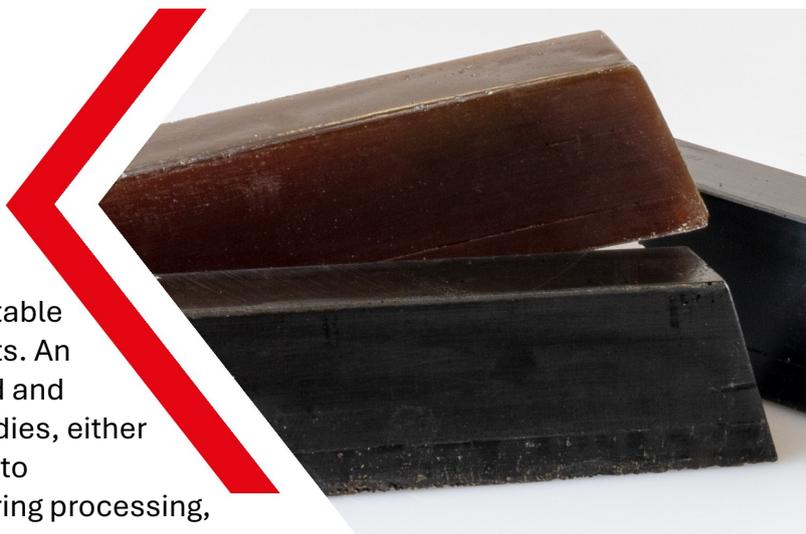
Sticks	25 x 25 x 160 mm
Bars	85 x 25 x 160 mm
Aluminium trays	128 x 33 x 220 mm

## SHELLAC BASED BLOCKING PITCHES

The shellac based blocking pitches Typ C and Punktkitt are made of natural resins like rosin and shellac as well as rosin pitches and natural plasticizers.

Shellac based blocking pitches are very elastic, stable and suitable for low-stress bonding of optical parts. An additional application is the glueing of large round and plane optics to regular or temporary mounting bodies, either as a full layer or as a spot adhesive. They are able to compensate high strengths and temperatures during processing, especially in the production of high-precision plane surfaces.

C-Kitt hardness 36 is particularly recommended for glueing optical parts for centering applications. Another area of application is the bonding of raw parts for cutting (roll bonding). Shellac based blocking pitches should not be heated to temperatures of more than 180°C for more than 20 minutes, as the shellac then increasingly vulcanizes (gums).



### Technical Data

Type	Hardness	Softening Point in °C	Solubility	Specific Characteristics
C	36 ± 1	68	A, A/S	Moderate resistance to parex and petroleum
	39 ± 1	70	A, A/S	
Punktkitt	30 ± 1	62	BDG, NMP	

CAUTION: Shellac raw adhesives must not be used directly with an open flame, as they are highly flammable!

### Packing

Sticks	25 x 25 x 160 mm
Bars	85 x 25 x 160 mm
Aluminium trays	128 x 33 x 220 mm

## WAX BASED BLOCKING PITCHES

Made primarily from natural and synthetic waxes these wax based blocking pitches have a very low melting point.

They are particularly recommended for low-stress bonding and for glueing optical parts to multiple bodies. For bonding blank and matt plane optics to mounting bodies, wax based blocking pitches have excellent adhesion properties. The low melting point allows low processing temperatures and has a positive effect on the tensioning behavior of the parts.

Because of their good adhesion properties on glass and good resistance to humidity, these blocking pitches are recommended as a protective coating for machining processes without the use of oil-based cooling lubricants.

They are also used to protect blasted flat optical parts.



### Technical Data

Type	Hardness	Softening Point in °C	Solubility	Specific Characteristics
F-28	28 ± 1	70 ± 5	Petrol	The HBJ type raw adhesives can be washed off in hot water (80°C) with ultrasonic support.
F-34	34 ± 1	72 ± 5	Petrol	
HBJ I	20 ± 1	60 ± 5	Petrol	
HBJ II	24 ± 1	60 ± 5	Petrol	
HBJ III	28 ± 1	60 ± 5	Petrol	

CAUTION: Wax pitches must not be used directly with an open flame, as they are highly flammable!

### Packing

Sticks	25 x 25 x 160 mm
Bars	85 x 25 x 160 mm
Aluminium trays	128 x 33 x 220 mm

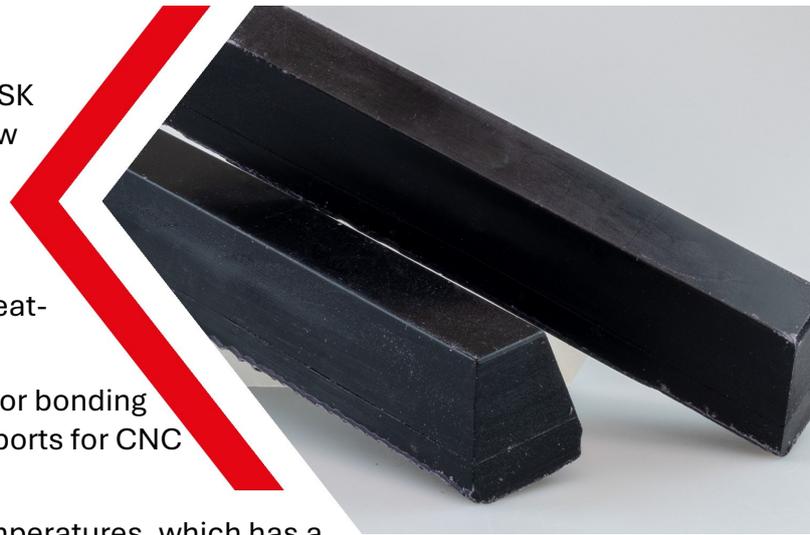
## BLOCKING PITCH NSK / NSK-F

Made of natural waxes and synthetic resins the NSK and NSK-F blocking pitches have a particularly low melting point.

By adding mineral fillers, these adhesives can be used particularly well for low-stress blocking applications on multiple carriers, especially on heat-sensitive glass types.

The wax adhesives NSK/NSK-F can also be used for bonding blank and matt plane optical components to supports for CNC machining as well as for drilling and sawing.

The low melting point enables low processing temperatures, which has a positive effect on the stress behavior of the components. These blocking pitches are only recommended for short-term machining operations in conjunction with oil-based cooling lubricants.



### Technical Data

Type	Hardness	Softening Point in °C	Solubility	Special Characteristics
NSK	34 ± 1	55 ± 5	Cleaning petrol	Removable in hot water (> 80°C) supported by ultra sonic cleaning
NSK-F	34 ± 1	55 ± 5	Cleaning petrol	

CAUTION: Wax melt adhesives should not be processed directly with an open flame, as they are highly flammable!

### Packing

Sticks	25 x 25 x 160 mm
Bars	85 x 25 x 160 mm
Aluminum trays	128 x 33 x 220 mm



## AHESIVES

- NORLAND Adhesives
- LENS BOND Adhesives
- TEBOLIT Adhesive Film
- TEBOLIT Fixing Adhesive
- TEBOLIT 2-K Fixing Adhesive
- TEBOLIT HD/FD Fixing Adhesive
- TEBOLIT UV-2 Fixing Adhesive
- TIZON Polishing Pad Adhesive



## NOA-61

NOA-61 Norland Optical Adhesive 61 is a clear, colorless, liquid photopolymer that will cure when exposed to ultraviolet light. Since it is a one part system and 100% solids, it offers many advantages in bonding where the adhesive can be exposed to UV-light.

The use of NOA 61 eliminates premixing, drying or heat curing operations common to other adhesive systems. NOA-61 meets Federal Specification MIL-A-3920 for optical adhesives and is approved for use on all government contracts specifying such adhesives. The adhesive is designed to give the best possible optical bond to glass surfaces, metals, fiberglass and glass filled plastics.

NOA 61 is recommended for bonding lenses, prisms and mirrors for military, aerospace and commercial optics as well as for terminating and splicing optical fibers. NOA 61 also has excellent clarity, low shrinkage and a slight flexibility that make it superior to other materials for optical bonding.

### Technical Data

Viscosity at 25°C:	300 cps
Refraction index:	1,56
Heat resistance:	-15°C bis +60°C (7 days after curing)
Modulus of elasticity:	150,000 psi
Tear resistance:	3,000
Elongation at fracture:	38%
Hardness according to Shore D:	85
Transport and storage:	Should be protected from direct light and high temperatures.
Shelf life:	at least 4 months after delivery, if stored in a dark and cool place (5 - 22°C)



## Curing time

Precuring	Curing
at room temperature of 22°C using long-wave UV light (350-380 nm, 100 watts)	at room temperature of 22°C using long-wave UV light (350-380 nm, 100 watts)
approx. 15 cm above the elements	approx. 15 cm above the elements
(350-380 nm, 15 watts)	(350-380 nm, 15 watts)
approx. 8 cm above the elements	approx. 8 cm above the elements
approx. 10 seconds ( 1 mil, 100 watts)	5 minutes ( 1 mil, 100 watts)
approx. 60 seconds (40 mil, 100 watts)	15 minutes (40 mil, 100 watts)
approx. 60 seconds ( 1 mil, 15 watts)	20 minutes ( 1 mil, 15 watts)
approx. 140 seconds (40 mil, 15 watts)	45 minutes (40 mil, 15 watts)

## Packing

30 g (1 oz) dropper bottle

Further units on request

## NOA-63

NOA-63 is a clear, colorless, liquid photopolymer that will cure when exposed to ultraviolet light. Since it is a one part system and 100% solids, it offers many advantages in bonding of optical elements where the bonding surface can be exposed to light.

The use of NOA 63 eliminates premixing, drying or heat curing operations common to other optical adhesive systems. Curing time is remarkably fast, and is dependent on the thickness applied and the amount of ultraviolet light energy available.

It is recommended for the bonding of achromats, prisms and all other precision compound optics. The outstanding characteristics of the adhesive are its low fluorescence and its excellent transmission in the near UV range. After full cure, the adhesive has good transmission from 320 to 3,000 nanometers.

NOA 63 is cured by ultraviolet light with maximum absorption in the range of 350 to 380 nanometers. The NOA bond can be separated in chlorinated solvent such as methylene chloride. The bonded area must be soaked in the solvent and normally will separate overnight if only precured.

### Technical Data

Viscosity at 25°C:	2000 cps
Refraction index:	1,56
Heat resistance:	-15°C bis +60°C (7 days after curing)
Modulus of Elasticity:	240,000 psi
Tear resistance:	5,000
Elongation at fracture:	5%
Hardness according to Shore D:	90
Transport and storage:	Keep away from direct light and high temperatures.
Shelf life:	at least 4 months after delivery, if stored in a dark and cool place (5 - 22°C)



## Curing time

Pre-curing	Curing
At room temperature of 22°C using long-wave UV light (350-380 nm, 100 watts) approx. 15 cm above the elements  (350-380 nm, 15 watts) approx. 8 cm above the elements  approx. 15 seconds ( 1 mil, 100 watts) approx. 60 seconds (40 mil, 100 watts) approx. 60 seconds ( 1 mil, 15 watts) approx. 180 seconds (40 mil, 15 watts)	At room temperature of 22°C using long-wave UV light (350-380 nm, 100 watts) approx. 15 cm above the elements  (350-380 nm, 15 watts) approx. 8 cm above the elements  5 minutes ( 1 mil, 100 watts) 20 minutes (40 mil, 100 watts) 20 minutes ( 1 mil, 15 watts) 60 minutes (40 mil, 15 watts)

## Packing

30 g (1 oz) dropper bottle

Further on request

## NOA-65

NOA-65 is a clear, colorless, liquid photopolymer that will cure when exposed to ultraviolet light. Since it is a one part system and 100% solids it offers many advantages in bonding of optical materials where the bonding surface can be exposed to light.

The use of NOA 65 eliminates premixing, drying, and heat curing operations compared to other optical adhesive systems. Curing time is remarkably fast and is dependent on the thickness applied and the amount of ultraviolet light energy available.

The cured adhesive is very flexible and was designed to minimize strain. NOA 65 is especially suitable where the adhesive cross section would be relatively thick. NOA 65 has enough elasticity to keep strain to a minimum even when dissimilar materials with different coefficients of expansion are bonded together. Typical applications would be potting of lenses in metal mounts, bonding plastic to glass and cold blocking.

NOA 65 is cured by ultraviolet light with a maximum absorption within the range of 350-380 nanometers. The polymer has minimum oxygen inhibition, and therefore any surfaces in contact with air will be non-tacky when fully cured.



## Technical Data

Viscosity:	1200 cps (at 25°C)
Refraction index:	1,524
Heat resistance:	-15°C bis +60°C (7 days after curing)
Modulus of elasticity:	20,000 psi
Tear resistance:	1,500
Elongation at fracture:	80%
Hardness according to Shore D:	50
Transport and storage:	Keep away from bright light and high temperatures.
Shelf life:	at least 4 months after delivery, if stored in a dark and cool place (5 - 22°C)

## Curing times

Pre-curing	Curing
at room temperature of 22°C using long-wave UV light (350-380 nm, 100 watts) approx. 15 cm above the elements (350-380 nm, 15 watts) approx. 8 cm above the elements approx. 15 seconds ( 1 mil, 100 watts) approx. 60 seconds (40 mil, 100 watts)	at room temperature of 22°C using long-wave UV light (350-380 nm, 100 watts) approx. 15 cm above the elements (350-380 nm, 15 watts) approx. 8 cm above the elements 5 minutes ( 1 mil, 100 watts) 20 minutes (40 mil, 100 watts)

## Packing

30 g (1 oz) dropper bottle

Further on request

## LENS BOND EK-93

EK-93 is a non-toxic, 100% solid epoxy adhesive system. It does neither drop nor subside.

It consists of two parts, Part "A" and "B", mixed at a ratio of 50 : 50.

EK-93 bonds surfaces with either the same or different materials.



## Technical Data

Viscosity:	> 25.000 cps
Refraction index:	÷ opaque
Colour:	part „A“ - white part „B“ - black after mixing - slate grey
Temperature resistance:	- 20°C bis + 100°C
Water absorption:	< 2% (after 7 days at 22°C)
Shrinkage on curing:	< 0,7 %
PH-level:	3,2
Specific weight:	Part A: 1,3 Part B: 1,7
After mixing:	1,45 (1:1)
Hardness according to Shore D:	> 95

## Recommended Application

Apply approximately equal parts of part 'A' and 'B'. Deviations of up to 20 % do not affect the adhesive strength. If necessary, one part of 'A' can be combined with two parts of 'B' to increase flexibility.

The pre-curing time for the 50:50 ratio is approx. 90 minutes at a processing temperature of 70°F. The curing time for the 50:50 ratio is approx. 8 hours at a processing temperature of 70°F. The use of heat ovens or infrared lamps accelerates the curing speed.

## **Packing**

114 g. (4 oz) Plastic tin

We recommend to transport and store Lens Bond EK-93 protected from light and excessive temperatures. Ideally, it should be stored at room temperature. The shelf life is 18 months from the date of manufacture.

## LENS BOND UV-69

When using Lens Bond type UV-69, no additional catalyst needs to be added for the curing.

The curing process takes place through treatment with UV light, for example an ordinary sunlamp, a UV lamp or a mercury lamp.

Heat alone has no effect on the cement layer. In order to accelerate the curing process, it is recommended to place the components to be cemented on a white piece of paper while irradiating.



### Technical data

Viscosity:	275 cps bis 320 cps
Refraction index:	1.55 at 25°C (cured), or. 1.53 (uncured)
Temperature resistance:	-54°C (-65°F) up to +100°C (+ 212°F)
Youngs Modul:	6,2 x 10 <sup>5</sup> lb/in <sup>2</sup> .
Shear resistance:	5,200 lb./in <sup>2</sup> .
Dielectric constant:	3 at 106 cps
Water absorption:	0,3 % (in 24 hrs at 25°C)
Shrinkage through curing:	approx. 4 %
PH-level:	3,2
Specific weight:	1.22
Hardness according to Shore D:	> 90
Heat conductivity:	500 x 10 <sup>-6</sup> cal. (sec) (cm <sup>2</sup> ) (°C)(cm)
Flashpoint (uncured):	50°C

There are no special requirements for the transport and storage of the cement. However, it is recommended to protect Lens Bond UV-69 from light and excessive temperatures. Ideally, it should be stored in a refrigerator. The shelf life is 18 months from the date of manufacture.

## Curing Time

When using a standard height sun, a distance of approx. 30 cm from the components is recommended.

Pre-curing: 20 minutes

curing: 90 minutes

When using a UV lamp (long-wave UV light, 365 nm), the distance to the components should be approx. 25 cm.

Pre-curing: 10 minutes

curing: 60 minutes

## Packing

114 g (4 oz.) bottle

## LENS BOND SK-9

The optical adhesive LENS BOND SK-9 is a one-component adhesive (modified acrylate/methacrylate photopolymer).

The low viscosity gives it good application possibilities, especially when thin cement layers are required and enables a very short pre-curing time.

The curing process is triggered by long-wave ultraviolet light (365 nm). High moisturising ability in conjunction with a low shrinkage rate lead to excellent adhesive qualities of this optical cement.

Due to the low viscosity of SK-9, there are practically no air bubble formation issues. LENS BOND SK-9 has extremely high adhesion qualities with many types of plastic that are generally difficult to bond. Typical applications are the bonding of plastic - plastic, plastic - glass, plastic - metal and substrates with low UV transmittance (40-60%).



### Technical Data

Viscosity:	250 - 300 cps
Refraction index:	1,55 (cured), or. 1,53 (uncured)
Heat resistance:	-50°C up to +100°C
Youngs Modul:	1,6 x 10 <sup>5</sup> psi
Shrinkage through curing:	< 0,3 %
PH-level:	5,5
Specific weight:	1,23
Hardness according to Shore D:	85 - 90

It is recommended that Lens Bond SK-9 is protected from light and excessive temperatures during transport and storage. Ideally, it should be stored at room temperature. The shelf life is 12 months from the date of manufacture.

## Curing Time

Pre-curing	Curing
At room temperature of 22°C using long- wave UV light (365 nm) approx. 25 mm above the elements	At room temperature of 22°C using long-wave UV light (365 nm) approx. 25 mm above the elements
Approx. 3 - 5 seconds	Approx. 1 hour

## Packing

28 g (1 oz) dropper bottle

LENS BOND SK-9 is available in two different viscosities (40/60 CPS)

## LENS BOND J-91

LENS BOND J-91 is a one-component, UV-light sensitive, universal optical cement.

The excellent adherence in conjunction with a low shrinkage rate results in an excellent bonding behavior. Due to the high viscosity of the adhesive, even large elements can be glued without air bubbles. After complete curing, LENS BOND J-91 offers high resistance to extreme temperatures and high humidity.

The type J-91 has a very short pre-curing time of approx. 3 to 5 sec. using a UV lamp with 4 - 15 watts at a distance of approx. 25 mm from the upper lens element. Complete curing is achieved after one hour.

Type J-91 fulfills MIL-A-3920.



### Technical Data

Viscosity:	250 cps up to 300 cps
Refractive index:	1.55 at 25°C (cured), or 1.53 (uncured)
Temperature resistance:	-50°C up to +110°C (5 days after curing)
Youngs module:	1,6 x 10 <sup>5</sup> psi
Wasseraufnahme:	0,19 % (5 days after curing)
Shrinkage through curing:	< 0.3 %
PH-level:	5,5
Specific weight:	1.23
Hardness according to Shore D:	85-90

For transport and storage of the optical cement, it is recommended to protect Lens Bond J-91 from light and excessive temperatures. Ideally, it should be stored at room temperature. The shelf life is 12 months from the date of manufacture.

## Curing Times

Pre-curing	Curing
At room temperature of 22°C using long-wave UV light (365 nm) approx. 25 mm above the elements	At room temperature of 22°C using long-wave UV light (365 nm) approx. 25 mm above the elements
approx. 3 - 5 seconds	approx. 1 hour

## Packing

28 g (1 oz) dropper bottle

## LENS BOND RD 3-74

LENS BOND Type RD3-74, a modification to LENS BOND, type F-65, that contains plasticiser in contrast.

The majority of optical adhesives shrink during curing, which can lead to tensions, especially with thin elements. This in turn can lead to fractures or optical distortions.

With the use of the adhesive LENS BOND Type RD3-74 these problems can be avoided, since Type RD3-74 remains slightly elastic even after curing.



### Technical Data

Viscosity:	275 cps. bis 320 cps.
Refraction Index:	1.55 at 25°C (cured), or 1.53 (uncured)
Heat resistance:	-54°C (-65°F) up to +100°C (+ 212°F)
Shear resistance:	5,200 lb./in2.
Dielectric constant:	3 at 106 cps
Water absorption:	0,3 % (in 24 hrs at 25°C)
Shrinkage through curing:	approx. 4 %
PH-level:	3,2
Specific weight:	1.22
Hardness according to Shore D:	approx. 90
Heat conductivity:	500 x 10 <sup>-6</sup> cal. (sec) (cm <sup>2</sup> ) (°C)(cm)
Flashpoint (uncured):	50°C
Transport and storage:	Should be protected from bright light and high temperatures.

There are no special requirements for the transport and storage of the optical cement. However, it is recommended to protect Lens Bond RD 3-74 from light and excessive temperatures. Ideally, it should be stored in a refrigerator. The shelf life is 18 months from the date of manufacture.

## Curing Time

The amount of catalyst supplied with the adhesive is sufficient to allow a 3:100 or higher ratio. Changes to this ratio will alter the time required for the adhesive to cure. For example, increasing the proportion of catalyst will shorten the curing process as shown below.

Addition of catalyst	Room temperature of 22°C (72°F)		Oven temperature of 70°C (160°F)	
	Pre-curing	Curing	Pre-curing	Curing
2 : 100	2 hours	36 hours	Not recommended	
3 : 100	45 minutes	30 hours		
5 : 100	30 minutes	1 day		

## Packing

114 g (4 oz.) bottle

## LENS BOND M-62

LENS BOND TYPE M-62 is used where large quantities of optical elements have to be adhered together.

The hardening of the treated elements can be achieved by an oven temperature of 70°C within one hour.

The long application time of 4 hours makes it possible to mix larger quantities of LENS BOND M-62 and thus to bond a large number of elements.

LENS BOND M-62 fulfils MIL-A-3920.



### Technical Data

Viscosity:	275 cps up to 320 cps
Refraction index:	1.55 bei 25°C (cured), bzw. 1.53 (uncured)
Temperature resistance:	-54°C (-65°F) up to +100°C (+ 212°F)
Shear resistance:	5,200 lb./in <sup>2</sup>
Dielectric constant:	3 at 10 <sup>6</sup> cps
Water absorption:	0,3 % (in 24 hrs at 25°C)
Shrinkage through curing:	approx. 4 %
PH-level:	3,2
Specific weight:	1.22
Hardness according to Shore D:	approx. 90
Heat conductivity:	500 x 10 <sup>-6</sup> cal. (sec) (cm <sup>2</sup> ) (°C)(cm)
Flashpoint (uncured):	50°C

There are no special requirements for the transport and storage of the optical cement. However, it is recommended to protect Lens Bond M-62 from light and high temperatures. Ideally, it should be stored in a refrigerator. The shelf life is 18 months from the date of manufacture.

## Curing Times

The amount of catalyst supplied with the adhesive is sufficient to allow a ratio of 2 : 100 or higher. Changes to this ratio will alter the time required for the adhesive to cure. For example, increasing the amount of catalyst will shorten the curing process as indicated below.

Addition of catalyst	Room temperature of 22°C (72°F)		Oven temperature of 70°C (160°F)	
	Pre-curing	Curing	Pre-curing	Curing
2 : 100	4 hours	4 days	20 minutes	1 hour
3 : 100	3 hours	3 days	15 minutes	45 minutes
5 : 100	2 hours	2 days	10 minutes	30 minutes

## Packing

114 g (4 oz.) bottle

## LENS BOND F-65

LENS BOND TYPE F-65 has been developed to provide an adhesive with a short curing time at room temperature.

When using the TYPE F-65 adhesive, the operator is able to fully test his system within a few hours.

LENS BOND Type F-65 is therefore particularly suitable for pilot projects, small production series and in cases where no drying ovens are available.

Lens Bond F-65 fulfils MIL-A-3920.



### Technical Data

Viscosity:	275 cps up to 320 cps
Refractive index:	1.55 at 25°C (cured), or 1.53 (uncured)
Temperature resistance:	-54°C (-65°F) up to +100°C (+ 212°F)
Shear strength:	5,200 lb./in <sup>2</sup>
Dielectric constant:	3 at 10 <sup>6</sup> cps
Water absorption:	0,3 % (in 24 hrs at 25°C)
Shrinkage through curing:	approx. 4 %
PH-level:	3,2
Specific weight:	1.22
Hardness according to Shore D:	approx. 90
Thermal conductivity:	500 x 10 <sup>-6</sup> cal. (sec) (cm <sup>2</sup> ) (°C)(cm)
Flash point (uncured):	50°C

There are no special requirements for the transport and storage of the optical cements. However, it is recommended to protect Lens Bond M-62 from light and high temperatures. Ideally, it should be stored in a refrigerator. The shelf life is 18 months from the date of manufacture.

## Curing Time

The amount of catalyst supplied with the adhesive is sufficient to allow a ratio of 2 : 100 or higher. Changes to this ratio will alter the time required for the adhesive to cure. For example, increasing the proportion of catalyst will shorten the curing process as indicated below.

Addition of catalyst	Room temperature of 22°C (72°F)		Oven temperature of 70°C (160°F)	
	Pre-curing	curing	Pre-curing	curing
2 : 100	60 minutes	36 hours	not recommended	
5 : 100	30 minutes	1 day	not recommended	

## Packing

114 g (4 oz.) bottle

## LENS BOND C-59

The two-component adhesive LENS BOND, TYPE C-59 is equally suitable for curing both in the oven and at room temperature.

Type C-59 fulfils MIL-A-3920.



### Technical Data

Viscosity:	275 cps up to 320 cps
Refractive index:	1.55 at 25°C (fully cured), respectively 1.53 (uncured)
Temperature resistance:	-54°C (-65°F) up to +100°C (+ 212°F)
Shear strength:	5200 lb./in <sup>2</sup>
Dielectric constant:	3 at 106 cps
Water absorption:	0,3 % (in 24 hrs at 25°C)
Shrinkage through curing:	approx. 4 %
PH-level:	3,2
Specific weight:	1.22
Hardness according to Shore D:	approx. 90
Thermal conductivity:	500 x 10 <sup>-6</sup> cal. (sec) (cm <sup>2</sup> ) (°C)(cm)
Flashpoint (uncured):	50°C

There are no special requirements for the transport and storage of the precision adhesive. However, it is recommended to protect Lens Bond C-59 from light and excessive temperatures. Ideally, it should be stored in a refrigerator. The shelf life is 18 months from the date of manufacture.

## Curing Times

The amount of catalyst supplied with the adhesive is sufficient to allow a 2:100 or higher ratio. Changes to this ratio will alter the time required for the adhesive to cure. For example, increasing the proportion of catalyst will shorten the curing process as shown below.

Addition of catalyst	Room temperature of 22°C (72°F)		Oven temperature of 70°C (160°F)	
	Pre-curing	Curing	Pre-curing	Curing
2 : 100	24 hours	5 days	45 minutes	2 hours
3 : 100	18 hours	4 days	30 minutes	1,5 hours
5 : 100	12 hours	3 days	22 minutes	1 hours

## Packing

114 g (4 oz.) bottle

## TEBOLIT ADHESIVE FILM

The TEBOLIT adhesive film was developed for the quick and easy application of a wide range of plane optical components onto different layers such as glass or metall.

The adhesive film develops its full bonding strength at room temperature. To remove the film, it must be heated to a temperature of 100°C, 120°C or 125°C, depending on the type of film which is used. However, the film can also be removed by putting it in solvent.

Due to the low-tension bonding of the optical parts, TEBOLIT adhesive films can be used as an alternative for molecular bonding for lapping, grading and polishing applications. The film is particularly easy and quick to handle.



### Technical Data

	TEBOLIT Adhesive Film Purple	TEBOLIT Adhesive Film Blue	TEBOLIT Adhesive Film Black
Removal Temperature	100 °C	120 °C	125 °C
Thickness	ca. 158 µm	ca. 158 µm	ca. 158µm
Adhesive strength	medium ca. 500 g / 40 mm <sup>2</sup>	high	medium

### Packing

Roll 50 m x 350 mm

Roll 50 m x 500 mm

Sheets / other dimensions on request

## TEBOLIT FIXING ADHESIVE

TEBOLIT is a UV-light- hardening one-component adhesive for applications in precision optics processing. It glues glass to glass, glass to metals and glass to ceramics and provides a mechanically stable bond during processing.

After the machining processes, such as cutting, ultrasonic cutting, grinding or polishing , the separation (deblocking) will be done by using an watery solution containing surfactant.

TEBOLIT is environmentally friendly due to the exclusive use of water as a release medium and is ideally suited for the substitution of raw cements.



### Technical data

Chemical basis:	Modified acrylate
Color:	Pale yellow, transparent
Density DIN EN 542:	1,18 g/cm <sup>3</sup>
Proportion of solids:	100 %
Viscosity:	20 mPas
Heat resistance:	up to 80 degrees

### Packing

- 50 ml dropper bottle
- 250 ml dropper bottle

TEBOLIT Fixing Adhesive can be stored unopened at room temperature for 6 months after delivery.



## TEBOLIT HD / 2K FIXING ADHESIVE

TEBOLIT HD is a 2-component epoxy adhesive which is primarily used for the temporary bonding of various components.

It is characterised by a particularly stable and low-tension curing. Possible areas of application for this adhesive is the lapping, fine grinding and polishing of various optical types of glasses and ceramics.

Due to the high stability of the cured adhesive, the TEBOLIT HD fixing adhesive is suitable for the separation of particularly thin components.



### Technical Data

Color:	white / yellow
Odor:	typical
Viscosity:	20 - 30 Pa.s
Density at +25°C:	1,35 g/cm <sup>3</sup>
Hardness after setting:	88 Shore D
Adhesive strength in N/mm <sup>2</sup>	34,4
Solubility:	hot water > 85°C, acetone, special de-bonding solution
Fully cured:	6 - 8 hours

### Application

Usable dosing system: Multi-Ratio Dispenser  
usable mixers: MCH 08-18T, MCH 08-24T

The corresponding dispensers and mixers for our Tebolit adhesives are also available from us.

### Packing

140 / 70g dual cartridge / mixing proportion 2:1

TEBOLIT HD / 2-K fixing adhesive can be stored separately in original cartridges at <+ 25 °C in dark and dry environmental until the specified expiry date.

## TEBOLIT FD 2-K FIXING ADHESIVE

TEBOLIT FD is a 2-component epoxy adhesive which is primarily used for the temporary bonding of various components.

It is characterised by particularly fast and low-tension curing. Possible applications for this adhesive include lapping, grinding and polishing of various optical glasses and ceramics.

The TEBOLIT FD fixing adhesive is also suitable for cutting and drilling applications in semiconductor processing.



### Technical Data

Color:	black / gray
Odor:	typical
Viscosity:	25 - 40 Pa.s
Density at +25°C:	1,5 g/cm <sup>3</sup>
Hardness after setting:	85 Shore D
Adhesive force in N/mm <sup>2</sup>	29,2
Solubility:	hot water > 85°C, acetone, special de-bonding solution
Fully cured:	2 - 3 hours

### Application

Usable dosing system:	Multi-Ratio Dispenser
usable mixers:	MCH 08-18T, MCH 08-24T

The corresponding dosing devices and mixers for our Tebolit adhesives are also available from us.

### Packing

100 g double cartridge / mixing proportion 1:1

TEBOLIT FD / 2-K fixing adhesive can be stored separately in original cartridges at <+ 25 °C in dark and dry environmental until the specified expiry date.

## TEBOLIT UV-2 FIXING ADHESIVE

TEBOLIT UV-2 is a one-component adhesive that can be used for temporary bonding and as a protective coating.

A 0.5 mm thick layer can be cured within a short time with a 200 watt mercury vapor lamp or UV lamp.

TEBOLIT UV-2 can be used during the polishing of components made of glass, ceramics and metals. It can also be used as a protective varnish either in the processing of glass, as well as for cutting and dicing in the semiconductor industry.

TEBOLIT UV-2 is removed by placing the part in hot water. The minimum temperature is 80 °C. At 90 °C, the separation takes place within seconds. TEBOLIT UV 2 is thereby removed without residues and can be removed as a film from the bath. The separation can also be done at 140 °C in a temperature cabinet



### Technical Data

Typ:	1-component UV epoxy resin mixture
Color:	beige
Odor:	typical
Viscosity:	35 - 40 Pa.s
Density at +25°C:	1,2 g/cm <sup>3</sup>
Hardened condition after curing:	80 Shore A

### Packing

50 g cartridge

TEBOLIT UV 2 is separately stored in airtight original containers at  $\leq + 25$  °C in the dark until the expiration date.

## TIZON POLISHING PAD ADHESIVE

The Tizon Polishing Pad Adhesive is a contact glue, specially formulated for the bonding of polyurethane, rubber, leather and textiles.

As is usually the case with adhesives, the surfaces to be bonded must be dry and free from dust, oil and other contaminants. It is advisable to roughen the surfaces with sandpaper if needed.

Stir the adhesive well before use and apply evenly to both surfaces. Highly absorbent surfaces may require several applications of glue. After the required evaporation time (bonding time) the parts can be pressed together.

The bonding needs 3 - 5 days to reach its final strength. Adhesive residues can be removed with a diluting agent specially formulated for our Tizon Polishing Pad Adhesive.



### Storage

The shelf life of TIZON Polishing Pad Adhesive is 6 months at 20°C (± 5°C). Higher temperatures shorten the shelf life, lower temperatures temporarily cause a higher viscosity.

### Packing

- 1 kg can
- 5 kg can



## OPTICAL PROTECTIVE LACQUERS

- Peel-Off Lacquer PB1, PB-2
- Protection Lacquer Illmar P4
- Protection Lacquer Illmar P4-ST
- Protection Lacquer M9 SO2
- Protection Lacquer M9 SO2-ST
- Protection Lacquer M-Lack 10
- Protection Lacquer M-Lack 10-ST
- Protection Lacquer OSL 1500
- Protection Lacquer PBJ 2002
- Protection Lacquer PBJ 2050
- Protection Lacquer TLS blue / 2002



## PEEL-OFF LACQUER PB-1

The peel-off lacquer PB-1 is a solvent-based, quick drying synthetic resin lacquer available as a colorless or colored version. By adding a very elastic, fully synthetic resin, this lacquer can be removed from the surface without leaving any residue with the help of a tape. No further cleaning is required.

The lacquer can be used in optical production to protect polished or matt workpiece surfaces against chemical and mechanical impacts.

Another application is the transport protection of various materials and the removal of minor impurities on the surface (dust particles). The lacquer can be applied by brushing, spraying or dipping. The varnish should only be diluted with butyl acetate.



### Technical Data

Viscosity:	33 - 36 sec / 20 ° C / 4 mm nozzle
Curing time:	max. 2 hours.
Resistance to water:	after 2 hours no change of the layer
Resistance to cooling concentrates:	resistant
Hardening time:	at least 12 hours
Solubility:	residue free removable

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## PEEL-OFF LACQUER PB-2

The peel-off lacquer PB-2 is a water-based protective lacquer. The advantage of this lacquer system is that no special precautions need to be taken during the use.

The protection lacquer is transparent, non-flammable, pH-neutral and does not produce any chemical waste that may have to be disposed of separately. After the use, this varnish can be removed from the surface to be protected without leaving any residue with the help of a peel-off tape. No further cleaning is required.

The lacquer is used to protect sensitive surfaces against chemical and mechanical impacts. It can also be used as transport protection and to clean dust or other particles from various surfaces.

The lacquer can be applied by brushing (brush or small paint roller), spraying (air less) or dipping. Further dilution of this protective lacquer is expressly not recommended.



### Technical Data

Viscosity:	32 - 35 sec / 20 ° C / 4 mm nozzle
Curing time:	max. 2-4 hours depending on the layer thickness
Resistance to water:	after 1 hour no change of the layer
Resistance to cooling concentrates:	partially resistant
Hardening time:	at least 12 hours
Solubility:	residue-free removable

### Packing

- 1 kg tin can
- 5 kg canister

## OPTICAL PROTECTION LACQUER Illmar P4 TRANSPARENT / BLACK

Optical protection lacquer Illmar P4 is a synthetic resin lacquer that can be used as a protective optical lacquer for a wide range of different optical production processes.

Illmar P4 can be used to protect matt or polished surfaces of workpieces against mechanical and chemical impacts or as an edge protection coating.

The black-colored version of Illmar P4 is particularly effective for examining material surfaces for imperfections and accuracy. It can also be used on glass which is susceptible to acids and corrosion.

The varnish is applied by painting, spraying or dipping.



### Technical Data

Flow time:	14 - 16 sec. / 20°C / 4 mm nozzle
Drying time:	max. 3 hours
Resistance to water:	good
Resistance to petroleum:	resistant
Curing time:	at least 12 hours
Solubility:	acetone, ethanol, butyl acetate

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER Illmar P4 -ST TRANSPARENT / BLACK

The optical protection lacquer Illmar P4-ST is a further development of our synthetic artificial resin protective lacquer Illmar P4.

By adding new specialty resins, we were able to improve drying time, bond strength and significantly increase surface stability.

The protective optical lacquer is used to protect polished and matt surfaces against mechanical and chemical attacks and as an edge protection lacquer.

Illmar P4-ST black is also particularly suitable for testing material surfaces for imperfections and accuracy.

This low-viscosity lacquer is suitable for use on acid and weather-sensitive glasses. The application of Illmar P4-ST can be done by brushing, spraying or dipping.



### Technical Data

Flow time:	14 - 17 sec. / 20°C / 4 mm nozzle
Drying time:	max. 4 hours
Resistance to water:	after 8 hours no change of lacquer film
Resistance to petroleum:	resistant
Curing time:	at least 6 hours
Solubility:	acetone, ethanol, butyl acetate

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER M9 SO2 TRANSPARENT / BLACK

Optical protection lacquer M9 SO2 is a synthetic resin lacquer with butyl acetate as a solvent. It has high elasticity due to the addition of a special resin. The varnish can be used as a protective or adhesive lacquer in optical manufacturing processes.

Because of the good adhesive properties, this lacquer can be used on molecular-bonded parts to be sealed against water. This prevents detachment of the surfaces from each other.

This varnish is suitable for protecting polished or matt workpiece surfaces against chemical and mechanical influences.

The lacquer can be applied by brushing, spraying or dipping and should only be diluted with butyl acetate.



### Technical Data

Flow time:	16 - 20 Sek. / 20°C / 4 mm nozzle
Drying time:	max. 3 hours
Resistance to water:	After 3 hours no change of lacquer film
Resistance to petroleum:	resistant
Curing time:	at least 12 hours
Solubility:	acetone, ethanol, butyl acetate

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 400 ml spray can
- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER M9 SO2-ST TRANSPARENT / BLACK

Optical protection lacquer 9 SO2-ST is a modification of our optical protection lacquer M9 SO2 with butyl acetate as a solvent. By adding new special resins, we were able to improve the drying time, the adhesion strength and significantly increase the surface stability.

The lacquer is mainly used as a protective or adhesive lacquer in optical production. Due to its improved adhesive properties, this lacquer can be used to seal molecular-bonded components against water and certain cutting oils for much longer. This also prevents the surfaces from detaching and contaminating.

A further application of the lacquer is the protection of matt or polished surfaces of workpieces against chemical and mechanical impacts.

The lacquer can be applied by brushing, spraying or dipping and should only be diluted with butyl acetate.



### Technical Data

Flow time:	18 - 21 Sek. / 20°C / 4 mm nozzle
Drying time:	max. 2 hours
Resistance to water:	After 8 hours no change of lacquer film
Resistance to petroleum:	resistant
Curing time:	at least 6 hours
Solubility:	acetone, ethanol, butyl acetate

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER M-Lack 10 TRANSPARENT / BLACK

M-Lack 10 is a protective lacquer with ethanol as a solvent. The varnish is available in colorless or black.

M-Lack 10 is recommended as a protective lacquer on polished surfaces for protection against mechanical impacts. M-Lack 10 is most commonly used to protect plaster bodies in optical production processes against water intrusion.

The lacquer is mostly applied by dipping the entire optical components with the layer. It should only be diluted with ethanol if necessary.



### Technical Data

Flow time:	23 - 29 Sek. / 20°C / 4 mm nozzle
Drying time:	max. 3 hours
Resistance to water:	After 3 hours no change of lacquer film
Resistance to petroleum:	resistant
Curing time:	at least 12 hours
Solubility:	acetone, ethanol

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER M-Lack 10-ST TRANSPARENT / BLACK

The optical protective lacquer M-Lack 10-ST is a modification of our synthetic resin lacquer M-Lack 10 with ethanol as a solvent. The addition of new synthetic resins made it possible to improve the drying time, adhesion and surface stability.

The optical protective lacquer is used on polished surfaces of workpieces for protection against mechanical impact. The improved M-Lack 10 ST can also be used to provide more effective and durable protection against aggressive polishing slurries and polishing emulsion for plaster bodies during optical manufacturing processes.

The varnish is mostly applied by brushing, spraying or dipping and should only be diluted with ethanol.



### Technical Data

FlowTime:	23-29 sec / 20°C / 4 mm nozzle
Drying Time:	max. 2 hours
Resistance to water:	after 8 hours no change of lacquer film
Resistance to Petroleum:	resistant
Curing Time:	at least 6 hours
Solubilty:	acetone, ethanol

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packaging

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER OSL 1500 TRANSPARENT / BLACK

OSL 1500 optical protective lacquer is a new developed quick-drying synthetic resin lacquer with butyl acetate as a solvent. By adding new special resins, we were able to achieve a significant improvement in drying time and an increase in surface stability.

OSL 1500 is used primarily as a protective coating in optical production processes. Due to the improved surface stability, this lacquer is recommended for protecting matt or polished surfaces against water, certain cooling concentrates or other mechanical impacts.

It also prevents the protected surface areas from peeling or contamination. It can be applied by brushing, spraying or dipping. Only butyl acetate should be used to dilute the lacquer accordingly.



### Technical Data

Flow time:	16 - 19 Sec. / 20°C / 4 mm nozzle
Drying time:	max. 2 hours
Resistance to water:	After 8 hours no change of lacquer film
Resistance to petroleum:	resistant
Curing time:	at least 6 hours
Solubility:	acetone, ethanol, butyl acetate

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER PBJ 2002 TRANSPARENT / BLACK

This protective lacquer is a special lacquer based on artificial resins and organic solvents. PBJ 2002 optical protective lacquer is used to protect matt and polished surfaces.

It is characterized by very short drying times. After approx. 30 minutes it is dust-dry and fully cured after approx. 1-2 hours. This varnish dries at room temperature.

Due to its short drying times, it can be used like a liquid adhesive for applying smaller plan optical parts.

PBJ 2002 can be applied by brushing, spraying or dipping.



### Technical Data

Flow time:	18 - 22 Sek. / 20°C / 4 mm nozzle
Drying time:	max. 2 hours
Resistance to water:	good
Curing time:	at least 1 - 2 hours
Solubility:	acetone, ethanol

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER PBJ 2050

PBJ-2050 is a special protective lacquer based on organic solvents. It is characterized by very short drying times (at room temperature), a long service life and a homogenous stable surface. PBJ-2050 is dust-dry after approx. 30 minutes and fully cured after approx. 2 hours. This optical protective lacquer is free of color pigments and other fillers.

PBJ 2050 optical protective lacquer is used as a protective lacquer for matt and polished surfaces. Due to its deep black, matt color, PBJ-2050 is perfect as a contrasting varnish for surface control as well as an edge varnish. The lacquer can be applied by brushing, spraying or dipping.



### Technical Data

Flow time:	15 - 18 Sek. / 20°C / 4 mm nozzle
Drying time:	0,5 hours
Resistance to water:	After 10 hours no change of lacquer film
Resistance to petroleum:	resistant
Curing time:	at least 2 hours
Solubility:	acetone, butyl acetate

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## OPTICAL PROTECTION LACQUER PBJ 2070

The protective varnish PBJ 2070 is a further developed recipe of the already existing protection lacquer PBJ 2050. It has significantly improved properties in terms of adhesion and brittleness, preventing the protective layer from flaking off.

It is as well characterized by very short drying times, a long service life and a stable homogenous surface. It is dust-dry after about 0.5 hours and fully cured after about 2-3 hours. This varnish dries at room temperature. Due to the high solvent content, this protective varnish is flammable. This optical protection lacquer is free of color pigments and other fillers.

The optical protection lacquer PBJ 2070 is used as a protective varnish for matt and polished surfaces. Thanks to its deep matt black color, the lacquer is also particularly suitable for checking surfaces for imperfections and accuracy.

When applying the protective varnish, always ensure that the surface to be treated is clean, dry and free of dirt and grease. The best way to apply PBJ 2070 is by spraying or lubricating by brush.



### Technical Data

Flow time:	16 - 20 Sek. / 20°C / 4 mm nozzle
Drying time:	0,5 hours
Resistance to water:	After 10 hours no change of lacquer film
Resistance to petroleum:	resistant
Curing time:	at least 2 - 3 hours
Solubility:	acetone, butyl acetate

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister

## PROTECTION LACQUER TLS blue 2002

TLS blue 2002 is based on artificial resins and organic solvents. Due to the use of a special plastic material the varnish film is transparent. Otherwise, it provides sufficient contrast to discover surface failures immediately.

TLS blue 2002 is used for polishing plano-optical parts, particularly for contacting procedures. This varnish has a comparatively low drying time (dust-dry after approx. ½ hour, further processing possible after approx. 2 – 3 hours). It dries at room temperature.

When applying the varnish the surfaces to be treated must be clean, dry and free of any grease. The varnish can be applied by dipping or by brush.



### Technical Data

Flow time:	18 - 22 Sek. / 20°C / 4 mm nozzle
Drying time:	max. 3 hours
Resistance to water:	good
Curing time:	at least 1 - 2 hours
Solubility:	acetone, ethanol

Please store all protective lacquers in closed cans at room temperature away from sun light. At the workplace we recommend to ensure adequate ventilation during processing. Because of the solvent content our protective lacquers are flammable.

### Packing

- 1 kg tin can
- 5 kg tin canister



## CONSUMABLES

- Optical Edge Coating Lisulol
- Defoamer PB-4
- EVERFLO Suspension Treatment
- Cooling Lubricant Concentrate TC-13 RS
- Cooling Lubricant Concentrate TC-910



## LISULOL OPTICAL EDGE COATING

Lisulol edge coating is typically used for blackening glass to minimize stray light and for lacquering various housings/cases/bodies.

Lisulol is a two-component lacquer based on epoxy resins as a hardening component. It has a very high mechanical strength, depending on the glass surface.

After curing at room temperature, the lacquer coating is partially resistant to acetone after a short exposure time.



### Technical Data

Color:	black
Gloss:	dull matt
Supply viscosity:	15 sec. (Run-out time 4mm nozzle)
Dry layer ceiling:	15 µm based on cured paint, including the colorant solution
Shelf life:	12 month in closed original container
Recommended lacquer structure:	single-layer up to a refractive index of nD = 1.65

### Handling Instructions

Before applying Lisulol, the surface should be cleaned of grease or impurities. Both components must be thoroughly mixed before application. We also recommend a trial coating before applying.

Lisulol is for use on glass only and can be applied by spraying/airbrushing or by brush.

Mixing ratio:	100 : 20
Pot life:	approx. 8 h at 20°C (The pot life can be shortened at higher temperatures.)
Evaporation time:	approx. 30 minutes (at 20°C)
Drying time:	2-3 days at room temperature at 60°C 5 hours at 75°C 2 hours

## LISULOL OPTICAL EDGE COATING 2.0

Lisulol edge coating is typically used for blackening glass to minimize stray light and for lacquering various housings/cases/bodies.

Lisulol is a two-component lacquer based on epoxy resins as a hardening component. It has a very high mechanical strength, depending on the glass surface.

After curing at room temperature, the lacquer coating is partially resistant to acetone after a short exposure time.



### Technical Data

Color:	black
Gloss:	dull matt
Supply viscosity:	19-21 sec. (Run-out time 4mm nozzle)
Dry layer ceiling:	15 µm based on cured paint, including the colorant solution
Shelf life:	12 month in closed original container
Recommended lacquer structure:	single-layer up to a refractive index of nD = 1.65

### Handling Instructions

Before applying Lisulol, the surface should be cleaned of grease or impurities. Both components must be thoroughly mixed before application. We also recommend a trial coating before applying.

Lisulol is for use on glass only and can be applied by spraying/airbrushing or by brush.

Mixing ratio:	100 : 30
Pot life:	approx. 4 h at 20°C (The pot life can be shortened at higher temperatures.)
Evaporation time:	approx. 30 minutes (at 20°C)
Drying time:	1-2 days at room temperature at 60°C - 3 hours at 75°C - 2 hours

## DEFOAMER PB-4

The defoamer PB-4 is the best choice for effective prevention of foam building in cooling lubricant solutions and suspensions based on cerium oxide or aluminum oxide.

Developed to meet the high demands of industrial applications, PB-4 provides high performance in foam reduction and prevention.

When foam is already occurring, PB-4 provides a quick and effective reduction. This allows a quick re-start of production without long downtimes.

The PB-4 defoamer is ideal for use in central circulation and individual systems. PB-4 is easy to dose and can be integrated into existing processes. The application is uncomplicated and requires minimal training.



### Technical Data

Characterization:	Alkyl polyalkylene glycol ethers and greasy alcohol
Consistence:	liquid, slight inherent odor
Color:	slightly yellow
pH:	4,5
Emulsifiable:	with water

### Recommended Concentration

Initial Start: 50 - 100 ml/m<sup>3</sup>

Please add the defoamer PB-4 into the circulation system. Then the defoamer needs some time to fully disperse in order to develop its defoaming effect.

If the desired anti-foam effect is not achieved after approx. 5 minutes, add another small dose of approx. 50 ml/m<sup>3</sup> if necessary.

Dosage: approx. 20 - 50 ppm (approx. 1-2 teaspoons) per 100 l for polishing slurries  
approx. 50-100 ppm (approx. 2-4 teaspoons) per 1 m<sup>3</sup> for cooling lubricant solutions.

Distribution time: approx. 5 minutes

The optimum setting values must be determined individually under operating conditions.

## **Please note**

The defoamer PB-4 has the classification 2 in the water hazard class and is not subject to labeling according to the hazardous substances ordinance.

## **Packing**

1 liter plastic can

5 liter plastic can

## EVERFLO SUSPENSION AGENT

EVERFLO is particularly designed to provide stabilization of particles in abrasive and polishing compounds, and prevent them from settling.

By adding EVERFLO, the abrasive or polishing agent does not run off the spindle. This results in shorter grinding and polishing times.

EVERFLO does not dry out. The machines can be cleaned at any time easily by only using a sponge.

EVERFLO is not toxic or corrosive, keeps even the heaviest grains suspended and can be used with brush lubrication or in circulation.



### Recommended concentration

The following information should be understood as a starting concentration.

circulation:	fine grinding:	1 : 10
	polishing:	1 : 20
brush lubrication:	grinding:	1 : 5
	polishing:	1 : 10

The optimal mixing ratio should be defined under operating conditions.

### Packing

1 Gallon

4 Gallons per carton

## COOLING LUBRICANT CONCENTRATE TC-13 RS

Synthetic, water-based cooling lubricants are replacing traditional mineral oil-based cooling lubricants in the glass and metalworking industries.

Synthetic cooling lubricants have a particularly good resistance against bacteria, which significantly minimizes the need for additional biocides.

TC-13 RS has an improved service lifetime compared to many comparable cooling lubricants, which leads to a reduction in the volume of waste.

TC-13 RS is used as a cooling lubricant concentrate for working with resin-bonded CBN or diamond pellets as well as in combination with our Surlap Lapping Pad. An additionally added corrosion inhibitor also reduces tool corrosion.



### Technical Data

Density at 20°C (DIN 51757):	1,05 - 1,11 g / ml
PH value (1,5%):	9 - 10,5
Colour:	slightly yellow
Odor:	neutral
Storage time:	maximum 24 months

### Recommended Concentration

The optimum concentration of the water-based suspension is between 1 - 2 %. If necessary, the concentration can be increased, but should not exceed 5%.

The optimum concentration should be empirically evaluated under production process conditions.

### Packing

- 5 kg canister
- 25 kg canister

## COOLING LUBRICANT CONCENTRATE TC-910

TC-910 is a cooling lubricant concentrate that is designed for the processing of optical construction-, safety-, flat- and mirror glass.

The fully synthetic cooling lubricant concentrate is water-soluble and free of diethanolamine and nitrite.

According to the available waste water technical report TC-910 can be discharged into the sewage system.



### Technical Data

Density at 20 °C	(DIN 51757):	1,049 g / ml
PH value (3%)	(DIN 51369):	8,5 - 9,0
Odor:		neutral
Colour:		transparent

### Recommended Concentration

Edge processing:	1 - 2%
Bevel grinding:	3 - 4%
Drilling:	2 - 3%
Sawing:	2 - 3%

The optimum concentration should be empirically evaluated under production process conditions.

### Packing

- 5 kg canister
- 25 kg canister



## APPARATUS AND ACCESSORIES

- Lens Tissues OCC-55 / OCC-150
- Lens Tissues OCC-80
- Lens Tissues OCC-2010
- Cleanroom Tissue PB-S
- Cleanroom Tissue PB-V
- Measuring and Control Magnifier MKL-SSV 10
- Precision Dispenser ARC-100, 110
- Lens Coating Hardness Tester Kit
- Fine-Hair Capsule Pinsel, Cleaning Sponge
- Beaumé Spindles and Graduated Cylinders
- Optic Hammer
- Optical Protection Foil
- UV Lamps UVL-56, UVL 21
- UV Curing Cabinet ACC-100



## LENS TISSUE AND WIPES

### OCC-55 / OCC-150

The OCC optical cloth is a special cloth for fine and precision optics. It is a lint-poor and scratch-free, chemically untreated special cloth made of 100% cotton.

The quality of the tissues will improve when being washed frequently (without any additional agents). The tissue will provide a higher cleaning effect.



### Technical Data

Type	OCC-150	OCC-55
Material	100% Cotton	100% Cotton
Colour	yellow	white
Available Types	on roll, 30m x 1,18m as running meter, width 1,18m in sheets 40 x 40 cm	in sheets 15 x 20 mm 50 x 50 mm (standard) 80 x 80 mm
Purity	not chemical treated, no greasy components, silicone free	
Properties	lint-poor, scratch-free, absorbent	

## LENS TISSUE OCC-80

The OCC-80 microfiber cleaning cloth is the ideal solution for effective cleaning of sensitive surfaces.

With its extremely Fine Fabric Structure, OCC-80 provides exceptional cleaning performance by removing particles from surfaces instantly. Regardless of whether you want to clean optics, semiconductors or other sensitive areas, this cloth is best suited for these purposes.

Another advantage of these tissues is their high absorbency. The microfiber can absorb and hold a considerable amount of liquid, so you don't have to keep changing the cloth even for wet cleaning tasks. This saves time and resources while still achieving a thorough and quick clean.



### Technical Data

Type	OCC-80
Material	Microfiber
Colour	white
Available types	In sheets 23 x 23 cm
Purity	Chemically untreated, no grease content, silicone-free
Properties	lint-free, scratch-free, absorbent

## LENS TISSUE OCC-2010

The OCC-2010 cleaning cloth is a special non-woven cloth that consists of two different synthetic fibers (polyamide and polyester fiber).

A special water jet treatment is used to consolidate the nonwoven cloth so that the fiber heads open up. This effect leads to an expansion and greater porosity of the surface.

The exposed fibers are primarily responsible for the cleaning effect of OCC-2010. Due to the porous surface, dirt particles are retained in the cloth and not spread over the surface to be cleaned.

Besides its cleaning effect, OCC-2010 can also be used as a storage or processing layer for sensitive substrates.



### Technical Data

Type	OCC-2010
Material	Polyamide and polyester fiber
Colour	white
Available Types	In section 43 x 40 cm, 86,5 x 100 cm
Purity	Chemically untreated, no grease content, silicone-free
Properties	- lint-poor, scratch-free, absorbent - reusable, washable (max. 60°C, do not use fabric softener)

## CLEANROOM TISSUE PB-S

The PB-S cleanroom tissue is a special cloth for precision optics and the semiconductor industry. It is a lint and scratch-free, chemically untreated special tissue with high cleaning performance.

The special arrangement of the yarns inside the textile structure leads to an increased absorption which enables both a faster cleaning processes and less liquid residue on the surface.

The edges of this cloth are cutted with a laser beam and thermally secured on all four sides. The meshes of the PB-S cleanroom tissue are tightly knitted next to each other, which is particularly beneficial for the absorption of small particles. The polyester fibers have a high material strength even with small diameters, so that fiber fractures during cleaning work are rare compared to wiping cloths with cellulose or viscose content. The adaptation to the topography of the surfaces allows efficient precision cleaning in a short time.



### Technical Data

Type	PB-S
Material	Polyester
Colour	white
Available types	In sheets 23 x 23 cm, 40 x 40 cm
Purity	Chemically untreated, no grease content, silicone-free
Properties	lint-free, scratch-free, absorbent

## CLEANROOM TISSUE PB-V

The PB-V cleanroom tissue is a very thin non-woven cleaning fleece, which is used for the cleaning of optical components in cleanrooms up to class ISO 6.

The chemically treated special cloth is lint and scratch-free and has a high cleaning efficiency.

The arrangement of the particularly thin and lightweight textile structures lead to a time-saving removal of thin layers of grease or other impurities on polished sensitive and non-sensitive surfaces.

The edges of this cloth are water jet cutted. The adaptation to the topography of the surfaces allows efficient precision cleaning in a short time.



### Technical Data

Type	PB-V
Material	Polyester - Cellulose
Colour	white
Available types	In sheets 23 x 23 cm
Purity	Chemically untreated, no grease, silicone-free
Properties	lint-free, scratch-free, absorbent

### Packing

100 pcs. in a sealed plastic bag

## MEASURING AND CONTROL LOUPE MKL-SSV 10

Our precision measuring and inspection loupe, has a 10x magnification and an advanced achromatic lens system consisting of 4 lenses in 2 groups.

The sophisticated optical design ensures a color-error-free image, providing the highest clarity and accuracy.

The loupe's stepless focusing mechanism allows a distortion-free, sharp view of the object, enabling precise examination and measurement. Its open structure permits free light to illuminate the object under inspection, ensuring clear visibility and accurate assessment.



### Technical Data

Measuring area template:	30mm
Effective working area:	ø20mm
Scale graduation:	0,1mm
Visual field:	ø32mm
Dimension:	ø46 x 44mm
Weight:	74g

Focusable

Further templates/scales available on request

### Delivery Content

- 1 x Measuring and inspection loupe MKL-SSV 10 incl. standard template
- 1 x Storage case

## PRECISION DISPENSER ARC-100, 110

In modern manufacturing processes, dispensing systems for liquids and pastes are used in a wide range of applications. They allow the smallest quantities from 0.001 grams up to larger quantities of several grams to be dispensed repeatably with a high degree of accuracy.

One of the universal and most common dispensing system is the pressure-time method. The precision dispenser AR-V 100 as well as the AR-V 110 with retaining vacuum and timer from Pieplow & Brandt are devices that allow the accurate dosing of various low or high viscosity liquids.

The material which needs to be dosed is stored in cartridges. The dosing needle is used to adapt to the material and dosing point. The lower the viscosity and the smaller the quantity to be dosed, the smaller needles are required. The dosing on the material occurs by a pressure impulse inside the cartridge. Air presses on the fluid and pushes it through the dispensing needle to desired position. The compressed air applied from outside is "switched through" for a short period of time using an electro-pneumatic valve. With a mechanical controller, the pressure which is built in the cartridge can be adjusted.

For materials with low viscosity, a vacuum function is also required to keep the material in the cartridge during breaktimes and prevent it from dripping out of the cartridge. This system has been tried and tested for years and is suitable for many applications.



### Technical Data

Power supply unit:	230V AC/50Hz (Intern 12V DC)
Power consumption:	12W (Standby < 0,5W)
Inlet pressure range:	3 – 6 bar
Outlet pressure range:	0 – 4 bar
Enclosure dimensions AR-V 100:	B x H x T: 150 x115 x 60mm
Enclosure dimensions AR-V 110:	B x H x T: 150 x115 x 80mm
Weight AR-V 100:	ca. 950 Gramm
Weight AR-V 110:	ca. 1195 Gramm

### Packing

- 1x Precision dispenser AR-V
- 1x Instructions for use
- 1x Power supply
- 1x Footswitch

## LENS COATING HARDNESS TESTER KIT

This Tester Kit is used for testing the hardness and resistance of optical coatings according to the standards MIL-C-00675, MIL-M-13508 and MIL-F-48616.

The eraser inserts included in the set comply with the MIL-E-12397 standard.

The set consists of two test pens, one made of brass for testing heavy abrasion, designed for a pressure of approx. 1.13 kp (2.5 lb.). The second pen, made of aluminum, is used for testing for low abrasion at a pressure of approx. 0.57 kp (1.25 lb.).

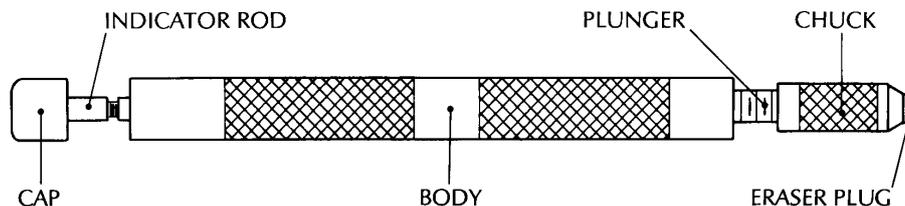
The set also includes: 2 additional sanding rubbers, 2 sq. yards of cheesecloth in accordance with MIL-CCC-C-440 and 1 roll of adhesive tape in accordance with MIL-A-A113 Rev. C.

All the necessary certificates are included in the set, which is supplied in a convenient carrying case.



### Instructions for use

The TEST PEN must be pressed on the lens to be tested up to the red mark on the shaft. Make approx. 20 "strokes", each 2.5 cm long (shorter for smaller lenses). The "strokes" should all be on the same line. After cleaning the lens, inspect it for damage to the coating. When checking the coating of extremely curved lenses, the TEST PEN should always be held vertically.



## Care instructions

The abrasive rubbers are pressed into the tester. The retaining bolt must be removed from the pin to replace the rubber seal. The retaining pin and thread of the plunger must be cleaned carefully and thoroughly each time the rubber pad is replaced.

Warning: The plunger must not be pressed down when the retaining bolt is removed from the hardness test pin. (This changes the length of the spring in the hardness test pin).

Signs of wear on the abrasive rubber can be compensated by unscrewing the bolt holding the rubber. To do this, hold the hardness test pin at the upper end and turn the retaining bolt according to the wear on the rubber.

The hardness tester pin is supplied already lubricated. If the lubrication decreases after prolonged use of the hardness tester pen, the part of the hardness tester pen on which the calibration mark is located and the plunger must be relubricated. A small amount of any good lubricant will suffice.

## FINE-HAIR CAPSULE BRUSH

Discover the versatile capsule brush, available in various sizes, designed to deliver the highest precision and care. Whether you need to dust polished optics or apply our premium protective lacquers to polished surfaces, this brush is your perfect companion.

The extremely fine and soft bristles make it an ideal tool for effectively removing dust or other particles from sensitive surfaces without damaging them. Its versatility allows it to be used also for precisely applying protective lacquer to polished surfaces.

The ergonomic design of the brush handle ensures a comfortable grip, allowing for fatigue-free work even during extended use. Crafted from high-quality materials, the capsule brush boasts durability and remains in top form even with frequent use.



## CLEANING SPONGE

Crafted from eco-friendly plant fibres, our viscose cleaning sponge is perfectly suited for all cleaning tasks in modern optical manufacturing.

Thru to its structure the sponge is extremely absorbent and can easily absorb dirt and other impurities. Due to the fine texture it also can be used for cleaning sensitive surfaces.

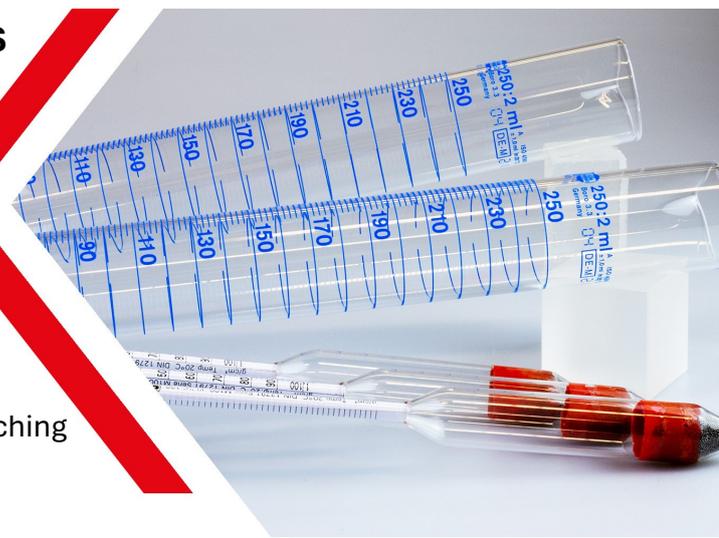
The cleaning sponge is machine washable (max. 60°C) and is therefore reusable. As a result, it is an environmentally friendly alternative to other cleaning tools, especially as the material is 100% bio-degradable.



## BEAUMÉ SPINDLES / GRADUATED CYLINDERS

Beaumé spindles are measuring devices for determining the density or the specific gravity of liquids. They are used in the preparation of aqueous suspensions as well as in the control during the grinding and polishing process.

Regular monitoring of the suspension density ensures guarantees a constant removal rate of the grinding and polishing suspensions. For the initial equipment, we recommend a set consisting of a hydrometer and a matching measuring cylinder.



### Available Specifications

Our Beaumé spindles and graduated cylinders are available in the following specifications:

- 1.000 - 1.060 - 1g Scale
- 1.060 - 1.120 - 1g Scale
- 1.000 - 1.100 - 2g Scale (DIN 12791)
- 1.100 - 1.200 - 2g Scale (DIN 12791)
- graduated cylinder with 250 mL

### Packing

1 beaumé spindle with cylinder

## OPTIC HAMMER, CONICAL

Made from wood, our optical hammer is suitable for molecular bonded and cemented optical parts.

### Packing

1 Optic Hammer

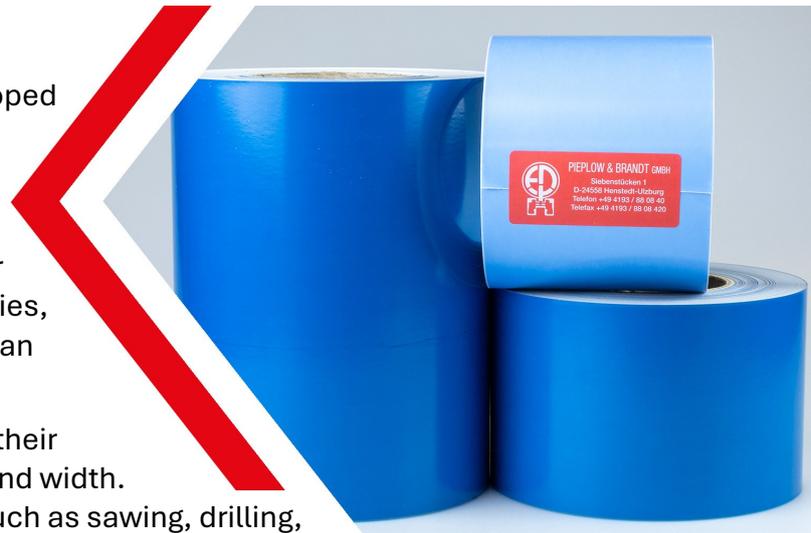


## OPTICAL PROTECTION FOIL

The optical protection films were specially developed to protect polished and matt workpiece surfaces from chemical and mechanical influences.

They are particularly easy to handle and can be removed without leaving any residue. Due to their excellent adaptation to different surface geometries, the different protective films can also be used as an alternative to solvent-based protective coatings.

Our two types of optical protection films differ in their adhesive strength, color as well as in roll length and width. Both offer protection for different applications, such as sawing, drilling, milling, lapping, fine grinding, polishing or filling.



### Technical Data

Dimensions:	35m x 100mm 70m x 100mm 70m x 200mm
Colour:	light blue, dark blue
Thickness of the protective film:	0.08-0.14 mm
Force required to remove the protective film:	5-10N

### Packing

- Roll 35 m x 100mm (light blue)
- Roll 70m x 100mm (dark blue)
- Roll 70m x 200mm ( dark blue)

## UV LAMP UVL 56, UVL 21

The UV lamps UVL 56 and UVL 21 are perfectly suited for pre-curing and curing of UV adhesives and cements of small units and production quantities.

The 6 watt lamps can be used both as hand lamps as well as for curing small quantities in combination together with a stand.



### Technical Information UVL 56

UV-wavelength:	365 nm
Output:	6 Watt
Intensity:	750 Microwatt / cm <sup>2</sup> at 150 mm
Lamp dimensions:	ca. 350 mm x 90 mm x 70 mm
Stand dimensions:	ca. 320 mm x 150 mm

### Technical Information UVL 21

UV-wavelength:	365 nm
Output:	6 Watt
Intensity:	420 Microwatt at 150 mm
Lamp dimensions:	ca. 200 mm x 70 mm x 50 mm
Stand dimensions:	ca. 190 mm x 120 mm

### Packing

- 1 x Handlamp with UV bulb
- 1 x Stand

## UV CURING CABINET ACC-100

The ACC 100 UV curing cabinet is a modular high-performance curing system which consists of a curing chamber, an exchangeable lamp plug-in and a control unit.

The main feature of this device is that the lamp intensity is continuously monitored to ensure optimum curing performance.

The cabinet has a large shelving level which allows perfect pre-positioning of the optical components on polishing plates.

The UV lamps are switched off automatically by a timer or when the curing cabinet is opened. This is to prevent operators from being exposed to UV radiation when loading or unloading optical components. The curing time is managed by the integrated timer and can be used in continuous or timed mode. The curing process is set by turning the rotary control knob and pressing the start button.



### Technical Data

Power supply unit:	230V AC/50Hz (+/- 15%)
Power consumption:	400W (Standby < 5W)
Protection class:	I (Insulation class A) IP 20
Unit dimension:	W x H x D: 660 x 600 x 240 mm
Weight:	approx. 38 kg

### Packing

- 1x UV curing cabinet ACC 100
- 1x Operating manual
- 1x Power adapter
- 1x Replacement fuse
- 1x Operating key
- 1x Protective glass lifting device (replacement of the UV lamps)