

# LASER OPTICS

F-THETA LENSES - BEAM EXPANDERS  
ASPHERIC LENSES - TRAPPED ION LENSES  
CUSTOM OPTICS

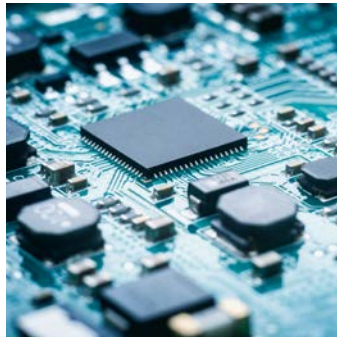
2024



Sill Optics has been a trusted partner for customized laser optic solutions for years. Our specialties lie in many different areas of application and a wide variety of designs. Sill Optics also has many years of experience with various projects for customized optical designs and individual mechanical layouts.

The close coordination between various internal departments, our large range of manufacturing capabilities and our high quality series production are the reasons why we are able to build your prototype in the shortest time possible.

In recent years, we have successfully completed more than 60% of laser optic orders as development projects based on individual inquiries and participation in public research projects. Most of these developments took part in the field of high-power solutions in solar systems, consumer electronics, eMobility or additive manufacturing applications for mechanical engineering processing.



**SEMICONDUCTOR &  
DISPLAY  
MANUFACTURING**



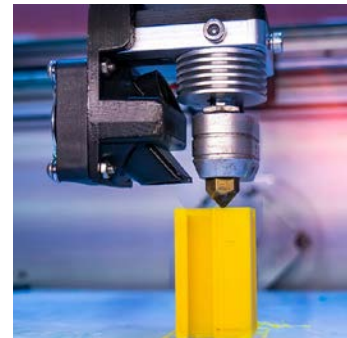
**AUTOMOTIVE INDUSTRY,  
E.G. BATTERY PRODUCTION  
BODY WELDING ETC.**



**CONSUMER  
ELECTRONICS**



**SOLARCELL  
PRODUCTION**



**ADDITIVE  
MANUFACTURING**

### **YOUR BENEFITS FROM A SILL OPTICS DEVELOPMENT**

- development of specification sheet close to design and production possibilities
- direct contact to optical designer and project manager
- short distances between design, development and production
- prototypes at short notice
- high quality of series production
- quality assurance according to individual needs

# CUSTOMIZED LASER OPTICS

BENEFIT FROM OUR EXPERTISE



REQUIREMENT ANALYSIS WITH OUR CUSTOMER

DETAILED IN-HOUSE SPECIFICATION

IN-HOUSE DESIGN & DEVELOPMENT

IN-HOUSE OPTICS PROTOTYPING

IN-HOUSE MECHANICS PROTOTYPING

SYSTEM INTEGRATION

IN-HOUSE TEST & MEASUREMENT

F-THETA LENSES

BEAM EXPANDERS
















ASPHERIC LENSES

TRAPPED ION LENSES

Sill Optics has been manufacturing high-quality laser optics for almost 40 years. These lenses are specifically designed for laser material processing applications for industrial mechanical engineering.

They are specially designed for applications in CE, automotive, semiconductor, additive or solar cell manufacturing. In addition to medical and biotech applications (confocal microscopy, ophthalmology) and science and research. The design and the quality of the optical components play a key role in the lens performance.

### GLASS OPTICS

PART NUMBER	FOCAL LENGTH [mm]	SCAN AREA [mm x mm]	FOCUS SIZE (1/e <sup>2</sup> )	MAX. BEAM-Ø [mm]	MAX. TELE-CENTRICITY ERROR [°]	WORKING DISTANCE [mm]	SP/USP*	ACHRO-MATIC	DATA-SHEET
<b>1000-1100 nm</b>									
S4LFT7010-450	100	35 x 35	18.3	10	1.5	115.0	yes	yes	
<b>1064 nm</b>									
S4LFT0080-126	80	39 x 39	6.5	25	3.8	79.4	no	no	
S4LFT0163-126	163	107 x 107	26.4	12	15	181.2	no	no	
S4LFT0253-126	254	160 x 160	35.2	14	16.7	284.9	no	no	
S4LFT1254-126	254	160 x 160	41.4	12	14.9	306.5	no	no	
S4LFT3254-126	254	115 x 115	16.6	30	8.5	297.0	no	no	
S4LFT0350-126	350	212 x 212	56.3	12	16	412.2	no	no	
S4LFT0420-126	420	242 x 242	27.7	30	14.8	480.9	no	no	
S4LFT0508-126	508	325 x 325	55.6	20	16.3	651.4	no	no	
S4LFT0635-126	635	370 x 370	51.3	25	16.3	732.8	no	no	
<b>532+1064 nm</b>									
S4LFT1163-081	163	102 x 102	13.3 / 20.0	12	12.7	159.0	no	yes	
S4LFT8254-081	254	180 x 180	16.6 / 33.0	15	19.7	211.6	no	yes	
<b>515-589 nm</b>									
S4LFT7012-292	100	35 x 35	9.4	10	1.3	101.4	yes	yes	
<b>532 nm</b>									
S4LFT5100-121	100	69 x 69	9.8	10	2.4	126.7	no	no	
S4LFT0300-121	300	200 x 200	19.4	14	15.8	324.1	no	no	

Besides our portfolio and customized optics, we also offer a variety of F-Theta lenses and Beam Expanders from our former portfolio with outstanding specifications upon request. This also includes lenses for different lens markets, applications and specifications.

- **MORE WAVELENGTHS**
- **MORE FOCAL LENGTHS**
- **MORE MAGNIFICATIONS**

\*usable for SP=Short Pulse, USP=Ultra Short Pulse

In case of deviations from the portfolio and delivery times, please contact our Customer Care Team.

# F-THETA LENSES

## BENEFIT FROM OUR 40 YEARS OF EXPERIENCE



### FUSED SILICA OPTICS















PART NUMBER	FOCAL LENGTH [mm]	SCAN AREA [mm x mm]	FOCUS SIZE (1/e <sup>2</sup> ) [µm]	MAX. BEAM-Ø [mm]	MAX. TELE-CENTRICITY ERROR [°]	WORKING DISTANCE [mm]	SP/USP*	DATA-SHEET
<b>1030-1090 nm</b>								
S4LFT4147-328	48	7 x 7	6.3	15	2.1	61.1	yes	
S4LFT4065-328	65	15 x 15	9.4	15	2	83.1	yes	
S4LFT0710-328	100	60 x 60	39.1	5	11.5	120.7	yes	
S4LFT4010-328	100	35 x 35	19.5	10	1.3	129.8	yes	
S4LFT4127-328	125	50 x 50	13.6	15	1.5	157.6	yes	
S4LFT0763-328	163	100 x 100	45.6	7	14.6	194.1	yes	
S4LFT3162-328	163	90 x 90	21.2	15	5.6	201.5	yes	
S4LFT3167-328	163	100 x 100	32.6	10	11.6	200.7	yes	
S4LFT0725-328	254	140 x 140	61.5	8	16.2	282.8	yes	
S4LFT3250-328	254	160 x 160	33.2	15	10.7	321.3	yes	
S4LFT1330-328	330	215 x 215	33.3	20	23.5	203.4	yes	
S4LFT1420-328	420	280 x 280	58.5	14	17.3	499.2	yes	
S4LFT5430-328	430	250 x 250	30.0	30	11.6	538	yes	
S4LFT1655-328	650	410 x 410	63.3	20	22.5	581.6	yes	
S4LFT0910-328	910	500 x 500	65.8	30	16.2	1048.8	yes	
<b>515-532 nm</b>								
S4LFT4148-292	48	6 x 6	3.2	15	1.8	60	yes	
S4LFT4066-292	65	15 x 15	4.8	15	1.5	85.8	yes	
S4LFT4010-292	100	35 x 35	9.8	10	1.5	130.2	yes	
S4LFT4126-292	125	53 x 53	12	10	1.6	167	yes	
S4LFT3161-292	163	90 x 90	15.4	10	4.8	219	yes	
S4LFT4262-292	163	65 x 65	12.7	12	1.7	195.4	yes	
S4LFT1330-292	330	212 x 212	24.3	14	20.3	279	yes	
<b>420-480 nm</b>								
S4LFT4125-373	125	45 x 45	6.1	20	1.6	160.2	yes	
S4LFT3170-373	168	75 x 75	7.6	20	3.2	228.3	yes	
S4LFT3250-373	241	115 x 115	10	20	7.4	304.8	yes	
S4LFT1330-373	330	180 x 180	10.7	20	11.1	268.2	yes	
<b>343-355 nm</b>								
S4LFT4149-075	48	6 x 6	2.1	15	2.1	69.3	yes	
S4LFT4067-075	65	15 x 15	3.1	15	1.8	81.7	yes	
S4LFT4010-075	100	35 x 35	6.5	10	1.2	132	yes	
S4LFT4125-075	125	53 x 53	8	10	1.1	156.9	yes	
S4LFT3170-075	163	90 x 90	11.4	10	4.3	221.7	yes	
S4LFT4262-075	163	65 x 65	10.5	10	2	193.7	yes	
S4LFT1330-075	330	210 x 210	15.4	14	21	260.5	yes	
<b>257-266 nm</b>								
S4LFT4068-199	65	20 x 20	2.5	15	1.3	85.6	yes	
S4LFT3170-199	154	85 x 85	7.7	10	3.8	208.1	yes	
S4LFT4263-199	163	70 x 70	9.2	10	2.6	218.4	yes	

Sill Optics has been manufacturing high-quality laser optics for almost 40 years. These lenses are specifically designed for laser material processing applications of industrial mechanical engineering.


They are specially designed for applications in CE, automotive, semiconductor, additive or solar cell manufacturing. In addition to medical and biotech applications (confocal microscopy, ophthalmology) and science and research. The design and the quality of the optical components play a key role in the lens performance.

Many of our Beam Expanders can also be used in reverse direction. Using a Beam Expander reverse may the result in increased divergence and possibly other disadvantages as the Beam Expanders are usually designed to magnify beams. Therefore, please feel free to contact our technical support if you have any questions.

### ZOOM BEAM EXPANDERS

PART NUMBER	MAGNIFICATION	CLEAR INPUT APERTURE [mm]	CLEAR OUTPUT APERTURE [mm]	LENGTH [mm]	THREAD	DATA-SHEET
<b>1030-1090 nm</b>						
S6EXZ5310-328	1-3x	10.5	20.0	85.2	C-Mount	
S6EXZ5311-328	1-3x	10.5	20.0	85.2	M30x1	
S6EXZ5076-328	1-8x	10.3	31.0	162.0	C-Mount	
<b>515-532 nm</b>						
S6EXZ5310-292	1-3x	10.5	20.0	85.2	C-Mount	
S6EXZ5311-292	1-3x	10.5	20.0	85.2	M30x1	
S6EXZ5076-292	1-8x	10.3	31.0	162.0	C-Mount	
<b>355 nm</b>						
S6EXZ5310-075	1-3x	10.5	20.0	85.2	C-Mount	
S6EXZ5311-075	1-3x	10.5	20.0	85.2	M30x1	
S6EXZ5075-075	1-8x	10.3	31.0	162.0	C-Mount	
<b>343-355 nm</b>						
S6EXZ0940-574	0.9-4x	16.0	28.0	191.0	M30x1	
S6EXZ5310-574	1-3x	10.5	20.0	85.2	C-Mount	
S6EXZ5311-574	1-3x	10.5	20.0	85.2	M30x1	
S6EXZ5075-574	1-8x	10.3	31.0	162.0	C-Mount	
<b>257-266 nm</b>						
S6EXZ5075-199	1-8x	10.3	31.0	162.0	C-Mount	

### MOTORIZED BEAM EXPANDER

PART NUMBER	MAGNIFICATION	CLEAR INPUT APERTURE [mm]	CLEAR OUTPUT APERTURE [mm]	LENGTH [mm]	THREAD	DATA-SHEET
<b>343-355 nm</b>						
S6EZM0940-574	0.9-4x	12.0	28.0	200.0	M30x1	






































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# BEAM EXPANDERS



































## BENEFIT FROM OUR 40 YEARS OF EXPERIENCE



### FIX MAGNIFICATION BEAM EXPANDERS

PART NUMBER	MAGNIFICATION	CLEAR INPUT APERTURE [mm]	CLEAR OUTPUT APERTURE [mm]	LENGTH [mm]	THREAD	DATA-SHEET
<b>1030-1090 nm</b>						
S6EXK0005-328	0.5	12.0	12.0	44.7	M30x1	
S6EXK0008-328	0.8	12.0	12.0	44.7	M30x1	
S6EXK0010-328	1.0	12.0	14.0	44.7	M30x1	
S6EXK0012-328	1.2	12.0	26.0	44.7	M30x1	
S6EXK0015-328	1.5	12.0	26.0	44.7	M30x1	
S6EXK0020-328	2.0	12.0	26.0	44.7	M30x1	
S6EXK0025-328	2.5	11.0	26.0	44.7	M30x1	
S6EXK0030-328	3.0	8.0	26.0	44.7	M30x1	
S6EXK0035-328	3.5	8.0	20.0	44.7	M30x1	
S6EXK0040-328	4.0	8.0	20.0	44.7	M30x1	
<b>515-532 nm</b>						
S6EXK0005-292	0.5	12.0	12.0	44.7	M30x1	
S6EXK0008-292	0.8	12.0	12.0	44.7	M30x1	
S6EXK0010-292	1.0	12.0	14.0	44.7	M30x1	
S6EXK0012-292	1.2	12.0	26.0	44.7	M30x1	
S6EXK0015-292	1.5	12.0	26.0	44.7	M30x1	
S6EXK0020-292	2.0	12.0	26.0	44.7	M30x1	
S6EXK0025-292	2.5	11.0	26.0	44.7	M30x1	
S6EXK0030-292	3.0	8.0	26.0	44.7	M30x1	
S6EXK0035-292	3.5	8.0	20.0	44.7	M30x1	
S6EXK0040-292	4.0	8.0	20.0	44.7	M30x1	
<b>355 nm</b>						
S6EXK0008-075	0.8	12.0	12.0	44.7	M30x1	
S6EXK0012-075	1.2	12.0	26.0	44.7	M30x1	
S6EXK0015-075	1.5	12.0	26.0	44.7	M30x1	
S6EXK0020-075	2.0	12.0	26.0	44.7	M30x1	
S6EXK0025-075	2.5	11.0	26.0	44.7	M30x1	
S6EXK0030-075	3.0	8.0	26.0	44.7	M30x1	
S6EXK0035-075	3.5	8.0	20.0	44.7	M30x1	
S6EXK0040-075	4.0	8.0	20.0	44.7	M30x1	
<b>343-355 nm</b>						
S6EXK0008-574	0.8	12.0	12.0	44.7	M30x1	
S6EXK0010-574	1.0	12.0	14.0	44.7	M30x1	
S6EXK0012-574	1.2	12.0	26.0	44.7	M30x1	
S6EXK0015-574	1.5	12.0	26.0	44.7	M30x1	
S6EXK0020-574	2.0	12.0	26.0	44.7	M30x1	
S6EXK0025-574	2.5	11.0	26.0	44.7	M30x1	
S6EXK0030-574	3.0	8.0	26.0	44.7	M30x1	
S6EXK0035-574	3.5	8.0	20.0	44.7	M30x1	
S6EXK0040-574	4.0	8.0	20.0	44.7	M30x1	

## FIX MAGNIFICATION BEAM EXPANDERS

PART NUMBER	MAGNIFICATION	CLEAR INPUT APERTURE [mm]	CLEAR OUTPUT APERTURE [mm]	LENGTH [mm]	THREAD	DATA-SHEET
<b>1030-1090 nm</b>						
S6EXP0005-328	0.5	14.0	31.0	85.0	M30x1	
S6EXP0008-328	0.8	14.0	20.0	85.0	M30x1	
S6EXP0012-328	1.2	14.0	28.0	85.0	M30x1	
S6EXP0015-328	1.5	8.0	31.0	85.0	M30x1	
S6EXP0020-328	2.0	8.0	31.0	85.0	M30x1	
S6EXP0025-328	2.5	8.0	31.0	85.0	M30x1	
S6EXP0030-328	3.0	8.0	31.0	85.0	M30x1	
S6EXP0040-328	4.0	8.0	31.0	85.0	M30x1	
S6EXP0050-328	5.0	8.0	31.0	85.0	M30x1	
<b>515-532 nm</b>						
S6EXP0005-292	0.5	14.0	31.0	85.0	M30x1	
S6EXP0008-292	0.8	14.0	20.0	85.0	M30x1	
S6EXP0015-292	1.5	8.0	31.0	85.0	M30x1	
S6EXP0020-292	2.0	8.0	31.0	85.0	M30x1	
S6EXP0025-292	2.5	8.0	31.0	85.0	M30x1	
S6EXP0030-292	3.0	8.0	31.0	85.0	M30x1	
S6EXP0040-292	4.0	8.0	31.0	85.0	M30x1	
S6EXP0050-292	5.0	8.0	31.0	85.0	M30x1	
<b>355 nm</b>						
S6EXP0015-075	1.5	8.0	31.0	85.0	M30x1	
S6EXP0020-075	2.0	8.0	31.0	85.0	M30x1	
S6EXP0025-075	2.5	8.0	31.0	85.0	M30x1	
S6EXP0030-075	3.0	8.0	31.0	85.0	M30x1	
S6EXP0040-075	4.0	8.0	31.0	85.0	M30x1	
S6EXP0050-075	5.0	8.0	31.0	85.0	M30x1	
<b>343-355 nm</b>						
S6EXP0015-574	1.5	8.0	31.0	85.0	M30x1	
S6EXP0020-574	2.0	8.0	31.0	85.0	M30x1	
S6EXP0025-574	2.5	8.0	31.0	85.0	M30x1	
S6EXP0030-574	3.0	8.0	31.0	85.0	M30x1	
S6EXP0040-574	4.0	8.0	31.0	85.0	M30x1	
S6EXP0050-574	5.0	8.0	31.0	85.0	M30x1	
<b>257-266 nm</b>						
S6EXP0015-199	1.5	8.0	31.0	85.0	M30x1	
S6EXP0020-199	2.0	8.0	31.0	85.0	M30x1	
S6EXP0030-199	3.0	8.0	31.0	85.0	M30x1	
S6EXP0040-199	4.0	8.0	31.0	85.0	M30x1	
S6EXP0050-199	5.0	8.0	31.0	85.0	M30x1	



# ASPHERES

## BENEFIT FROM OUR CAPABILITIES



### ASPHERES

The use of aspheric lenses in optical systems is increasing. Aspheric lenses enable an enhancement of resolution especially for optical systems with a high numerical aperture. The aspheric deviation of the high end series is smaller than 0.05  $\mu\text{m}$  RMSi.

Aspheres offer the great advantage to accomplish monochromatic imaging tasks with one optical element where multiple lens elements would otherwise be needed. Main advantages of aspheres are less spherical aberrations, less weight, increased transmission and no internal ghosts.

PART NUMBER	FOCAL LENGTH [mm]	LENS-Ø [mm]	CENTER THICKNESS [mm]	WORKING DISTANCE [mm]
<b>1064 nm</b>				
S1ADX0220-328	20	25.0	13.2	13.3
S1ADX0230-328	30	30.0	16.0	20.9
S1ADX0240-328	40	30.0	15.0	31.3
S1ADX0250-328	50	30.0	13.7	42.1
S1ADX0260-328	60	30.0	11.3	53.5
S1ADX0370-328	72	38.1	11.0	63.6
S1ADX0380-328	80	38.1	12.0	73.1
S1ADX0310-328	100	38.1	11.0	93.7
S1ADX0312-328	120	38.1	10.3	114.0
S1ADX0316-328	150	30.0	9.6	144.4
S1ADX0320-328	200	38.1	8.9	194.8
S1ADX0325-328	250	38.1	8.9	245.2
S1ADX0330-328	300	30.0	9.0	294.7
S1ADX0540-328	400	52.0	8.0	395.2

Besides our portfolio and customized optics, we also offer a variety of F-Theta lenses and Beam Expanders from our former portfolio with outstanding specifications upon request. This also includes lenses for different lens markets, applications and specifications.

- **MORE WAVELENGTHS**
- **MORE FOCAL LENGTHS**
- **MORE MAGNIFICATIONS**



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### LENS SYSTEMS

Multi-element lens systems minimize the imaging errors of single lenses and provide precision focusing for non-scanning applications.

### MULTI-ELEMENT LENS SYSTEMS

PART NUMBER	FOCAL LENGTH [mm]	FOCUS SIZE 1/e <sup>2</sup> [μm]	HOUSING-Ø [mm]	LENGTH [mm]	WORKING DISTANCE [mm]	DATA-SHEET
<b>532 nm</b>						
S6ASS2020-292	25	2.4	25.0	13.5	19.3	
S6ASS2060-292	62	3.0	40.0	32.0	47.9	
S6ASS5300-292	100	5.4	41.0	16.0	86.7	
S6ASS6151-292	150	7.2	56.0	20.0	135.0	
S6ASS6200-292	200	6.6	54.0	15.0	188.5	
<b>355 nm</b>						
S6ASS2020-075	25	1.6	25.0	17.0	17.9	
S6ASS2060-075	60	2.8	40.0	30.0	46.5	
S6ASS5120-075	114	5.6	48.0	20.0	104.4	
<b>266 nm</b>						
S6ASS2020-199	24	1.4	25.0	17.0	17.1	
S6ASS2060-199	57	2.2	40.0	30.0	43.9	
S6ASS5120-199	109	4.6	48.0	20.0	99.1	

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- **MORE WAVELENGTHS**
- **MORE FOCAL LENGTHS**
- **MORE MAGNIFICATIONS**



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# TRAPPED ION LENSES

## BENEFIT FROM OUR CAPABILITIES

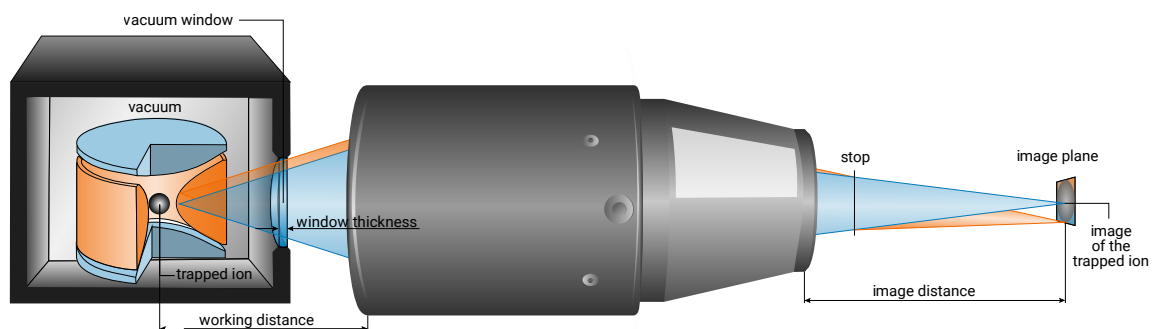


### TRAPPED ION LENSES

Trapped (cold) ions are a research topic with increasing interest over the last few years because of their possibility to store Qubits (quantum bits) and the related use for quantum computers. To make the qubits usable under certain conditions, we must observe and study their behaviour in detailed experiments first.

Sill Optics has designed lenses both, for just observation and observation combined with laser focusing for these experiments. Those lenses are exceptional for their high NA and adjustment to specific wavelengths (UV to IR). As the vacuum cryostats differ in dimension (e.g. the window thickness) every lens has to be designed specifically for the existing conditions.

PART NUMBER	WAVE-LENGTH 1 [nm]	WAVE-LENGTH 2 [nm]	MATERIAL	FOCUS LENGTH [mm]	NA	MAX. FOV [mm]	MAGNIFICATION @ WAVE-LENGTH 1	MAGNIFICATION @ WAVE-LENGTH 2	THICK-NESS WINDOW	MATERIAL WINDOW	WORKING DISTANCE [mm]
S6ASS2243-126	1064	-	optical glass	40.5	0.4	0.71	infinity	-	6.0	fused silica	50.7
S6ASS2242-081	590	1064	optical glass	40.0	0.4	0.71	infinity	infinity	6.0	fused silica	50.7
S6ASS2224	494	671	optical glass	22.0	0.5	0.08	infinity	infinity	-	-	11.6
S6ASS22255	422	-	fused silica	45.0	0.4	0.27	10.0	-	19.1	fused silica	63.4
S6ASS22256	422	-	fused silica	44.9	0.4	0.27	10.0	-	19.1	N-BK7	63.8
S6ASS22258	397	422	optical glass	44.8	0.4	0.28	10.0	10.0	19.1	N-BK7	62.3
S6ASS22258-006	397	422	optical glass	45.5	0.4	0.29	10.0	10.0	6.3	fused silica	60.5
S6ASS2241	395	729	optical glass	66.9	0.3	0.2	20.0	20.0	6.0	fused silica	55.7
S6ASS2241-045	395	729	optical glass	66.9	0.3	0.19	20.0	20.0	6.0	fused silica	55.7
S6ASS2341	370	-	optical glass	82.1	0.2	0.2	6.0	-	6.0	fused silica	55.7
S6ASS2245	369	-	fused silica	40.0	0.4	0.35	infinity	-	8.0	fused silica	39.3
S6ASS2246	369	-	fused silica	41.2	0.4	0.36	infinity	-	4.3	fused silica	38.7
S6ASS2247	369	493	fused silica	50.1	0.2	0.95	8.0	78.0	2.0	sapphire	49.4
S6ASS2247-389	313	397	fused silica	49.0	0.2	0.95	8.2	79.0	2.0	sapphire	48.2
S6ASS2248	313	397	fused silica	49.0	0.3	0.27	15.0	145.0	3.0	fused silica	46.5



In case of deviations from the portfolio and delivery times, please contact our Customer Care Team.



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Customer Care



**Sara Hildebrandt**  
Customer Care



**Lenka Hightower**  
Customer Care



**Sophia Tillack**  
Customer Care



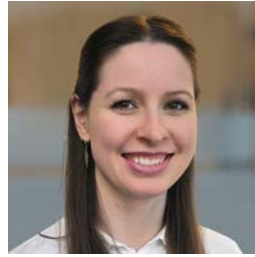
**Sabine Epner**  
Customer Care



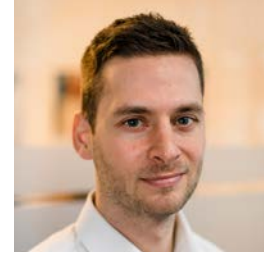
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**Dr. Jonas Herbst**  
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