

# Optical Materials for Precision Molding

## Product Information

SCHOTT offers various optical glasses specifically developed for precision molding – the so called low Tg glasses. Low Tg glasses have a glass transformation temperature suitable for precision molding and a special glass composition to decrease the tendency for devitrification and to reduce the reaction with mold materials within the molding temperature range. During a precision molding process, a polished or fire polished preform is shaped into a final geometry, while conserving its surface quality. The typical temperature range for the molding process is between 500°C and 700°C, enabling the extension of the operating lifetime of the mold material and a significant time reduction of the press process.

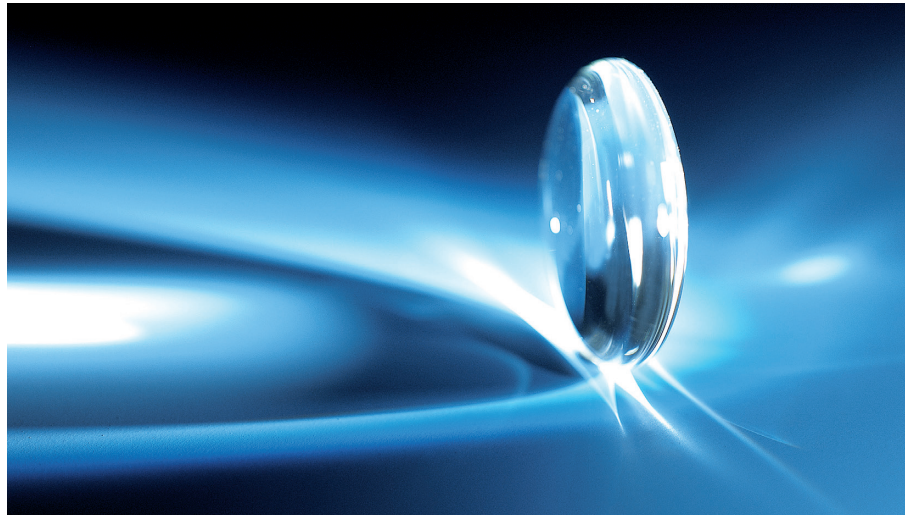
## Advantages

- Low transformation temperatures, most below 550°C, to increase lifetime of molds and to reduce process time
- Low tendency to chemical interaction between glass constituents and mold materials within the molding temperature range
- Tight optical tolerance
- Wide range of dimensions
- Various forms of supply
- Application support from SCHOTT
- Continuous extension of the portfolio ⇒ new glass types in development

## Forms of Supply

- Optical glass rods\* in various shapes and surface qualities, diameter <1–12.5 mm, length up to 1000 mm
- Ball lenses\* in different formats
- Other supply forms on request

\*individual product flyers available



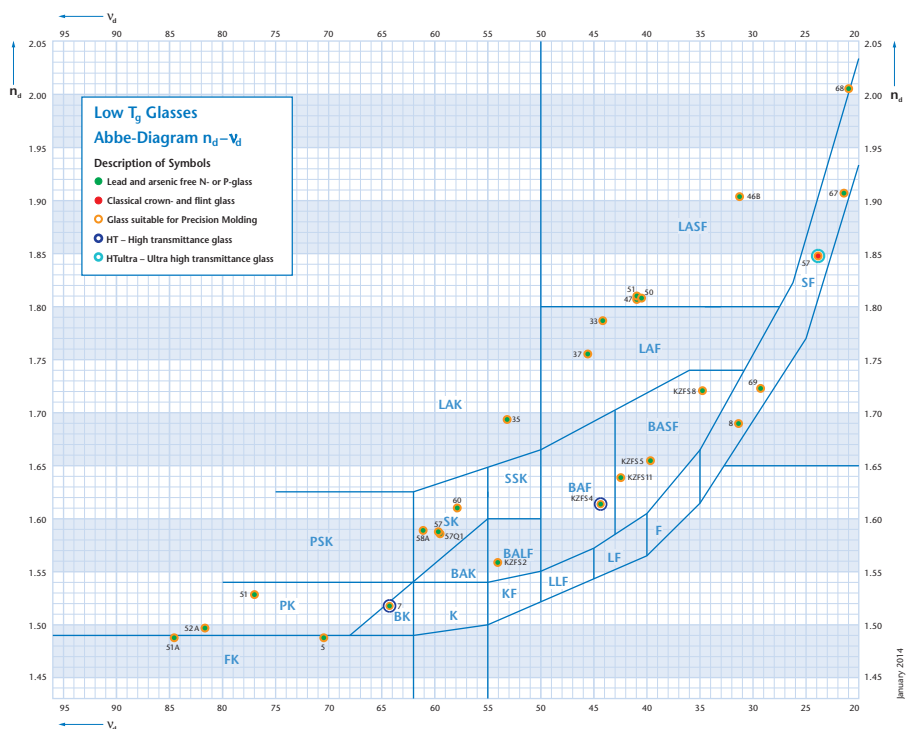
## Applications

Precision molding is the state-of-the-art technology for the volume production of complex lenses, e.g. aspheres, for various applications such as:

- Digital Projection
- Digital Cameras
- Camcorders
- Microscopy
- Industrial Applications

## Materials

### SCHOTT Low Tg Glass



Glass Type**	Optical Properties			n <sub>d</sub> ref. <sup>2</sup>	After molding <sup>3</sup>		Thermal Properties		Chemical Res.		Physical Properties			
	n <sub>d</sub> <sup>1</sup>	v <sub>d</sub> <sup>1</sup>	Color code		n <sub>d</sub>	v <sub>d</sub>	Tg [°C]	AT [°C]	SR-J <sup>4</sup> Acid Res.	WR-J <sup>4</sup> Water Res.	CTE [10 <sup>-6</sup> K <sup>-1</sup> ] <sup>5</sup>	Hardness (HK)	Abrasion Aa <sup>4</sup>	Density [g/cm <sup>3</sup> ]
N-FK51A	1.48656	84.47	34/28	1.48597	1.4847	84.2	464	503	3	1	14.8	345	528	3.68
N-FK5	1.48749	70.41	30/27	1.48666	1.4850	70.2	466	557	5	4	10.0	520	109	2.45
N-PK52A	1.49700	81.61	34/28	1.49640	1.4952	81.3	467	520	4	1	15.0	355	526	3.70
P-BK7	1.51640	64.06	33/30	1.51576	1.5144	63.9	498	546	1	4	7.3	627	66	2.43
P-PK53 <sup>i</sup>	1.52690	66.22	36/31	1.52567	1.5232	66.0	383	418	3	1	16.0	335	977	2.83
N-PK51	1.52855	76.98	34/29	1.52784	1.5267	76.7	487	528	3	1	14.1	415	592	3.86
N-KZFS2	1.55836	54.01	34/30	1.55666	1.5534	53.7	472	533	6	6	5.4	490	70	2.54
P-SK57Q1	1.58600	59.60	34/31	1.58496	1.5833	59.4	439	522	4	1	8.9	535	124	3.01
P-SK57	1.58700	59.60	34/31	1.58596	1.5843	59.4	493	522	4	1	8.9	535	124	3.01
P-SK58A	1.58913	61.15	35/31	1.58795	1.5860	60.8	510	551	4	2	8.4	662	102	2.97
P-SK60	1.61035	57.90	33/29	1.60918	1.6068	57.7	507	547	4	3	8.9	601	86	3.08
N-KZFS4	1.61336	44.49	36/32	1.61227	1.6100	44.5	536	597	6	4	8.2	520	130	3.00
N-KZFS11	1.63775	42.41	36/30	1.63658	1.6341	42.3	551	–	–	–	7.6	530	74	3.20
N-KZFS5	1.65412	39.70	37/32	1.65272	1.6498	39.8	584	648	1	1	7.4	555	122	3.04
P-SF8	1.68893	31.25	40/36	1.68623	1.6814	31.7	524	580	1	1	11.1	533	200	2.90
P-LAK35	1.69350	53.20	36/29	1.69234	1.6904	53.0	508	544	4	3	9.7	616	119	3.85
N-KZFS8	1.72047	34.70	38/33	1.71896	1.7158	34.8	509	561	1	1	9.4	570	152	3.20
P-SF69	1.72250	29.23	40/36	1.72006	1.7155	29.7	508	547	1	1	11.1	612	–	2.93
P-LAF37	1.75550	45.66	37/31	1.75396	1.7508	45.5	506	546	4	1	7.8	697	67	3.99
N-LAF33	1.78582	44.05	39/32	1.78425	1.7813	43.9	600	628	6	1	6.7	730	67	4.36
P-LASF47	1.80610	40.90	39/33	1.80449	1.8016	40.8	530	580	3	1	7.3	620	70	4.54
P-LASF50	1.80860	40.46	39/32	1.80699	1.8036	40.3	527	571	3	1	7.3	655	62	4.54
P-LASF51	1.81000	40.93	39/33	1.80842	1.8055	40.8	526	570	3	1	7.4	722	66	4.58
SF57 <sup>h</sup>	1.84666	23.83	40/37*	1.84608	1.8447	23.7	414	449	6	1	9.2	350	344	5.51
N-LASF46B	1.90366	31.32	40/36*	1.90165	1.8977	31.4	611	649	1	2	7.1	712	55	4.51
P-SF67 <sup>i</sup>	1.90680	21.40	48/39*	1.90439	1.8998	21.6	539	601	1	1	7.4	440	309	4.24
P-SF68	2.00520	21.00	49/41*	2.00365	2.0004	20.9	428	468	4–5	1	9.7	410	298	6.19

\* Wavelength for transmittance 0.7 and 0.05

\*\* Technical datasheets available at: [http://www.schott.com/advanced\\_optics/downloads/optical\\_glass](http://www.schott.com/advanced_optics/downloads/optical_glass)

<sup>1</sup> Catalog value (reference annealing rate 2 K/h)

<sup>2</sup> nd reference value (annealing rate 25 K/h)

<sup>3</sup> As pressed @ SCHOTT, for details please contact SCHOTT.

<sup>4</sup> SR-J, WR-J and Abrasion Aa according to Jogis

<sup>5</sup> Value between 20–300°C

<sup>h</sup> Also in High Transmission version available, color code 39/36

<sup>i</sup> P-PK53 will become inquiry glass as of 2014/01/01, not recommended for new designs

P-SF67 will become inquiry glass as of 2016/01/01, not recommended for new designs

N-glasses: lead & arsenic free

P-glasses: lead & arsenic free Low Tg glasses exclusively developed for precision molding

In case the optical values do not fit exactly to your applications, please get in touch with your local sales office.



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