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无色光学玻璃 红外光学玻璃

Colorless optical glass **Infrared optical glass**

無 色 光 学 ガ ラ ス 赤 外 光 学 ガ ラ ス

2025

中国·湖北新华光信息材料有限公司

前言

湖北新华光信息材料有限公司作为专业的光学材料制造商，本着“简单、务实、快乐”的管理理念，积极倡导和推进绿色生产，为客户提供高品质的光学材料、光学元件和光学镜头等产品和技术服务，也可以根据客户的特殊需求，提供新型光学玻璃材料的设计、开发与制作。目前能提供 200 多种光学玻璃的性能数据。与 2024 年手册相比，本手册新增了 1 个新产品。

本手册为最新版本，取代之前所有版本，最新数据文件请到公司网站(www.hbnhg.com)下载更新。

如果本手册中没有包含您需要的信息，请与营销人员联系，我们将一如既往地为您提供优质的服务。

湖北新华光信息材料有限公司

2025.1 修订

Preface はじめに

As a professional manufacturer in the field of optical glasses, Hubei New Huaguang Information Materials Co., Ltd. (NHG) actively advocates and promotes green production relying on the management philosophy of “Simple, Pragmatic, Happy”, and provides optical materials, optical elements, optical lens and other products as well as technical services of high quality for customers. NHG is able to design, develop and manufacture new types of optical glass materials according to customers’ special requirements. NHG currently provides the performance data of more than 200 kinds of optical glass. Comparing to the edition of Year 2024, the handbook adds one new products.

湖北新華光信息材料有限公司は光学ガラス専業メーカとして、“簡単、务実、快乐”の管理理念で、生産のエコ化を主張し、積極的に推進しています。お客様に高質量な光学材料と技術的なサービスをご提供しております。特別なご要望に対しまして、新型な光学材料のデザイン、開発と溶解生産も取り扱っています。目前、200 種類以上の光学ガラスの性能データを提供することができる。2024 年のカタログに比べて、1 種類の新製品が追加されます。

The current handbook is the latest edition, replacing all previous editions. The latest data files are available on our website: www.hbnhg.com.

本カタログは最新版で､最新のデータは当社のウェブサイドよりダウンロードすることができます(www.hbnhg.com)。ご利用ください。

If what you need is not included in this handbook, please contact with the salesman. We will, as always, provide excellent services for you.

本カタログに記載されていない項目をご希望の場合には、当社営業部門へご問い合わせください。これから、当社はいつもの通りで高品質の製品といいサービスをご提供いたします。

Hubei New Huaguang Information Materials Co., Ltd.

湖北新華光信息材料有限公司

Revised in Jan., 2025

2025.1 修訂

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产品推荐
Product recommendations
製品推奨

※ 低色散、异常色散玻璃
Low dispersion, abnormal dispersion glass　低分散、異常分散ガラス

H-FK 系列　H-FK series　H-FK シリーズ

该类玻璃具有极低的折射率温度系数、色散系数大，还具有较高的特殊相对部分色散，在光学系统设计中能有效解决温度漂移、消除二级光谱；且软化温度低，可用于精密模压，实现光学系统的小型化和轻量化。

The H-FK series glass has very low dn/dt coefficient, large dispersion coefficient and relatively high special relative partial dispersion. In optical design system, the H-FK series glass can be used to effectively solve the temperature shift and eliminate secondary spectrum. The H-FK series glass can be used for precision mould pressing to realize the miniaturization and lightweight of optical system due to the low softening points.

この種類のガラスはもっと低い屈折率温度係数、分散係数が大きく、もっと高い特殊な相対部分分散を有し、光学系設計において温度ドリフトを効果的に解決し、二次スペクトルを除去することができ、軟化温度が低く、精密プレスに用いることができ、光学システムの小型化と軽量化を実現する。

性能 Properties		H-FK61	H-FK69	H-FK76	H-FK90	H-FK95
n_d		1.49700	1.59282	1.55032	1.45860	1.43700
υ_d		81.61	68.63	75.50	90.19	95.10
相对折射率温度系数 $dn/dt_{rel.}$ Temperature coefficient of refractive index (d 线，20-40℃，$\times 10^{-6}$/℃)		-6.0	-5.6	-5.8	-6.5	-6.4
异常色散 $\Delta P_{g,F}$ Abnormal dispersion		0.0305	0.0145	0.0210	0.0450	0.0475
膨胀系数 $\alpha_{-50/80℃}$ ($\times 10^{-7}$/K) Thermal expansion coefficient		124	113	122	134	143
转变温度 Tg Transformation temperature (℃)		464	584	553	442	409
弛垂温度 Ts Sag temperature (℃)		489	608	576	467	433
密度 ρ Density (g/cm^3)		3.67	4.07	4.13	3.64	3.56
磨耗度 F_A Abrasion		385	365	420	459	449
耐水性 Dw Water resistance		1	1	1	2	2
耐酸性 D_A Acid resistance		3	3	2	3	3
耐碱性 R_{OH}(S) Alkali resistance		2	2	2	4	4
耐洗涤性 RP(S) Phosphate resistance		2	2	2	2	3
内部透过率 (τ 10mm) Internal Transmittance	460nm	0.998	0.998	0.998	0.998	0.997
	400nm	0.998	0.994	0.998	0.998	0.997
	360nm	0.975	0.909	0.978	0.996	0.988

H-PK 系列　H-PK series　H-PK シリーズ

该类玻璃具有负的折射率温度系数、较大的色散系数和特殊的相对部分色散，与火石玻璃配合使用可以消除透镜的像差和色差，同时膨胀系数小、加工性能好。

The H-PK series glass has the negative dn/dt coefficient, large dispersion coefficient and special relative partial dispersion. The H-PK series glass can be used with flint glass to eliminate the aberration and chromatic aberration of the lens. The H-PK series glass also has the advantage of low expansion coefficient and good processability.

この種類のガラスは負の屈折率温度係数、大きな分散係数と特殊な相対部分分散を有し、フリントガラスと組み合わせて使用する場合、レンズの収差と色差を解消することができ、同時に膨張係数が小さく、加工性能が良い。

性能 Properties		H-PK60	H-PK62A	H-PK63	H-PK65	H-PK71
n_d		1.59349	1.61800	1.60300	1.61997	1.56907
υ_d		67.00	63.39	65.44	63.88	71.30
相对折射率温度系数 $dn/dt_{rel.}$ Temperature coefficient of refractive index (d 线，20-40℃，$\times 10^{-6}$/℃)		-1.8	-2.4	-3.4	-2.9	-9.5
异常色散 $\Delta P_{g,F}$ Abnormal dispersion		0.0039	0.0012	0.0023	0.0045	0.0199
膨胀系数 $\alpha_{-50/80℃}$ ($\times 10^{-7}$/K) Thermal expansion coefficient		87	94	93	103	123
转变温度 Tg Transformation temperature (℃)		509	616	604	568	480
弛垂温度 Ts Sag temperature (℃)		538	649	632	594	509
密度 ρ Density (g/cm^3)		3.27	3.53	3.64	3.52	4.27
磨耗度 F_A Abrasion		299	320	351	315	435
耐水性 Dw Water resistance		1	1	1	1	1
耐酸性 D_A Acid resistance		4	4	4	4	1
耐碱性 R_{OH}(S) Alkali resistance		1	1	2	1	1
耐洗涤性 RP(S) Phosphate resistance		2	2	2	2	2
内部透过率 (τ10mm) Internal Transmittance	460nm	0.998	0.998	0.998	0.986	0.998
	400nm	0.988	0.990	0.988	0.967	0.998
	360nm	0.952	0.906	0.936	0.785	0.983

异常色散玻璃　Abnormal dispersion glass　異常分散ガラス

该类玻璃具有异常色散特性，与其它玻璃组合使用时，可有效消除色差、改善成像质量；还具备膨胀系数小、加工性能和化学稳定性优异等特性。

The abnormal dispersion glass has the abnormal dispersion properties. It can be used to eliminate the chromatic aberration and improve the image quality by using with the other glass. The abnormal dispersion glass has the advantage of low expansion coefficient, good processability and excellent chemical stability.

この種類のガラスは異常分散特性を有し、他のガラスと組み合わせて使用する場合、色収差を効果的に解消し、結像品質を改善することができて、膨張係数が小さい、加工性能と化学安定性に優れるなどの特性を備える。

性能 Properties		H-TF3L	H-ZBaF65	H-ZF56	H-ZLaF86
n_d		1.61340	1.65412	1.85478	1.88252
υ_d		44.11	39.68	24.80	27.00
相对折射率温度系数 $dn/dt_{rel.}$ Temperature coefficient of refractive index (d 线，20-40℃，$\times 10^{-6}$/℃)		5.1	3.6	2.9	3.2
异常色散$\Delta P_{g,F}$ Abnormal dispersion		-0.0080	-0.0050	0.0094	0.0137
膨胀系数$\alpha_{-50/80℃}$($\times 10^{-7}$/K) Thermal expansion coefficient		62	74	76	70
转变温度 Tg Transformation temperature (℃)		579	609	585	717
弛垂温度 Ts Sag temperature (℃)		623	671	623	762
密度ρ Density (g/cm^3)		2.84	3.01	3.49	4.05
硬度 HK Hardness (10^7Pa)		575	565	572	608
磨耗度 F_A Abrasion		111	141	201	94
耐水性 Dw Water resistance		1	1	1	1
耐酸性 D_A Acid resistance		1	1	1	1
耐碱性 R_{OH}(S) Alkali resistance		1	1	1	1
耐洗涤性 RP(S) Phosphate resistance		1	1	1	2
内部透过率 (τ10mm) Internal Transmittance	460nm	0.992	0.994	0.957	0.929
	400nm	0.980	0.983	0.797	0.647
	360nm	0.899	0.813	0.080	/

※ 高折射率玻璃
High refractive index glass 高屈折率ガラス

透过率提升系列　Transmittance enhancement series　透過率向上シリーズ

通过工艺优化，该系列玻璃在蓝紫光范围内的透过率显著提高，除透过性能以外的其它性能保持不变。

The transmittance of this series glass is significantly improved in the blue-violet light range through the process optimization while the other properties except transmittance property remain the same.

技術最適化に経って、このシリーズのガラスの青紫色光の範囲内での透過率は著しく向上し、透過性能以外の性能は変わらない。

性能 Properties		H-ZF62GT	H-ZF72GT	H-ZF75GT	H-ZLaF70GT	H-ZLaF80A	H-ZLaF82GT
n_d		1.92286	1.92286	1.94595	1.90366	2.00069	2.00100
υ_d		20.88	18.90	17.98	31.32	25.46	29.14
相对折射率温度系数 $dn/dt_{rel.}$ Temperature coefficient of refractive index (d 线，20-40℃，$\times 10^{-6}$/℃)		1.9	2.4	3.5	4.2	4.2	4.3
异常色散 $\Delta P_{g,F}$ Abnormal dispersion		0.0284	0.0377	0.0412	0.0031	0.0146	0.0045
膨胀系数 $\alpha_{-50/80℃}$ ($\times 10^{-7}$/K) Thermal expansion coefficient		61	65	54	66	73	70
转变温度 Tg Transformation temperature (℃)		690	656	682	679	700	725
弛垂温度 Ts Sag temperature (℃)		725	684	709	707	740	761
密度 ρ Density (g/cm^3)		3.93	3.57	3.53	4.54	4.76	5.02
硬度 HK Hardness (10^7Pa)		485	488	510	640	630	720
磨耗度 F_A Abrasion		228	206	199	80	78	61
耐水性 Dw Water resistance		1	1	1	1	1	1
耐酸性 D_A Acid resistance		1	1	1	2	1	1
耐碱性 R_{OH}(S) Alkali resistance		1	1	1	1	1	1
耐洗涤性 RP(S) Phosphate resistance		1	1	1	1	1	1
内部透过率 Internal Transmittance (10mm)	460nm	0.965	0.949	0.946	0.975	0.894	0.969
	400nm	0.700	0.450	0.365	0.886	0.542	0.850

铋玻璃系列　Bismuth glass series　ビスマスシリーズ

该类玻璃具有超过 2.0 的特高折射率，能有效增大视场角，实现光学系统的小型化，可广泛应用于 AR/VR、监控、数码相机、投影、车载、手机、光通信、医疗等领域。

This series glass has the extremely high refractive index of over 2.0 and can be used to increase the FOV to realize the miniaturization of optical systems. The series glass can be widely used in the fields such as AR/VR, CCTV, digital camera, projection, auto ,cellphone, photo-communication and medical treatment.

この種類のガラスは 2.0 以上の超高屈折率を有し、視野角を効果的に増大させ、光学システムの小型化設計を実現でき、AR/VR、監視、デジタルカメラ、投影、車載、スマートフォン、光通信、医療などの分野に広く応用できる。

性能 Properties		H-BiF200	H-BiF210
n_d		2.00272	2.10420
υ_d		19.32	17.02
相对折射率温度系数 $dn/dt_{rel.}$ Temperature coefficient of refractive index (d 线，20-40℃，$\times 10^{-6}$/℃)		7.8	/
异常色散 $\Delta P_{g,F}$ Abnormal dispersion		0.0304	/
膨胀系数 $\alpha_{-50/80℃}$ ($\times 10^{-7}$/K) Thermal expansion coefficient		75	69
转变温度 Tg Transformation temperature (℃)		519	580
弛垂温度 Ts Sag temperature (℃)		558	611
密度 ρ Density (g/cm^3)		5.10	5.40
硬度 HK Hardness (10^7Pa)		403	411
磨耗度 F_A Abrasion		251	155
耐水性 Dw Water resistance		1	1
耐酸性 D_A Acid resistance		1	1
耐碱性 $R_{OH}(S)$ Alkali resistance		1	1
耐洗涤性 RP(S) Phosphate resistance		1	1
内部透过率 (τ10mm) Internal Transmittance	460nm	0.838	/
	400nm	0.038	/

※ 高强度、高信赖性玻璃

High strength, high reliability glass 高強度･高信頼性ガラス

机械强度高、耐热冲击强度高，化学稳定性好，透过率高，深受客户欢迎，能够有效满足高性能光学系统的设计需求。

This kind of glass has high mechanical strength, high thermal shock strength, good chemical stability, high transmittance, and are well received by customers, effectively meeting the design needs of high performance optical systems.

耐機械強度、耐熱衝撃強度が高くて、優れた化学安定性、高い透過率があり、顧客の高性能光学システムの設計ニーズを効果的に満たすことができます。

性能 Properties		H-LaF50B	H-ZLaF50	H-ZLaF64	H-ZLaF68A	H-ZLaF72	H-ZLaF72A
n_d		1.77250	1.80400	1.87070	1.88300	1.91082	1.91082
υ_d		49.60	46.58	40.73	40.79	35.25	35.25
相对折射率温度系数 $dn/dt_{rel.}$ Temperature coefficient of refractive index (d 线，20-40℃，$\times 10^{-6}$/℃)		3.4	4.7	3.3	6.0	6.3	4.7
异常色散 $\Delta P_{g,F}$ Abnormal dispersion		-0.0097	-0.0095	-0.0076	-0.0067	-0.0014	-0.0014
膨胀系数 $\alpha_{-50/80℃}$ ($\times 10^{-7}$/K) Thermal expansion coefficient		56	61	68	68	67	68
转变温度 Tg Transformation temperature (℃)		682	688	719	695	712	714
弛垂温度 Ts Sag temperature (℃)		701	713	746	742	752	756
密度 ρ Density (g/cm^3)		4.23	4.47	4.84	5.47	4.88	4.82
硬度 HK Hardness (10^7Pa)		713	712	671	682	663	676
磨耗度 F_A Abrasion		62	65	91	58	74	67
耐候性 RC(S) Humidity resistance		1	1	1	1	1	1
耐酸性 RA(S) Acid resistance		1	2	1	1	1	1
耐水性 Dw Water resistance		1	1	1	1	1	1
耐酸性 D_A Acid resistance		3	3	2	2	1	1
耐碱性 R_{OH}(S) Alkali resistance		1	1	1	1	1	1
耐洗涤性 Phosphate resistanceRP(S)		1	1	1	1	1	1
内部透过率 (τ10mm) Internal Transmittance	460nm	0.996	0.991	0.979	0.985	0.948	0.968
	400nm	0.980	0.973	0.933	0.937	0.837	0.856
	360nm	0.861	0.869	0.727	0.730	0.261	0.245

※ 光波导用玻璃材料
Glass material for wave guides ウェイブガイド用ガラス素材

NHG 可提供折射率 1.5~2.0 范围内，最大规格 12 寸的多款适合光波导用的玻璃材料，该类材料具有较高的透过率、相对较低的密度和优异的化学稳定性等。特别是 H-ZLaF82 产品折射率高达 2.001，在高折射率的 H-ZLaF 系列中，是透过率最高的玻璃材料，在光学设计中可以提高视场角，蓝波区域光损失少，可用于各种领域，如波导基材。

NHG can provide a variety of glass materials for optical waveguide application whose refractive index ranges from 1.5-2.0 while the maximum size is 12 inches. The material has the relatively high transmittance, relatively low density and excellent chemical stability. H-ZLaF82 glass material has the highest refractive index 2.001 among the high refractive H-ZLaF series glass. The H-ZLaF series glass material can be used to increase FOV in optical design. The light loss in blue wave region is low. This kind of glass material can be used in various fields such as waveguide substrate.

NHG は屈折率 1.5 ~ 2.0 の範囲内で、最大規格 12 寸の複数の光導波路用ガラス材料を提供することができ、このような材料は高透過率、もっと低い密度、優れた化学安定性などを持っている。特に H-ZLaF 82 の屈折率は 2.001 に達し、高屈折率の H-ZLaF シリーズの中で、透過率が一番高いガラス材料であり、光学設計において視野角を高めることができ、青波領域の光損失が少なく、導波路基材などの様々な分野に広く応用できる。

性能 Properties		H-QF14	H-LaF2	H-ZF7LGT	H-ZF62GT	H-ZLaF70GT	H-ZLaF82GT
n_d		1.59551	1.71700	1.80518	1.92286	1.90366	2.00100
υ_d		39.22	47.89	25.46	20.88	31.32	29.14
杨氏模量 Young's modulus	E (GPa)	75.3	95.4	93.6	98.0	117.6	133.7
剪切模量 Shear modulus	G (GPa)	30.9	36.1	36.1	39.0	45.6	50.0
泊松比 Poisson ratio	μ	0.221	0.320	0.296	0.257	0.288	0.338
密度 Density	ρ (g/cm^3)	2.71	4.18	3.38	3.93	4.54	5.02
硬度 Hardness	HK (10^7Pa)	534	516	523	485	640	720
磨耗度 Abrasion	F_A	168	180	186	228	80	61
膨胀系数 Expansion coefficient	$\alpha_{-50/80℃}$ ($10^{-7}/K$)	80	73	88	61	66	70
转变温度 Transformation temperature	Tg (℃)	546	645	606	690	679	725
耐水性 Water resistance	D_W	1	1	1	1	1	1
耐酸性 Acid resistance	D_A	1	3	1	1	2	1
内部透过率 Internal Transmittance (τ 10mm)	480nm	0.998	0.998	0.983	0.975	0.983	0.979
	460nm	0.994	0.998	0.980	0.965	0.975	0.969
	420nm	0.986	0.996	0.953	0.894	0.942	0.919
	400nm	0.980	0.986	0.904	0.700	0.886	0.850

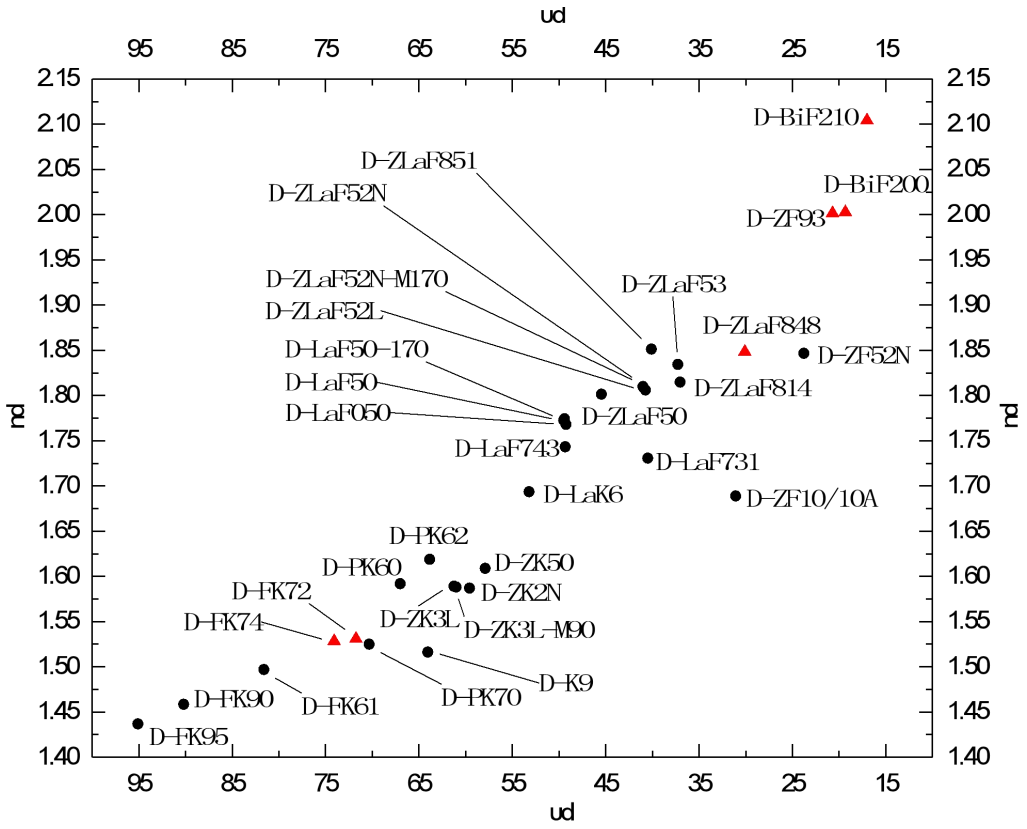
※ 低熔点玻璃系列产品
Low softening point glass series　非球面用ガラス推奨硝種

低熔点玻璃目前能提供 27 个玻璃品种的批量供货。
At present, 27 types of low softening point glass are available in volume.
目前、27 種類の非球面用ガラスを量産的に出荷できます。

低熔点玻璃材料的折射率和阿贝数通常按照-30℃/H 达到标准值进行控制，也可按照-4℃/H 控制，允许波动范围：n_d±0.00050，υ_d±0.5% 。
The refractive index and Abbe number of low melting point glass materials are usually controlled according to the standard value of -30°C/H, and can also be controlled according to -4°C/H, and the allowable ranges are: n_d±0.00050，υ_d±0.5%.
新華光の非球面用ガラスはガラス移転点温度付近から-30℃/H 或いは-4℃/H でアニールしたときに本カタログ基準値及び規格公差内であることを保証するものです。公差は n_d±0.00050，υ_d±0.5%です。

可提供-60~160℃每隔 20℃的折射率温度系数、-50~160℃每隔 10℃的膨胀系数、模压前后折射率对照表、不同降温速率下折射率参考表等。并可根据客户需求，提供非球面精密模压技术支持。
We can provide temperature coefficients of refractive indices every 20℃ from -60℃ to 160℃, thermal expansion coefficients of every 10℃ from -50℃ to 160℃, comparison table of refractive indices before and after precision molding, reference table of refractive indices at different cooling rates, etc. We can also provide technical support of aspheric precision molding according to customers' demands.
-60~160℃の温度範囲に 20℃毎の屈折率温度係数、-50~160℃の温度範囲に 10℃毎の膨脹係数、モールドプレス前後の屈折率対照、冷却速度に対する屈折率の変化量などのデータが提供できます。お客様のニーズに対して、非球面レンズのモールドプレス条件など、技術的なサポートも可能です。

低熔点玻璃推荐牌号　Low softening point glass series　非球面用ガラス推奨硝種



光学玻璃牌号对照表
Comparison table of optical glass types 光学ガラスの対照表

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
497816	H-FK61	S-FPL51	H-FK61B	FCD1	N-PK52A	54
593686	H-FK69	(S-FPM2)	H-ZPK5	FCD515		55
550755	H-FK76		H-FK55	FCD705		56
459902	H-FK90		(H-FK71)	FCD10A	(N-FK58)	57
437951	H-FK95	(S-FPL53)	(H-FK95N)	FCD100		58
487704	H-QK3L	S-FSL5	H-QK3L	FC5	N-FK5	59
593670	H-PK60	(S-FPM2)	H-ZPK3	PCD51		60
618634	H-PK62A	S-PHM52	H-ZPK1A	PCD4	N-PSK53A	61
603654	H-PK63	S-PHM53	H-ZPK2A			62
620639	H-PK65	(S-PHM52)	(H-ZPK1A)	PCD40	(N-PSK53A)	63
569713	H-PK71		H-ZPK7	(FCD615)		64
511605	H-K6		H-K6		K7	65
517642	H-K9L	S-BSL7	H-K9L	BSC7	N-BK7	66
518590	H-K10	S-NSL3	H-K10	E-C3	(N-K5)	67
534555	H-K12		H-K12			68
523586	H-K51	(S-NSL3)	H-K51	(E-C3)	(N-K5)	69
540597	H-BaK2	S-BAL12	H-BaK2		N-BAK2	70
569560	H-BaK7B	S-BAL14	H-BaK7	BAC4	N-BAK4	71
573575	H-BaK8		H-BaK8		N-BAK1	72
589613	H-ZK3A	S-BAL35	H-ZK3A	BACD5	N-SK5	73
613586	H-ZK6		H-ZK6	BACD4	N-SK4	74
613606	H-ZK7		H-ZK7A			75
620603	H-ZK9	S-BSM16	H-ZK9B	BACD16	N-SK16	76
620603	H-ZK9A	S-BSM16	H-ZK9A	BACD16	N-SK16	77
622567	H-ZK10	(S-BSM10)	H-ZK10	(E-BACD10)	(N-SK10)	78
623570	H-ZK10N	S-BSM10	H-ZK10L	E-BACD10	N-SK10	79
639555	H-ZK11	S-BSM18	H-ZK11	BACD18		80
603606	H-ZK14	S-BSM14	H-ZK14	BACD14	N-SK14	81
617539	H-ZK20		H-ZK20			82
623581	H-ZK21	S-BSM15	H-ZK21	BACD15	N-SK15	83
607567	H-ZK50	S-BSM2	H-ZK50	BACD2	N-SK2	84
660574	H-LaK1		H-LaK1			85
691547	H-LaK2	S-LAL9	H-LaK59A	LAC9	N-LAK9	86
692545	H-LaK2H	(S-LAL9)	H-LaK2A	(LAC9)	(N-LAK9)	87
747510	H-LaK3	(S-LAM60)	H-LaK3		(N-LAK28)	88
640602	H-LaK4L	S-BSM81	H-LaK4L	LACL60	N-LAK21	89
678555	H-LaK5A	S-LAL12Q	H-LaK5A	LAC12	N-LAK12	90
694533	H-LaK6	L-LAL13	H-LaK6A	LAC13		91
713539	H-LaK7	S-LAL8	H-LaK7A	LAC8	N-LAK8	92

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
720503	H-LaK8A	S-LAL10	H-LaK8A	LAC10	N-LAK10	93
720503	H-LaK8B	S-LAL10	H-LaK8B	LAC10	N-LAK10	94
699511	H-LaK9	S-LAL20				95
651559	H-LaK10	S-LAL54Q	H-LaK10		N-LAK22	96
651562	H-LaK11	S-LAL54Q	H-LaK10		N-LAK22	97
697562	H-LaK12	(S-LAL14)	H-LaK12		(N-LAK14)	98
652584	H-LaK50A	S-LAL7Q	H-LaK50A	LAC7	N-LAK7	99
697555	H-LaK51	S-LAL14	H-LaK51A	LAC14	N-LAK14	100
697555	H-LaK51A	S-LAL14	H-LaK51A	LAC14	N-LAK14	101
729547	H-LaK52	S-LAL18	H-LaK52	TAC8	N-LAK34	102
755523	H-LaK53A	S-LAH97	H-LaK53A	TAC6	N-LAK33B	103
755523	H-LaK53B	S-LAH97	H-LaK53B	TAC6	N-LAK33B	104
734511	H-LaK54	S-LAL59	H-LaK54	TAC4		105
741527	H-LaK61	S-LAL61	H-LaK61	TAC2		106
678507	H-LaK68					107
775503	H-LaK77	(S-LAH66)		(TAF1)	(N-LAF34)	108
517522	H-KF6	S-NSL36	H-KF6	E-CF6		109
596392	H-QF14		H-QF14	E-F8		110
581409	H-QF50	S-TIL25	H-QF50A	E-FL5	LF5	111
603380	H-F1	S-TIM5	H-F1	E-F5	F5	112
620364	H-F4	S-TIM2	H-F4	E-F2	N-F2	113
626357	H-F13		H-F13	E-F1		114
648338	H-ZF1		H-ZF1	E-FD2	N-SF2	115
648338	H-ZF1B		H-ZF1A	E-FD2	N-SF2	116
673322	H-ZF2	S-TIM25	H-ZF2	E-FD5	N-SF5	117
717295	H-ZF3	S-TIH1	H-ZF3	E-FD1L	N-SF1	118
728283	H-ZF4	S-TIH10	H-ZF4A	E-FD10L	N-SF10	119
728283	H-ZF4GT		H-ZF4AGT			120
728283	H-ZF4A	S-TIH10	H-ZF4A	E-FD10L	N-SF10	121
728283	H-ZF4AGT		H-ZF4AGT			122
740283	H-ZF5	S-TIH3	H-ZF5	(E-FD13)		123
740283	H-ZF5GT					124
755275	H-ZF6	S-TIH4	H-ZF6	E-FD4L	N-SF4	125
755275	H-ZF6GT					126
805255	H-ZF7L	S-TIH6	H-ZF7LA	FD60	N-SF6	127
805255	H-ZF7LGT		H-ZF7LAGT	FD60-W	N-SF6HTultra	128
689312	H-ZF10	S-TIM28	H-ZF10	E-FD8	N-SF8	129
699301	H-ZF11	S-TIM35	H-ZF11	E-FD15L	N-SF15	130
762266	H-ZF12	S-TIH14	H-ZF12	FD140	N-SF14	131
762266	H-ZF12GT					132
785257	H-ZF13	S-TIH11	H-ZF13		N-SF11	133
785257	H-ZF13GT		H-ZF13GT			134
741278	H-ZF50	S-TIH13	H-ZF50	E-FD13		135

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
741278	H-ZF50GT					136
847238	H-ZF52N	S-TIH53W	H-ZF52GT	FDS90-SG	N-SF57HT	137
847238	H-ZF52NGT	S-TIH53W	H-ZF52TT	FDS90-SG	N-SF57HTultra	138
855248	H-ZF56	S-NBH56		NBFD25		139
923209	H-ZF62		H-ZF62	E-FDS1	N-SF66	140
923209	H-ZF62GT		H-ZF62GT	E-FDS1-W		141
923189	H-ZF72B	S-NPH2	H-ZF72A			142
923189	H-ZF72GT		H-ZF72AGT			143
946180	H-ZF75A		H-ZF88	FDS18		144
946180	H-ZF75GT		H-ZF88GT	FDS18-W		145
959175	H-ZF76	S-NPH3	H-ZF73			146
613441	H-TF3L	S-NBM51	H-TF3L	E-ADF10	N-KZFS4	147
657511	H-ZBaF3	(S-BSM25)	H-ZBaF3	(BACED5)	(N-SSK5)	148
671473	H-ZBaF5		H-ZBaF5	(BAF10)	(N-BAF10)	149
618498	H-ZBaF10	S-BSM28			N-SSK8	150
667484	H-ZBaF16	S-BAH11	H-ZBaF16	BAF11		151
667484	H-ZBaF16A	S-BAH11	H-ZBaF16	BAF11		152
702412	H-ZBaF20	S-BAH27	H-ZBaF20	BAFD7	(N-BASF64)	153
723380	H-ZBaF21	S-BAH28	H-ZBaF21	BAFD8		154
658509	H-ZBaF50	S-BSM25	H-ZBaF50	BACED5	N-SSK5	155
670472	H-ZBaF52		H-ZBaF52	BAF10	N-BAF10	156
654397	H-ZBaF65	S-NBH5	H-TF5	E-ADF50	N-KZFS5	157
694492	H-LaF1	(S-LAL58)	H-LaF1			158
717479	H-LaF2	S-LAM3	H-LaF2	LAF3	N-LAF3	159
717479	H-LaF2A	S-LAM3	H-LaF2	LAF3	N-LAF3	160
744449	H-LaF3B	S-LAM2	H-LaF3B	LAF2	N-LAF2	161
744449	H-LaF3C	S-LAM2	H-LaF3B	LAF2	N-LAF2	162
750350	H-LaF4	S-LAM7	H-LaF4	E-LAF7	N-LAF7	163
750350	H-LaF4A	S-LAM7	H-LaF4	E-LAF7	N-LAF7	164
757477	H-LaF6LB		H-LaF6LA			165
782371	H-LaF7		H-LaF7			166
788475	H-LaF10A	S-LAH64	H-LaF10LA	TAF4	N-LAF21	167
773496	H-LaF50	S-LAH66	H-LaF50B	TAF1	N-LAF34	168
773496	H-LaF50B	S-LAH66	H-LaF50B	TAF1	N-LAF34	169
700481	H-LaF51		H-LaF51			170
786442	H-LaF52	S-LAH51	H-LaF52	NBFD11	N-LAF33	171
743492	H-LaF53	S-LAM60	H-LaF53	NBF1	N-LAF35	172
800423	H-LaF54	S-LAH52	H-LaF54	NBFD12	N-LAF36	173
750353	H-LaF55	S-NBH51				174
800422	H-LaF56	S-LAH52Q		NBFD12		175
720437	H-LaF62		H-LaF62			176

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
720460	H-LaF72			(LAF3)		177
762401	H-LaF76	S-LAM55	H-LaF55			178
802443	H-ZLaF1		H-ZLaF1			179
803468	H-ZLaF2	(S-LAH65V)	H-ZLaF2A	(TAF3)	(N-LASF44)	180
855366	H-ZLaF3		H-ZLaF3			181
804466	H-ZLaF50	S-LAH65V	H-ZLaF50E	TAF3D	N-LASF44	182
805396	H-ZLaF51	S-LAH63Q	H-ZLaF51	NBFD3	(N-LASF43)	183
806410	H-ZLaF52	S-LAH53	H-ZLaF52A	NBFD13	N-LASF43	184
834373	H-ZLaF53	S-LAH60	H-ZLaF53B	NBFD10	N-LASF40	185
816466	H-ZLaF54	S-LAH59	H-ZLaF69	TAF5		186
816466	H-ZLaF54A	S-LAH59	H-ZLaF69A	TAF5		187
835427	H-ZLaF55F	S-LAH55V	H-ZLaF55D	TAFD5G	N-LASF41	188
806333	H-ZLaF56		H-ZLaF56B	NBFD15		189
806333	H-ZLaF56B		H-ZLaF56B	NBFD15		190
800298	H-ZLaF57	S-NBH55				191
852408	H-ZLaF59	S-LAH89				192
850323	H-ZLaF60	S-LAH71	H-ZLaF71		N-LASF9	193
850323	H-ZLaF60GT		H-ZLaF71AGT		N-LASF9HT	194
850323	H-ZLaF60A	S-LAH71	H-ZLaF71		N-LASF9	195
871407	H-ZLaF64			TAFD32		196
874306	H-ZLaF65					197
801350	H-ZLaF66A	S-LAM66	H-ZLaF66		N-LASF45	198
881401	H-ZLaF67	(S-LAH58)	H-ZLaF73	TAFD33	(N-LASF31A)	199
883408	H-ZLaF68A	S-LAH58	H-ZLaF68B	TAFD30	N-LASF31A	200
883392	H-ZLaF68L		H-ZLaF68N			201
904313	H-ZLaF70	S-LAH95	H-ZLaF75A	TAFD25	N-LASF46A	202
904313	H-ZLaF70GT					203
904313	H-ZLaF70B	S-LAH95	H-ZLaF75A	TAFD25	N-LASF46A	204
911353	H-ZLaF72	(S-LAH93)	H-ZLaF4LA	TAFD35L		205
911353	H-ZLaF72A	(S-LAH93)	H-ZLaF4LB	TAFD35		206
950294	H-ZLaF75				(N-LASF55)	207
850301	H-ZLaF76	S-NBH57	H-ZLaF76		(N-LASF9)	208
850301	H-ZLaF76A	S-NBH57	H-ZLaF76		(N-LASF9)	209
954323	H-ZLaF77A	S-LAH98	H-ZLaF89LA	TAFD45L	(N-LASF55)	210
901371	H-ZLaF78		H-ZLaF78B	TAFD37A		211
921240	H-ZLaF79			FDS24		212
001255	H-ZLaF80		H-ZLaF90	TAFD40		213
001255	H-ZLaF80A		H-ZLaF90	TAFD40		214

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
001291	H-ZLaF82	S-LAH99	(H-ZLaF92)	TAFD55	SCHOTT RealView® 2.0	215
001291	H-ZLaF82GT	S-LAH99W		TAFD55-W		216
883270	H-ZLaF86					217
051269	H-ZLaF95		H-ZLaF96	TAFD65		218
003193	H-BiF200			E-FDS2		219

(　　)：附近牌号，Δn_d 超过±0.00050 或$\Delta \upsilon_d$ 超过±0.5；

(　　)：Nearby types, Δn_d exceeds ±0.00050 or $\Delta \upsilon_d$ exceeds ±0.5;

(　　)：近傍硝種，他社材との n_d の差が 0.00050 以上、または他社材とのυ_d の差が 0.5 以上；

低熔点玻璃牌号对照表
Comparison table of low softening point glass types 非球面レンズ用ガラス

代码 Code	牌号/Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SUMITA	
497816	D-FK61		D-FK61A-25	M-FCD1	K-PFK80	220
459902	D-FK90				K-PFK90	221
437951	D-FK95		(D-FK95-25)		(K-CaFK95)	222
516641	D-K9	L-BSL7	(D-K9-25)		K-BK7	223
592670	D-PK60		(D-ZPK3-25)	M-PCD51	(K-PSK400)	224
619639	D-PK62		(D-ZPK1A-25)	M-PCD4	(K-PSKn2)	225
525703	D-PK70		(D-PK3-25)		K-PMK30	226
587596	D-ZK2N	(L-BAL42)	(D-ZK2L-25)	(M-BACD12)	K-CSK120	227
589613	D-ZK3L	L-BAL35	(D-ZK3-25)	M-BACD5N	K-SKLD5	228
588610	D-ZK3L-M90	(L-BAL35)	D-ZK3-25	(M-BACD5N)	(K-SKLD5)	229
609579	D-ZK50		(D-ZK79-25)		(K-VC79)	230
694532	D-LaK6	L-LAL13	(D-LaK6-25)	M-LAC130	K-VC80	231
689311	D-ZF10	(L-TIM28)	(D-ZF10-25)	M-FD80	K-SFLD8	232
689311	D-ZF10A	(L-TIM28)	(D-ZF10-25)	M-FD80	K-SFLD8	233
847238	D-ZF52N					234
002207	D-ZF93		(D-ZF93-25)		K-PSFn2	235
768492	D-LaF050	(L-LAH91)	(D-LaF050-25)	M-TAF101	(K-LaFK50T)	236
773495	D-LaF50		D-LaF50-25	M-TAF105	K-LaFK50	237
774494	D-LaF50-170		(D-LaF50-25)	(M-TAF105)	(K-LaFK50)	238
731405	D-LaF731	L-LAM69	(D-LaF79-25)	M-LAF81		239
743493	D-LaF743	L-LAM60	(D-LaF53-25)	M-NBF1	K-LaFn5	240
801455	D-ZLaF50		(D-ZLaF50-25)	M-TAF31		241
806407	D-ZLaF52L	L-LAH53	(D-ZLaF81-25)	M-NBFD130		242
810410	D-ZLaF52N	(L-LAH53)	(D-ZLaF52LA-25)	(M-NBFD130)	K-VC89	243
808409	D-ZLaF52N-M170	L-LAH84	D-ZLaF52LA-25	MC-NBFD135	(K-LaSFn1)	244
834373	D-ZLaF53			M-NBFD10		245
815370	D-ZLaF814					246
851401	D-ZLaF851	(L-LAH85V)	D-ZLaF85A-25	M-TAFD305	(K-VC185)	247

(　　)：附近牌号，Δn_d 超过±0.00050 或$\Delta \upsilon_d$ 超过±0.5；

(　　)：Nearby types, Δn_d exceeds ±0.00050 or $\Delta \upsilon_d$ exceeds ±0.5;

(　　)：近傍牌号，他社材との n_d の差が 0.00050 以上、または他社材とのυ_d の差が 0.5 以上；

非环保玻璃牌号对照表
Comparison table of non-environmentally friendly glass types 非エコガラスの対照表

代码 Code	牌号/Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
620364	F4		F4		F2	248
648338	ZF1		ZF1		SF2	249
673322	ZF2		ZF2		SF5	250
717295	ZF3		ZF3		SF1	251
728283	ZF4		ZF4		SF10	252
755275	ZF6		ZF6		SF4	253
805255	ZF7L		ZF7L	FD60	SF6	254
785258	ZF13		ZF13	FD110	SF11	255
754377	LaF5					256
803314	ZLaF58					257

红外光学玻璃牌号对照表
Comparison table of infrared glass types 赤外ガラスの対照表

牌号 Type						页码 Page
NHG	VITRON	SCHOTT	UMICORE	PIKE	CDGM	
IRG201	IG2	IRG22		AMTIR-1	HWS3	260
IRG202			GASIR-1		HWS4	261
IRG203			GASIR-2		HWS2	262
IRG204						263
IRG205	IG5	IRG25		AMTIR-3	HWS1	264
IRG206	IG6	IRG26	GASIR-5	AMTIR-2	HWS6	265
IRG207	IG4	IRG24			HWS5	266
IRG208		IRG27			HWS27	267
IRG209						268

产品推荐表
Recommended products
推奨硝種表

重点推荐牌号：性能优异、存量充裕，可适时满足供货的牌号

Excellent recommended types：Glass types which have good performances and adequate stocks, and the demand can be satisfied in a short cycle

主要な推奨の硝種：優れる性能、充足な在庫量、タイムリーに供応できる硝種。

H-FK 系列	H-QK 系列	H-PK 系列	H-QF 系列	H-F 系列	H-ZF 系列
H-FK61	H-QK3L	H-PK60	H-QF14	H-F1	H-ZF4GT
H-FK69		H-PK62A	H-QF50	H-F13	H-ZF4AGT
H-FK76		H-PK63			H-ZF7LGT
H-FK90		H-PK65			H-ZF13GT
H-FK95		H-PK71			H-ZF52N
					H-ZF56
					H-ZF62GT
					H-ZF72GT
					H-ZF75GT

H-ZBaF 系列	H-LaK 系列	H-LaF 系列	H-ZLaF 系列	低熔点系列	其它
H-ZBaF3	H-LaK2H	H-LaF1	H-ZLaF50	D-FK61	H-TF3L
H-ZBaF10	H-LaK4L	H-LaF2A	H-ZLaF52	D-ZK2N	H-KF6
H-ZBaF16A	H-LaK5A	H-LaF3C	H-ZLaF53	D-ZK3L	
H-ZBaF21	H-LaK7	H-LaF10A	H-ZLaF54A	D-LaK6	
H-ZBaF50	H-LaK9	H-LaF50B	H-ZLaF56B	D-ZF10A	
H-ZBaF52	H-LaK11	H-LaF52	H-ZLaF60A	D-ZLaF52L	
H-ZBaF65	H-LaK12	H-LaF62	H-ZLaF64	D-ZLaF52N	
	H-LaK51A		H-ZLaF66A	D-ZLaF52N-M170	
	H-LaK52		H-ZLaF68A	D-ZLaF851	
	H-LaK53B		H-ZLaF70GT		
			H-ZLaF70B		
			H-ZLaF72A		
			H-ZLaF76A		
			H-ZLaF77A		
			H-ZLaF80A		
			H-ZLaF82/82GT		

说明-无色光学玻璃

1 分类和命名

1.1 分类

根据折射率 n_d 和色散系数υ_d在 n_d-υ_d 领域图中的位置，无色光学玻璃分为 17 类，见表 1。

表 1　Table 1　表 1

玻璃类别 Group	代号 Code	玻璃类别 Group	代号 Code
氟冕玻璃 Fluor Crown	FK	火石玻璃 Flint	F
轻冕玻璃 Light Crown	QK	钡火石玻璃 Barium Flint	BaF
磷冕玻璃 Phosphate Crown	PK	重钡火石玻璃 Dense Barium Flint	ZBaF
冕玻璃 Crown	K	重火石玻璃 Dense Flint	ZF
钡冕玻璃 Barium Crown	BaK	镧火石玻璃 Lanthanum Flint	LaF
重冕玻璃 Dense Crown	ZK	重镧火石玻璃 Dense Lanthanum Flint	ZLaF
镧冕玻璃 Lanthanum Crown	LaK	钛火石玻璃 Titanium Flint	TiF
冕火石玻璃 Crown Flint	KF	特种火石玻璃 Special Flint	TF
轻火石玻璃 Light Flint	QF	铋火石玻璃 Bismuth Flint	BiF

1.2 牌号命名

由其所属玻璃类别代号加序号组成，也可用六位数字作代码来标识（前三位数字表示折射率小数点后三位数，后三位数字表示阿贝数的前三位数）。例如：F4，n_d=1.62005，υ_d=36.35，其代码为 620364。

1.3 环境友好玻璃的命名

无铅、砷、镉以及其它放射性元素的玻璃牌号，用“环”字汉语拼音字母的声母“H”加“-”作为前缀表示。例如：H-F4。

1.4 低软化点玻璃的命名

用于模压成型的低软化点环境友好玻璃，用“低”字汉语拼音字母的声母“D”加“-”作为前缀来表示。例如：D-LaK6。

对原有牌号进行折射率调整的产品，在原牌号后面使用“-折射率变化量”或“-M 折射率变化量”来表示，其中“M”表示折射率降低，否则为折射率提高。如：D-ZLaF52N 折射率 n_d 降低 170×10^{-5}，则在牌号名称后加“-M170”，即 D-ZLaF52N-M170；D-LaF50 折射率 n_d 提高 170×10^{-5}，则直接在牌号名称后加“-170”，即 D-LaF50-170。

1.5 高透过率玻璃牌号命名

高透过率玻璃牌号，在牌号后加字母“GT”命名。用“GT”即“高透”汉语拼音首位字母表示高透过率玻璃，如 H-ZF7LGT。

1.6 其他命名

在原牌号基础上进行光性微调的，在原牌号名称后加后缀“L”或“N”，其中“L”表示折射率或阿贝数比原牌号稍低，“N”表示折射率或阿贝数比原牌号稍高。

在原牌号基础上对其他性能进行配方改良的，不改变光性指标，依改良顺序在该牌号名称后加后缀“A”、“B”、“C”、……“F”。

Instructions For Colorless Optical Glass 無色光学ガラス的説明

1 Classification and Designation 種類と表示

1.1 Classification 種類

According to the position of refractive index (n_d) and dispersion coefficient (υ_d) in n_d-υ_d domain diagram, colorless optical glass are classified into the 17 groups as shown in table 1.

無色光学ガラスは屈折率 n_d、分散係数（アッベ数）υ_d が n_d-υ_d 図にある位置によって、表 1 の 17 種類に分類されています。

1.2 Designation 表示

Each optical glass type within a group is designated by an abbreviated group symbol and a number. A six-digit code can also be used to characterize each glass type. The first three digits indicate the first three numbers after the decimal point of refractive index n_d, the last three digits indicate the first three numbers of the Abbe-number υ_d. For example, F4 with n_d of 1.62005 and υ_d of 36.35 is indicated by its six-digit code 620364.

光学ガラスが属するガラスグループ名称の記号とコードによって表示されます。また、6 桁の数字をコードとして表示します（初めの 3 桁が屈折率の小数点後の 3 桁を表示して、後の 3 桁がアッベ数（υ_d）の初めの 3 桁を表示しています）。例えば：F4，n_d=1.62005，υ_d=36.35、そのコードは 620364 と表示されます。

1.3 Designation of environment-friendly glass types エコガラスの表示

The glass type without lead, arsenic, cadmium and other radioactive elements is expressed by a prefix “H-”. For example, H-F4.

鉛フリー、砒素フリー、カドミウムフリーガラス及びそのほかの放射性元素フリーのガラス硝種は名称記号の前に「H-」を付けて、エコガラスを表示しています。例えば： H-F4。

1.4 Designation of low softening point glass types 非球面用ガラスの表示

The low softening point environment-friendly glass used for molding is represented by the initial “D” of the Chinese pinyin alphabet with “-” as a prefix. For example, D-LaK6.

MO 用エコガラスはガラス硝種名の前に「D」をつけて表示しております。例えば：D-LaK6

When adjusting the refractive index on basis of the original types, “-refractive index variation” or “-M refractive index” is added to the end of the original names. The letter M means the refractive index is reduced. Otherwise, the refractive index is increased. Take D-ZLaF52N and D-LaF50 for example. If the refractive index (n_d) of D-ZLaF52N is reduced by 170×10^{-5}, the new material will be named as “D-ZLaF52N-M170”. If the refractive index (n_d) of D-LaF50 is increased by 170×10^{-5}, the new material will be named as “D-LaF50-170”.

設計要請による屈折率基準を微調整した硝種に対して、現行硝種名の後ろに、屈折率変化単位を付けて区分します。例えば、D-ZLaF52N(n_d=1.81000)を微調整品の屈折率は 1.80834 となります。D-ZLaF52N の 1.81000 に比べて 170×10^{-5} マイナスなので、硝種名を D-ZLaF52N-M170 として区別します。逆に 170×10^{-5} プラスの場合は、“（現行硝種名）-170” で区別します。

1.5 Designation of high transmittance glass types 高透過率光学ガラスの表示

High transmittance glass is suffixed with “GT”, which refers to the first letter in Pinyin “Gao Tou”, for example, H-ZF7LGT.

高透過率ガラスは硝種名＋「GT」によって命名されます。「GT」は中国の漢字「高透」のピンインの最初の文字で高透過率ガラスを表示します、例：H-ZF7LGT。

1.6 Other designation その他の表示

If the optical constant is slightly adjusted, suffix “L” or “N” will be added to the end of the original material name. “L” means the refractive index or Abbe number is slightly lower than the original material while “N” shows the refractive index or Abbe number is slightly higher than the original material.

元の硝種の基礎で、光性を少し調整すれば、硝種名の後に「L」または「N」を付きます。「L」は屈折率またはアッベ数がより低くなった意味で、「N」は屈折率またはアッベ数がより高くなった意味です。

If the optical constants aren’t changed while their formulation is modified to improve other properties, the prefix “A”, “B”, “C”…… “F” will be added to the end of the material name according to the sequence.

元の硝種の基礎で、他の性能を組成改善すれば、光性指標不変の場合、改善の順番に従って、硝種名の後に「A」「B」「C」……「F」を付きます。

2 光学性能

2.1 折射率 n_x

n 表示折射率，x 表示光谱线或波长。

本手册中无色光学玻璃提供的表 1 中 20 条谱线的折射率是采用最小偏向角法测量得出。

测试设备：德国 TRIOPTICS 公司 SpectroMaster UV-VIS-IR 高精度折射率测试仪；

测试精度：紫外波段±3×10^{-6}；可见光波段±2×10^{-6}；近红外波段±5×10^{-6}；

样品要求：样品无肉眼可见的条纹、气泡和结石，应力双折射 1 级。

若有特殊需要，我们还可提供波长 253.65nm~14μm 范围内任一谱线的折射率的测试值。

在 365.01nm~2325.42nm 的光谱范围内，未列出波长的折射率，可以按肖特公式（1）计算：

$$n^2=A_0+A_1\lambda^2+A_2\lambda^{-2}+A_3\lambda^{-4}+A_4\lambda^{-6}+A_5\lambda^{-8}\cdots\cdots\cdots\cdots（1）$$

式中：A_0~A_5—计算常数；

λ—波长，μm；

n—折射率（计算精度：可见波段±1×10^{-5}）。

表 2　Table 2　表 2

光谱线 Spectral Line	光源 Light Source	波长（nm） Wavelength	光谱线 Spectral Line	光源 Light Source	波长（nm） Wavelength
i	Hg	365.01	C	H	656.27
h	Hg	404.66	r	He	706.52
g	Hg	435.84	A′	K	768.19
F′	Cd	479.99	s	Cs	852.11
F	H	486.13	t	Hg	1013.98
e	Hg	546.07		Nd Laser	1064.00
d	He	587.56		Hg	1128.64
D	Na	589.29		Hg	1529.58
He-Ne	He-Ne laser	632.80		Hg	1970.09
C′	Cd	643.85		Hg	2325.42

本手册中的低软化点玻璃（即：“D-”开头的玻璃）给出的相关谱线的折射率是在-30℃/H 退火速率下的数据，手册中给出了 d 线折射率随冷却速度的变化量β_d，冷却速度 s 下的折射率 n_d 可以通过公式（2）计算。

其他谱线的折射率随冷却速度的变化，如果需要我们也可提供。

$$n_{ds}=n_{ds_0}-\beta_d\times\log\left(\frac{s}{s_0}\right)\cdots\cdots\cdots\cdots（2）$$

式中：

s—退火速率；

s_0—退火速率-30℃/H；

n_{ds_0}—退火速率 s_0 下的 d 线折射率；

n_{ds}—退火速率 s 下的 d 线折射率；

β_d—d 线折射率随冷却速度的变化量。

为满足设计使用需求，还提供了不同退火速率下折射率及模压折射率（一定模压条件下），命名及数据见参考表（见附表 1）。

2 Optical properties 光学的性質

2.1 Refractive index 屈折率 n_x

Refractive index is denoted by the letter n, while spectrum line or wavelength is denoted by x.

n は屈折率、x はスペクトル線あるいは波長。

Twenty spectrum lines' refractive indices of colorless optical glass provided in table 1 are measured by minimum deviation angle method.

本カタログの無色光学ガラスの屈折率は表 1 中の 20 スペクトル線の屈折率で表示して、最小偏差角法によって測定されます。

Test equipment: High precision refractive index tester (SpectroMaster UV-VIS-IR) made by German TRIOPTICS,

試験設備: ドイツ TRIOPTICS 会社製 SpectromasterUv 可視光赤外線精密屈折計,

Measurement accuracy: $\pm3\times10^{-6}$ in the ultraviolet range, $\pm2\times10^{-6}$ in the visible range, $\pm5\times10^{-6}$ in the near-infrared range,

測定の精度: 紫外波長： $\pm3\times10^{-6}$、可視光波長： $\pm2\times10^{-6}$、近赤外波長： $\pm5\times10^{-6}$,

Sample requirements: No visible striae, bubbles or stones with naked eye, stress birefringence up to class 1.

サンプルの要求:脈理と泡・異物は目で見えない程度、歪レベル 1 級。

Upon special request, we can provide refractive index of any spectral line from 253.65nm to 14μm.

特別なご要望があれば、波長 253.65nm~14μm の範囲内でいずれのスペクトル線の屈折率の測定値を提供できます。

In the spectral range of 365.01nm~2325.42nm, the refractive indices not listed in the handbook can be calculated by the Schott formula (1):

365.01nm~ 2325.42nm のスペクトル範囲で、波長の屈折率が表示されないとショット式 (1) で計算できます。

$$n^2=A_0+A_1\lambda^2+A_2\lambda^{-2}+A_3\lambda^{-4}+A_4\lambda^{-6}+A_5\lambda^{-8}\text{……（1）}$$

Where ここで:

A_0~A_5—Calculating constants 計算定数;

λ—Wavelength 波長, μm;

n—Refractive index 屈折率 (Calculation accuracy at the visible band 目に見える光バンド: $\pm1\times10^{-5}$).

Correlative spectrum lines' refractive indices of low softening point glass (glass starting with "D-") in this handbook are tested after -30℃/H annealing process. The variations of refractive index of d line with annealing rates β_d are given in the handbook, and refractive index n_d in different annealing rates can be calculated by formula (2).

本カタログに掲載している MO 用ガラスの屈折率は-30℃/H で冷却アニールしたときの屈折率です。冷却速度に対する d 線屈折率の変化量β_dも掲載しております。そのデータで冷却速度 s でアニールしたときの屈折率が下記の式（2）で算出しております。

Other spectrum lines' refractive indices varying with annealing rates are also available if required.

その他のスペクトル線の冷却速度に対する屈折率変化量に対して、ご要望がある場合にも提供することができます。

$$n_{ds}=n_{ds_0}-\beta_d\times\log\left(\frac{s}{s_0}\right)\text{.....（2）}$$

Where ここで:

s—Annealing rate アニールスピード,

s_0—Annealing rate -30℃/H アニールスピード基準-30℃/H,

n_{ds_0}—d-line refractive index at annealing rate s_0 アニールスピード s_0 時の d 線の屈折率,

n_{ds}—d-line refractive index at annealing rate s アニールスピード s 時の d 線の屈折率,

β_d—The amount of change in the refractive index of the d-line as a function of the cooling rate 冷却速度に対する d 線屈折率の変化量.

To meet the requirements of designers, we also provide the refractive index at different annealing rates and molded refractive index (under certain molding conditions), designations and datas are shown in the annexed table 1.

屈折率基準値を更新したガラス硝種に対して、モールドプレス後のアニール条件（冷却速度）による屈折率データ、またはモールドプレス後そのままの屈折率データ（参考値。設備と条件によって異なる可能性がある）を掲載しています。別表 1 を覧ください。

2.2 色散和阿贝数

中部色散为n_F-n_C或$n_{F'}$-$n_{C'}$。

阿贝数υ_d、υ_e定义如下：

$$\upsilon_d=\frac{n_d-1}{n_F-n_C}\cdots\cdots\cdots

2.2 Dispersion and Abbe-number 分散とアッベ数

The central dispersion is expressed by n_F-n_C or $n_{F'}$-$n_{C'}$.

中部分散は n_F-n_C 或は $n_{F'}$-$n_{C'}$ です。

Abbe-number υ_d and υ_e are defined as:

アッベ数υ_d、υ_e はそれぞれ次式によって求めています：

$$\upsilon_d=\frac{n_d-1}{n_F-n_C} \quad \text{……（3）}$$

$$\upsilon_e=\frac{n_e-1}{n_{F'}-n_{C'}} \quad \text{……（4）}$$

2.3 Relative partial dispersion 相対部分の分散

Relative partial dispersion is usually calculated with arbitrary spectrum lines. For example, relative partial dispersion for wavelength X and Y can be expressed by formula （5）:

相対部分の分散は任意のスペクトル線で計算できます。例：波長 X と Y の相対部分の分散比は公式（5）で表示します。

$$P_{X,Y}=\frac{n_X-n_Y}{n_F-n_C},\ P'_{X,Y}=\frac{n_X-n_Y}{n_{F'}-n_{C'}} \quad \text{……（5）}$$

The values of $P_{d,c}$, $P_{e,d}$, $P_{g,F}$ and $P'_{d,c'}$, $P'_{e,d'}$, $P'_{g,F'}$ are given in the handbook.

カタログの中には硝種によって、$P_{d,c}$、$P_{e,d}$、$P_{g,F}$ と $P'_{d,c'}$、$P'_{e,d}$、$P'_{g,F'}$ 値で表示されます。

2.4 Abnormal dispersion 異常分散性

According to the Abbe-number formula, the following linear relationship is tenable for most " normal glass " :

アッベ公式に基づいて、大多数の「正常ガラス」が、次の公式は成立的です。

$$P_{X,Y}=m_{X,Y}\upsilon_d+b_{X,Y} \quad \text{……（6）}$$

The deviation value $\Delta P_{X,Y}$ of relative partial dispersion can be calculated by the following formula:

相対部分の分散の偏差値$\Delta P_{X,Y}$ の数値が次式によって求めています：

$$P_{X,Y}=m_{X,Y}\upsilon_d+b_{X,Y}+\Delta P_{X,Y} \quad \text{……（7）}$$

$\Delta P_{g,F}$, $\Delta P_{F,e}$, $\Delta P_{C,t}$ and $\Delta P_{C,s}$ against H-K6, F4 can be calculated by formula （8）:

H-K6 と F4 を基準として、公式（8）によって、$\Delta P_{g,F}$、$\Delta P_{F,e}$、$\Delta P_{C,t}$ 和 $\Delta P_{C,s}$ を算出できます：

$$\Delta P_{F,e}=P_{F,e}-0.4902+0.000552\ \upsilon_d$$
$$\Delta P_{g,F}=P_{g,F}-0.6436+0.001661\upsilon_d$$
$$\Delta P_{C,t}=P_{C,t}-0.5401-0.004846\ \upsilon_d$$
$$\Delta P_{C,s}=P_{C,s}-0.4004-0.002400\ \upsilon_d \quad \text{……（8）}$$

2.5 Temperature coefficient of refractive index dn/dt 屈折率の温度係数 dn/dt

Refractive indices of optical glass change with temperatures. The relationship of refractive index changes to temperature change is called temperature coefficient of refractive index dn/dt. Temperature coefficients of refractive indices are determined by temperature coefficients of relative refractive indices in the dry air $(dn/dt)_{rel.}$(101.3KPa) and temperature coefficients of absolute refractive indices in the vacuum $(dn/dt)_{abs.}$.The testing data are provided every 20℃ from -60℃ to ＋160℃.

光学ガラスの屈折率は温度によって変化します。その変化は屈折率の温度係数 dn/dt で表示しています。屈折率の温度係数は乾燥的な空気中での相対屈折率の温度係数 $(dn/dt)_{rel.}$(101.3KPa)と真空中での絶対屈折率の温度係数 $(dn/dt)_{abs.}$を表示します。-60℃～+160℃の温度範囲に、 20℃毎の実測 dn/dt データが示しています。

Temperature coefficients of absolute refractive indices $(dn/dt)_{abs.}$ can be calculated by formula (9), and the temperature coefficients of refractive indices for air (dn_{air}/dt) are indicated in table 3.

絶対屈折率の温度係数は公式（9）によって算出できます、空気の屈折率温度係数 dn_{air}/dt は表 3 を参考します。

$$\left(\frac{dn}{dt}\right)_{abs.}=\left(\frac{dn}{dt}\right)_{rel.}+n_{rel.}\cdot\frac{dn_{air}}{dt} \quad \text{……（9）}$$

2.6 折射率温度系数的计算常数

手册中没有给出的绝对折射率温度系数，按公式（10）计算：

$$\left(\frac{dn}{dt}\right)_{abs.}=\frac{n^2(\lambda,T_0)-1}{2n(\lambda,T_0)}\cdot(D_0+2D_1\cdot\Delta T+3D_2\cdot\Delta T^2+\frac{E_0+2E_1\cdot\Delta T}{\lambda^2-\lambda_{TK}{}^2}) \quad \cdots\cdots（10）$$

式中：

$n(\lambda,T_0)$ —参考温度下的相对折射率；

T_0 —参考温度（20℃）；

T—目标温度（单位：℃）；

ΔT—温度 T 与 T_0 的差值；

λ —真空中电磁波的波长（单位：μm）；

D_0、D_1、D_2、E_0、E_1 和λ_{TK}—与玻璃牌号有关的计算常数；

适用温度范围：–60℃~+160℃；

适用波长范围：0.365μm ~1.014 μm。

2.7 应力光弹系数 B

采用圆盘压缩法测试样品的应力光弹系数 B，即沿直径方向向圆盘施加载荷 F，弹性力学圆盘中心处主应力差Δσ值为：

$$\Delta\sigma=\frac{8\cdot F}{\pi\cdot\emptyset\cdot d}\cdots\cdots（11）$$

式中：

F—加力的大小，kgf；

Φ—样品直径，cm；

d—样品厚度。

根据平面光弹性试验的平面应力-光学定律，在样品中心点处，垂直入射光线的延迟即光程差δ，与光弹系数 B 的主应力差Δσ存在以下关系：

$$\delta=B\cdot\Delta\sigma\cdot d\cdots\cdots（12）$$

由公式（11）（12）可以推导出光弹系数，见公式（13）：

$$B=\frac{\pi\times\Phi\times\delta}{8\times F}\cdots\cdots（13）$$

式中：

δ—光程差，nm；

Φ—样品直径，单位 cm；

F—加力的大小，单位 kgf；

B—应力光弹系数。

测试波长：1550nm，单位：10^{-12}/Pa。

2.6 Calculating constants of dn/dt 屈折率温度係数の計算定数

The temperature coefficients of absolute refractive indices unspecified in the handbook can be calculated with the aid of equation (10).

このカタログではある温度の絶対屈折率温度係数が記載されない場合、次の公式（10）によって算出できます。

$$\left(\frac{dn}{dt}\right)_{abs.} = \frac{n^2(\lambda,T_0)-1}{2n(\lambda,T_0)} \cdot (D_0 + 2D_1 \cdot \Delta T + 3D_2 \cdot \Delta T^2 + \frac{E_0 + 2E_1 \cdot \Delta T}{\lambda^2 - \lambda_{TK}^2}) \quad \cdots\cdots\cdots (10)$$

Where ここで:

$n(\lambda,T_0)$ —Relative refractive index at the reference temperature参考温度で的相対屈折率;

T_0—Reference temperature 参考温度(20 ℃);

T —Targeted temperature目標温度(℃);

ΔT—Temperature difference $T-T_0$温度TとT_0の差(℃);

λ—Wavelength of the electromagnetic wave in the vacuum真空中の電磁波の波長(μm);

D_0, D_1, D_2, E_0, $E_1$and λ_{TK}—Constants depending on glass typeガラス硝種により定まる計算定数.

The applied temperature range 温度範囲: -60℃ to +160℃;

The applied wavelength range 波長範囲: 0.3650 μm to 1.014 μm.

2.7 Stress photoelastic coefficient 応力光弾性定数 B

The stress photoelastic coefficient B of the sample is tested by disk compression method, that is, the load F is applied to the disk along the diameter direction. The value of the principal stress difference Δσ at the center of the elastic disk is:

円板圧縮法で試料の光弾性定数 B を測定しています。円板状試料の一直線方向に圧縮荷重を加えたときに円板の中心に生じる光路差Δσは次の式で算出します。

$$\Delta\sigma = \frac{8 \cdot F}{\pi \cdot \emptyset \cdot d} \quad \cdots\cdots\cdots (11)$$

Where ここで:

F—The magnitude of the aftereffect 荷重, kgf;

Φ—Sample diameter 試料直径, cm;

d—Sample thickness 試料厚み, cm.

According to the law of plane stress-optics in the plane photoelastic test, the delay of the perpendicular incident light, namely the optical path difference δ, at the center point of the sample has the following relationship with the principal stress difference Δσ of the photoelastic coefficient B:

複屈折による光路差をδ(nm)、ガラスに生じた光路差をΔσ、試料の厚さを d (cm)とすると、これらの間には以下の関係があります。

$$\delta = B \cdot \Delta\sigma \cdot d \quad \cdots\cdots\cdots (12)$$

Stress photoelastic coefficient can be calculated from equations (11) and (12), as listed in equation (13):

式（11）と（12）で換算すると、光弾性定数は式（13）で算出できます。

$$B = \frac{\pi \times \Phi \times \delta}{8 \times F} \quad \cdots\cdots\cdots (13)$$

Where ここで:

δ—Optical path difference 光路差, nm;

Φ—Sample diameter サンプルの直径, cm;

F—The amount of force applied 加えた圧力の大きさ, Pa;

B—Stress photoelastic coefficient 応力光弾性定数.

The testing wavelength is 1550nm, and the unit is 10^{-12}/Pa.

測定波長：1550nm。光弾性定数 B の単位： 10^{-12}/Pa で表示しております。

2.8 内部透过率τ

测试不同厚度样品（50mm、10mm）的透过率，然后通过公式（14）计算厚度为 d 的样品在波长λ处的内部透过率τ_λ：

$$\tau_\lambda = \left(\frac{T_{1\lambda}}{T_{2\lambda}}\right)^{d/(d_1-d_2)} \quad \cdots\cdots\cdots\

2.8 Internal transmittance 内部透過率τ

The internal transmittance of samples with different thickness (50mm, 10mm) are tested, and then the internal transmittance τ_λ of samples with thickness d at wavelength λ are calculated by equation (14) :
厚み50㎜と10㎜の試料のそれぞれの透過率を測定します。次の式（14）で厚みｄのガラスの波長λ時の内部透過率$\tau\lambda$を算出できます。

$$\tau_\lambda = \left(\frac{T_{1\lambda}}{T_{2\lambda}}\right)^{d/(d_1-d_2)} \quad \text{……（14）}$$

Where ここで:

d_1、d_2—Sample thickness 試料厚み，$d_1>d_2$;

$T_{1\lambda}$—Transmittance at wavelength λ (including surface loss) for a sample of thickness d_1 厚み d_1 の試料の波長λ時の透過率（表面損失を含む）;

$T_{2\lambda}$—Transmittance at wavelength λ (including surface loss) for a sample of thickness d_2 厚み d_2 の試料の波長λ時の透過率（表面損失を含む）.

Test equipment: Hitachi spectrophotometer (UH4150 UV-VIS-NIR),
試験装置: 日立 UH4150 UV-VIS-NIR 分光光度計,
Measurement accuracy: better than ±0.3%,
測定の精度：±0. 3 %より,
Sample requirement: bubble up to class 1, striae up to class B.
サンプルの要求：泡は一級、脈理はB級。
In the handbook, internal transmittance of 10mm (τ10) from 280nm to 2400nm can be calculated by formula (12).
マニュアルの 280~ 2400nm 波長範囲内の 10mm の内部透過率 (τ10) 、2 つの標本の厚さの差の内部透過率に等しい (12) に計算されます。
The internal transmittances of different wavelengths for 5mm and 10mm glass are shown in the handbook.
カタログの中には各硝種の厚さ 5mm、10mm の内部透過率を記載しています。

2.9 Color code 着色度$\lambda_{80(70)}/\lambda_5$

Transmitted spectrum performance of optical glass at short wave band can be expressed by the color code $\lambda_{80(70)}/\lambda_5$. Measure the transmittance of glass with a thickness of 10mm±0.1mm (including reflection losses at the surfaces), wavelengths λ_{80} and λ_5 respectively corresponding with transmittance 80%, 5% are used to express color code in 5 nm step (round off 2 and round up 3 or more, round off 7 and round up 8 or more of the bits of integers). For instance, if the corresponding wavelength of transmittance 80% is 357nm while transmittance 5% is 324 nm, the color code λ_{80} / λ_5 is 355/325, as shown in figure 1.
光学ガラスの短波の分光透過特性は着色度$\lambda_{80(70)}/\lambda_5$で表示します。厚み 10mm±0.1mm の試料の透過率（表面反射損失を含め）は 80%と 5%を示す波長がλ_{80}とλ_5で表示して、5nm を単位としています（整数の 1 の位数字が二捨三入、七捨八入の原則で決まります）。例えば、透過率 80%を示す波長が 357nm であり、透過率 5%を示す波長が 324nm であり、着色度λ_{80}/λ_5は 355/325 であります。図 1 を参考してください。
For a glass whose n_e is higher than 1.85, λ_{70} is used in place of λ_{80} as a color code due to a heavier reflecting loss. That is to say, the color code is expressed by λ_{70}/λ_5.
また、n_e≥1.85 の場合、表面反射損失が大きいため、80%の透過率を示す波長の代わりに 70%の透過率を示す波長を用いてのように表示します、即ちλ_{70}/λ_5で表示します。
The variance range of color code is usually within ±10 nm. Upon special request, we can provide materials with smaller tolerance.
着色度は基準値に±10nm 内変動幅で管理しています。特別なご要望に対して、小さい公差の材料を提供できます。

2.10 内透着色度$\lambda\tau_{80}/\lambda\tau_5$

用 10mm 厚玻璃内透过率 80%和 5%对应的波长$\lambda\tau_{80}$、$\lambda\tau_5$简易表征玻璃的着色程度。

2.11 过度曝光指数Δλ

“过度曝光”是指由阳光或紫外线长时间照射引起的光学玻璃透过率变化。按照 JOGIS：04-2005 光学玻璃过度曝光测量方法进行测试。将 30mm×12.5mm×10mm 的两大面抛光的样品，在曝光前测试透过率 80%对应的透射波长λ，然后将样品固定在曝光装置的样品支架上，打开汞灯照射，使样品在 100℃±5℃旋转 4 小时，然后避光、室温保存，在 24 小时内测试波长λ所对应的透过率。前、后透过率之差Δλ即为过度曝光指数。

过度曝光指数Δλ以百分数表示，精确到小数点后 1 位。

2.10 Internal transmittance 内透着色度$\lambda\tau_{80}/\lambda\tau_5$

For a 10 mm glass, wavelengths $\lambda\tau_{80}$ and $\lambda\tau_5$ respectively corresponding with internal transmittance 80%, 5% are used to express coloring degree of the glass simply.

厚み 10mm のガラスの内部透過率 80％と 5％を示す波長が$\lambda\tau_{80}/\lambda\tau_5$によって、着色程度を簡易的に表示します。

2.11 Solarization ソラリゼーションΔλ

"Solarization" means the transmittance change of optical glass due to sun or ultraviolet radiation for a long time. Solarization is measured according to JOGIS: 04-2005. Polish the two large sides of a 30mm×12.5mm×10mm sample, and test its corresponding transmission wavelength λ where the transmittance is 80% before solarization. Fit the sample in the sample holder of solarization device, open mercury lamp to irradiate for 4h at 100℃±5℃, and then keep the sample in dark place and room temperature. Test its corresponding transmittance after solarization at wavelength λ inside 24h. Δλ refers to the transmittance difference before and after solarization. Solarization Δλ is expressed as a percentage and is accurate to one decimal place.

"ソラリゼーションΔλ"は太陽光線或いは紫外線を長い時間で照射して、光学ガラスの透過率を変化させると言うことです。JOGIS：04-2005 光学ガラスのソラリゼーションの測定方法によって測定します。30mm×12.5mm×10mm のサンプルの両面を研磨し、測定する前に試料の透過率を測定します。サンプルを測定装置に固定され、試料温度を 100℃±5℃に抑えて、試料を回転させながら光量が所定値になるような光源で 4 時間照射します。その後、室温で暗所に保存し、24 時間内に分光透過率を測定します。照射前の透過率 80％に対応する波長において照射後の透過率の減少を小数点第 1 位まで％単位で表示します。

3 化学性能

光学玻璃元件在制造和使用过程中，其抛光表面抵抗各种侵蚀性介质作用的能力称为光学玻璃的化学稳定性。

3.1 抗潮湿大气作用稳定性 RC(S) (表面法)

在温度 50 ℃、相对湿度 85%的条件下，根据玻璃抛光表面形成水解斑点所需要的时间，将光学玻璃抗潮湿大气作用稳定性分为三级，见表 4。

表 4　Table 4　表 4

级别 Grade	1	2	3
时间 Time （H）	>20	5~20	<5

3.2 抗酸作用稳定性 RA(S)(表面法)

在 0.1N （pH=2.9）、温度 50℃的醋酸溶液作用下，根据玻璃抛光表面出现干涉色，或表面呈现杂色或脱落所需要的时间，将光学玻璃抗酸作用稳定性分为三级，见表 5。

表 5　Table 5　表 5

级别 Grade	1	2	3
时间 Time（H）	>5	1~5	<1

3.3 耐水作用稳定性 D_W(粉末法)

在过滤器中装入 10g±0.0001g、粒度 450～560μm 粉末玻璃（过 40 目～32 目筛），将之浸渍在装有 80mL 蒸馏水（pH=6.5～7.5）的石英玻璃烧瓶内，在 98~100℃水浴中恒温 60 分钟，将玻璃颗粒全部转移至恒重的过滤器中，用 80mL 无水乙醇洗涤后，放于 120±5℃烘干至恒重。根据式（15）计算玻璃浸出百分数：

$$D_W = \frac{B-C}{B-A} \times 100 \quad \text{……（15）}$$

式中：

D_W—玻璃浸出百分数，%；

B—过滤器和试样的质量，g；

C—过滤器和侵蚀后试样的质量，g；

A—过滤器质量，g。

根据质量浸出百分数，将光学玻璃耐水作用稳定性 D_W 分为六级，见表 6。

表 6　Table 6　表 6

级别 Grade	1	2	3	4	5	6
浸出百分数(%) Soaking-out percentage	<0.04	≥0.04 <0.10	≥0.10 <0.25	≥0.25 <0.60	≥0.60 <1.10	≥1.10

3.4 耐酸作用稳定性 D_A(粉末法)

与 D_W 的测定方法相同，在烧瓶内装入 0.01mol/L 的硝酸水溶液进行处理，根据式（16）计算玻璃浸出百分数:

$$D_A = \frac{B-C}{B-A} \times 100 \quad \text{……（16）}$$

式中：

D_A—玻璃浸出百分数，%；

B—过滤器和试样的质量，g；

C—过滤器和侵蚀后试样的质量，g；

A—过滤器质量，g。

根据质量浸出百分数，将光学玻璃耐酸作用稳定性 D_A 分为六级，见表 7。

表 7　Table 7　表 7

级别 Grade	1	2	3	4	5	6
浸出百分数（%） Soaking-out percentage	<0.20	≥0.20 <0.35	≥0.35 <0.65	≥0.65 <1.20	≥1.20 <2.20	≥2.20

3 Chemical properties 化学的性質

The chemical stability is the ability of polished surface to resist erosive substance of sorts during the glass component being processed and afterwards being applied.

ガラス素子は加工と使用の間に、研磨液や大気中の水蒸気、炭酸ガスなどの侵食を耐える能力が光学ガラスの化学耐久性質と言われています。

3.1 Humidity resistance RC (S) (surface method) 湿気に対する耐久性 RC(S)(表面法)

The humidity resistance of optical glass is classified into 3 grades according to the time required for a polished surface to form a hydrolyzing spot at the temperature of 50℃ and humidity of 85% (see table 4).

温度が 50℃、相対湿度 85%の環境条件で、ガラスの研磨の表面にヤケが生じるまでかかる時間によって、光学ガラスが湿気に対する耐久性を 3 級に分類されています、表 4 のように。

3.2 Acid resistance RA (S) (surface method) 耐酸性の作用の安定性 RA(S)(表面法)

The acid resistance of optical glass is classified into 3 grades according to the time required for a polished surface to appear interference color or parti-color or fall-off in 0.1N (pH=2.9) acetic acid solution at the temperature of 50℃ (see table 5).

0.1N、温度 50℃の酢酸溶液の作用の下で、ガラスの研磨表面にの破壊深さが 135nm までにかかる時間によって、光学ガラスは耐酸性の作用の安定性を 3 級に分類されています、表 5 のように.

3.3 Water Resistance D_W (powder method) 耐水性 D_W(粉末法)

Place 10g±0.0001g glass powder of grain size 450-560μm (sieved with 40~32 sized mesh) in the filter, soak into a silex glass flask filled with 80ml distilled water (pH=6.5~7.5). After constant temperature water bath (98~100℃) for 60 minutes, move all the glass grain to constant weight filter, wash with 80mL absolute ethyl alcohol, and then dry to constant weight at 120±5℃. Calculate the leaching percentage according to formula (15).

フィルターは、10g±0.0001 g、粒 450～560μm 粉末ガラス (40 メッシュ～ 32 メッシュスクリーニング)、 80 ml の蒸留水(pH = 6.5～7.5)を含む石英ガラスフラスコに含浸させた、98～100 度水温バス 60 分、すべてのガラスの粒子を一定の重量のフィルターに転送します。80 mL の無水エタノール洗浄で 120±5℃に一定の重量になるまで乾燥します。ガラス式 (15) によると溶出率を計算します。

$$D_W=\frac{B-C}{B-A}\times 100 \quad \text{（15）}$$

Where ここで:

D_W—Soaking-out percentage ガラスの浸出したパーセント, %;

B—Mass of filter and sample フィルターと試料の質量, g;

C—Mass of filter and soaked sample フィルターと侵食した後の試料の質量, g;

A—Mass of filter フィルターの質量, g.

According to the calculation results, D_W is classified into 6 grades as shown in Table 6.

計算で得た侵食したパーセントによって、光学ガラスの耐水性 D_W を 6 級に分類されています、表 6 のように。

3.4 Acid resistance D_A (powder method) 耐酸性 D_A(粉末法)

The testing method is similar to D_W, but 0.01mol/L Nitric acid aqueous solution is placed into the flask for treatment. Calculate the leaching percentage according to formula (16).

D_W の測定方法と同じように 0.01mol /L 硝酸溶液がフラスコに入り、ガラス溶出率は(16) 式に従って計算されます。

$$D_A=\frac{B-C}{B-A}\times 100 \quad \text{（16）}$$

Where ここで:

D_A—Soaking-out percentage ガラスの浸出したパーセント, %;

B—Mass of filter and sample フィルターと試料の質量, g;

C—Mass of filter and soaked sample フィルターと侵食した試料の質量, g;

A—Mass of filter フィルターの質量, g.

According to the calculation results, D_A is classified into 6 grades, as shown in Table 7.

計算で得た侵食したパーセントによって、光学ガラスの耐酸性 D_A を 6 級に分類されています、表 7 のように。

3.5 耐碱作用稳定性 $R_{OH}(S)$(表面法)

将六面抛光尺寸为 40mm×40mm×5mm 的试样，浸渍于充分搅拌、温度恒定为 50℃±3℃、浓度为 0.01mol/l 的氢氧化钠水溶液中 15 小时。根据单位面积内浸出质量的平均值，单位 mg/(cm^2·15h)，将光学玻璃的耐碱作用稳定性 $R_{OH}(S)$分为五级，见表 8。

表 8　Table 8　表 8

级别 Grade	1	2	3	4	5
浸出质量 Soaking mass mg/(cm^2·15h)	<0.02	≥0.02 <0.10	≥0.10 <0.20	≥0.20 <0.30	≥0.30

3.6 耐洗涤作用稳定性 RP(S)(表面法)

将六面抛光的35mm×35mm×8mm试样，浸渍于温度恒定为50℃±3℃、浓度为0.01mol/L且充分搅拌的$Na_5P_3O_{10}$水溶液中1小时。根据单位面积内浸出质量的平均值，单位mg/(cm^2·h)，将光学玻璃耐洗涤作用稳定性RP(S)分为五级，见表9。

表 9　Table 9　表 9

级别 Grade	1	2	3	4	5
浸出质量 Soaking mass mg/(cm^2·1h)	<0.02	≥0.02 <0.20	≥0.20 <0.40	≥0.40 <0.60	≥0.60

3.5 Alkali Resistance R_{OH}(S) (surface method) 耐アルカリ安定性 R_{OH}(S)(表面法)

Dip a 40 mm×40 mm×5 mm sample polished for six surfaces into essentially stirred NaOH solution, whose constant temperature and concentration is 50±3℃, 0.01mol/L respectively, and the dipping time is fifteen hours. According to the calculated average value of the soaking mass in unit area and the unit is mg/(cm^2·15h),the alkali resistance R_{OH} (S)of optical glass is classified into 5 grades as shown in table 8.

六面を研磨したサイズが 40mm×40mm×5mm の試料を充分に撹拌して、固定な温度 50℃±3℃、濃度が 0.01mol/L の NaOH 水溶液に 15 時間を浸します。ユニット面積によって、浸出した重量の平均値を計算して、光学ガラスの耐アルカリ安定性 R_{OH}(S)を 5 級に分類しています、単位 mg/(cm^2·15h）。表 8 のように。

3.6 Phosphate Resistance RP (S) (surface method) 耐洗剤安定性 RP(S)(表面法)

Dip a 35 mm×35 mm×8 mm sample polished for six surfaces into essentially stirred $Na_5P_3O_{10}$ solution, whose constant temperature and concentration is 50±3℃, 0.01mol/L respectively, and the dipping time is one hour. According to the calculated average value of the soaking mass in unit area and the unit is mg/(cm^2·h), the phosphate resistance RP (S)of optical glass is classified into 5 grades as shown in table 9.

六面を研磨したサイズが 35mm×35mm×8mm の試料を充分に撹拌して、固定な温度 50℃±3℃、濃度が 0.01mol/L の $Na_5P_3O_{10}$ 水溶液に 1 時間を浸します。ユニット面積によって、浸出した重量の平均値を計算して、光学ガラスの耐洗剤安定性 RP(S)を 5 級に分類されています、単位 mg/(cm^2·h）。表 9 のように。

4 热学性能

4.1 线性热膨胀系数α

线性热膨胀系数指一定范围内温度升高 1℃时玻璃试样单位长度的伸长量。采用石英比较法，采用热膨胀仪测量，得到玻璃样品从室温至软化温度间的温度与样品伸长量的关系曲线，由作图法求得玻璃的转变温度和弛垂温度。被测样品在一定的温度范围内，温度每升高 1℃，单位长度的伸长量，表示此温度范围内样品的平均线膨胀系数，以 10^{-7}/K 为单位表示。

测试设备：德国耐驰公司 DIL402 SELECT 膨胀系数测试仪；

温度范围：-150℃~1000℃；

测试精度：优于±1 %；

样品要求: 样品玻璃内应无肉眼可见条纹、气泡、结石等夹杂物；应力双折射 1 类。

手册中给出了-50℃~80℃和 100℃~300℃的平均线膨胀系数（见图 2），以及-50℃~+160℃范围内每隔 10℃的平均线膨胀系数。

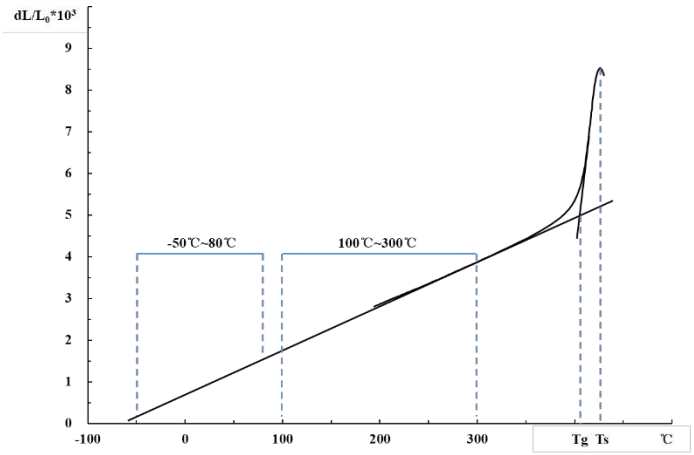


图 2　Figure 2　図 2

4.2 转变温度 Tg

将退火后的样品以一定速率升温，得到温度和试样伸长量关系的热膨胀曲线，如图 2 所示。将低温区域和高温区域伸长直线部分延长相交的交点所对应的温度作为转变温度，单位为℃。

4.3 弛垂温度 Ts

退火后的样品在升温过程中停止膨胀的温度为弛垂温度，单位为℃，如图 2 所示，膨胀曲线上的峰顶对应的温度即为弛垂温度。

4.4 应变点 $T_{10}^{14.5}$

应变点是玻璃粘度为 $10^{14.5}$dPa·s 时的温度，即几小时内可消除玻璃内应力的温度，也称为玻璃退火下限温度。

4.5 退火点 T_{10}^{13}

退火点是玻璃粘度为 10^{13}dPa·s 时的温度，即几分钟内可消除玻璃内应力的温度，也称为玻璃退火上限温度。

4.6 导热系数λ

光学玻璃的导热系数是指在稳定传热条件下，单位时间内通过单位面积传递的热量除以单位距离的温度差，用λ表示，单位为 W/(m•℃)。

本产品目录的数据表上记载的导热系数是玻璃温度为 23±2℃的数值，测定精确度±5%。

4 Thermal properties 熱的特性

4.1 Linear thermal expansion coefficient 線膨張係数(α)

Linear thermal expansion coefficient refers to the elongation of the unit length of glass when heated per 1℃ in a certain temperature range. It is measured with thermal dilatometer by quartz comparison method. After obtaining the relationship curve between temperature and sample elongation from room temperature to softening temperature, we can get transition and sag temperatures through graphing method. In a certain temperature range, after every 1℃ increase in temperature, the elongation of the unit length of sample indicates the mean linear expansion coefficient in this temperature range, and expressed by 10^{-7}/K.

線熱膨張係数：一定的な温度の範囲内に、ガラスの温度は 1 ℃ごとに上げる時、ガラスの単位長さの伸長量です。石英の比較の方法を使用して、熱膨張計による室温から軟化温度までの温度とサンプルの伸長量の関係を求めたし、転移温度と屈伏点 Ts が描画法で求めた。測定サンプルは特定の温度範囲、1 ℃ごとに温度上昇、単位長さの伸長量でこの温度範囲内でサンプルの平均線膨張係数を表します，単位は 10^{-7}/K です。

Test equipment: NETZSCH expansion coefficient tester (DIL402 SELECT),

試験装置: ドイツ Nike CorporationDIL402 SELECT 膨張係数測定機,

Temperature range: -150℃~1000℃,

温度範囲：-150℃~1000℃，

Measurement accuracy: better than ±1%,

測定の精度: ±1 %より，

Sample requirement: No visible stripes, bubbles, stones or other impurity with naked eye, stress birefringence up to class 1.

サンプルの要求:脈理と泡と石は目で見えない程度、応力複屈折レベル 1 級。

The mean thermal expansion coefficients from -50℃ to 80℃ and from 100℃ to 300℃ are given in the handbook (see figure 2). Also, the mean thermal expansion coefficients of every 10℃ from -50℃ to 160℃ are provided.

カタログの中には、-50℃~80℃と 100℃~300℃の平均線熱膨張係数を掲示しています（図 2），及び-50℃~160℃温度範囲に 10℃毎の平均線膨脹係数が提供されています。

4.2 Transformation temperature 転移点 Tg

Heat an annealed sample at a certain rate, we can obtain the thermal expansion curve between temperature and sample elongation, as shown in figure 2. The transformation temperature Tg is defined as the intersection of two lines that are extrapolated from the low and high temperature sides respectively.

アニールしたガラスが一定的な速度で昇温して、温度と試料の伸長量の関係の熱膨張グラフを得られます。図 2 に示すように。低温領域と高温領域の直線の延長部分の交差点に対応する温度が転移温度として、単位は℃です。

4.3 Sag temperature 屈伏点 Ts

The sag temperature Ts is defined as the temperature at which annealed sample stops expanding when being heated, as shown in figure 2. The peak temperature on the expansion curve is sag temperature.

図 2 に示すようにアニールしたガラスの伸びが止まる温度が屈伏点の温度として表示しています、単位℃。膨張曲線のピークは、屈伏点 Ts に対応します。

4.4 Strain point 歪点 $T_{10}^{14.5}$

The strain point refers to the temperature at which the glass viscosity is $10^{14.5}$ dpa·s. It is also called the lower limit temperature at which inner stress in the glass can be eliminated within several hours.

歪み点はガラスの粘性が $10^{14.5}$ dPa·s になる時の温度です。即ち数時間、ガラス内の歪みを消去できる温度です、ガラスのアーニルの下限温度と言われています。

4.5 Annealing point 徐冷点 T_{10}^{13}

The annealing point refers to the temperature at which the glass viscosity is 10^{13}dPa·s. It is also called the upper limit temperature at which inner stress in the glass can be eliminated within several minutes.

徐冷点はガラスの粘度が 10^{13} dPa·s になる時の温度です。即ち数分の内、ガラス内の歪みを消去できる温度です。ガラスのアニールの上限温度とも言われています。

4.6 Thermal conductivity 熱伝導率(λ)

The thermal conductivity of optical glass refers to the heat transferred through the unit area per unit time divided by the temperature difference of the unit distance under stable heat transfer conditions, and expressed by λ, in unit of W/(m•℃).

The thermal conductivity listed in this catalog is measured at the temperature of 23±2℃. The measurement accuracy is ±5%.

熱伝導率は安定した熱伝達で単位時間に通る単位面積の熱量を単位距離の温度差で割って、W/(m•℃)を単位として表示されます。

本カタログのデータ表に記載されている熱伝導率はガラスの温度が 23±2℃での数値であり、測定精度は±5%です。

5 机械性能

5.1 杨氏模量 E、剪切模量 G 和泊松比μ

光学玻璃杨氏模量 E、剪切模量 G 和泊松比μ按下列公式计算：

$$E=\frac{4G^2-3G\cdot V_L^2\cdot\rho}{G-V_L^2\cdot\rho}\quad\text{……（17）}$$

$$G=V_T^2\cdot\rho\quad\text{……（18）}$$

$$\mu=\frac{E}{2G}-1\quad\text{……（19）}$$

式中：

E—杨氏模量，Pa；

G—剪切模量，Pa；

V_L—纵波速度，m/s；

V_T—横波速度，m/s；

μ—泊松比；

ρ—玻璃密度，g/cm^3。

5.2 Knoop 硬度 HK

Knoop 硬度使用显微硬度仪测定。采用对称棱角为 172°30′和 130°的四角锥金刚石压头，给试样表面施加 0.98N 的负荷，保持 15 秒出现痕迹，撤去负荷，用显微镜观察并测量试样上压痕长对角线的长度，使用公式(20)计算 Knoop 硬度：

$$HK=1.451\cdot\frac{F}{d^2}\quad\text{……（20）}$$

式中：

F—加压负荷，N；

d—压痕长对角线的长度，mm；

HK—Knoop 硬度，10^7Pa。

5.3 磨耗度 F_A

将 30mm×30mm×10mm 玻璃试样，水平固定在 65 转/分钟旋转的铸铁平面盘，距中心 80mm 的位置上，垂直施加 9.8N 的负荷，使用 W14#金刚砂研磨液连续研磨 3 分钟，测定研磨前后试样质量计算出磨损减少质量 W。并且，以同样方式，测定标准玻璃（H-K9L）的磨损减少质量 W_0，按公式（21）计算磨耗度。

$$F_A=\frac{V}{V_0}\times100=\frac{w/\rho}{w_0/\rho_0}\times100\quad\text{……（21）}$$

式中：

W_0—标准玻璃 H-K9L 的磨损减少质量，g；

W—被测试样的磨损减少质量，g；

ρ_0—标准玻璃 H-K9L 的密度，g/cm^3；

ρ—被测试样的密度，g/cm^3。

5 Mechanical properties 機械的性質

5.1 Young's modulus ヤング率 E, shear modulus 剛性率 G and poisson ratio とボアソン比μ

Young's modulus E, shear modulus G and poisson ratio μ of optical glass can be calculated with the following formula:

光学ガラスのヤング率模量 E、剛性率 G とボアソン比μは次式によって計算します：

$$E=\frac{4G^2-3G\cdot V_L^2\cdot\rho}{G-V_L^2\cdot\rho} \quad \text{……（17）}$$

$$G=V_T^2\cdot\rho \quad \text{……（18）}$$

$$\mu=\frac{E}{2G}-1 \quad \text{……（19）}$$

Where ここで:

E—Young's modulus ヤング率, Pa;

G—Shear modulus 剛性率, Pa;

V_L—Velocity of longitudinal wave 縦波の速度, m/s;

V_T—Velocity of transverse wave 横波の速度, m/s;

μ—Poisson ratio ボアソン比;

ρ—Glass density ガラスの密度, g/cm^3.

5.2 Knoop Hardness ヌープ硬さ HK

Knoop hardness is measured with micro hardness tester. For this measurement, a pyramid-shaped diamond indenter with vertex-angles 172°30′ and 130° with a rhombic base is applied to the polished specimen surface for 15 seconds, and then remove the loads and the length of the longer diagonal of the resulting indentation is observed with a microscope. Knoop hardness is computed with formula (20):

ヌープ（Knoop）硬さは微小硬さ試験機で測定します。対称の角度は 172°30′と 130°の 4 つのコーナーの円錐形ダイヤモンド圧ヘッドで試験片表面に 0.98N の荷重して 15 秒後にトレースを維持して、負荷を削除して、、顕微鏡で観察して標本の長い斜めの線の長さを測定して、式 (20)でヌープ硬さを計算します。

$$HK=1.451\cdot\frac{F}{d^2} \quad \text{……（20）}$$

Where ここで:

F—Load 荷重, N;

d—The length of the longer diagonal of the indentation くぼみの長い方の対角線の長さ, mm;

HK—Knoop hardness ヌープ（Knoop）硬度, 10^{7}Pa.

5.3 Abrasion factor 摩耗度 F_A

Fix a 30×30×10mm glass sample horizontally on the cast iron flat, rotating at 65 rpm. The test piece is located 80mm from the centre of the flat and is under a 9.8N load. Grind continuously with W14# emery grinding fluid for 3 minutes. Test sample weight before and after grinding, and calculate weight loss W. Test weight loss W_0 of standard glassH-K9L by the same method. Calculate abrasion factor F_A by formula (21):

30×30×10mm のサンプルが毎分 65 回転の鋳鉄平板の水平方向にで固定して、センターから 80 mm の位置に 9.8N 垂直荷重、3 分連続 w14＃ エメリー研削液を使用して、サンプルの前後の質量を測定して研削摩耗減少質量Wを計算します。そして、同じ方法で標準的なガラス (H-K9L) の摩耗減少質量 W_0、(21) の数式に従って計算されます。

$$F_A=\frac{V}{V_0}\times100=\frac{w/\rho}{w_0/\rho_0}\times100 \quad \text{……（21）}$$

Where ここで:

W_0—The grinding weight loss of the standard glass H-K9L 標準ガラス H-K9L の摩耗重量, g ;

W—The grinding weight loss of the test sample 試料の摩耗重量, g;

ρ_0—The density of the standard glass H-K9L 標準ガラス H-K9L の密度, g/cm^3;

ρ—The density of the test sample 試料の密度, g/cm^3.

5.4 弯曲强度σ_b

用“三点弯曲试验”法测试经过精退火且上下面抛光试样的断裂载荷，按公式（22）计算弯曲度：

$$\sigma_b = \frac{3P \cdot L}{2 \cdot w \cdot t^2} \quad \text{（22）}$$

式中：

P—断裂载荷，N；

L—跨距，mm；

w—宽度，mm；

t—厚度，mm。

5.5 密度ρ

密度是指在规定温度下单位体积的质量。利用浸在介质中的物体受到的浮力大小等于该物体排开介质的重量即排水法测量玻璃的密度ρ。

5.4 Flexural Strength 曲げ強さσ_b

Well-annealed specimens with polished upper and lower surfaces are used to measure breaking load by the "3-point bending test", and the flexural strength is calculated by the equation (22):

"3 点曲げ"試験法により、アニールされ、上下面が研磨された試料の破壊荷重を測定し、公式（22）により曲げ強さを算出します。

$$\sigma_b = \frac{3P \cdot L}{2 \cdot w \cdot t^2} \quad \text{……（22）}$$

Where ここで:

P—The breaking load 破壊荷重, N；

L—The support span 支点間距離, mm；

w—The width of the specimen 試料の幅, mm；

t—The thickness of the specimen 試料の厚さ, mm。

5.5 Density 密度ρ

Density refers to the mass of per unit volume of optical glass at specified temperature. Use the size of buoyancy of object immersing in a medium equaling to medium weight discharged by this object can obtain glass density ρ, that is drainage method.

密度は規定の温度の単位体積の質量を指します。メディア内のオブジェクトが受ける浮力とオブジェクトがメディアを排出する重量は同じで、つまり排水法でガラスの密度を測定します。

6 玻璃质量指标

6.1 折射率 n_d 和阿贝数υ_d 允许偏差

每批次产品的折射率 n_d 和阿贝数υ_d 与标准值的差异一般在以下公差范围内：
折射率 n_d：$\pm30\times10^{-5}$；
阿贝数υ_d：±0.5%。
如有特殊要求，可按照以下标准供货：
板料折射率 n_d：$\pm2\times10^{-5}$~$\pm5\times10^{-5}$；
阿贝数υ_d：±0.3%。
二次型料折射率 n_d：$\pm10\times10^{-5}$~$\pm20\times10^{-5}$；
阿贝数υ_d：±0.3%。
圆棒切片品折射率 n_d：$\pm5\times10^{-5}$~$\pm20\times10^{-5}$；
阿贝数υ_d：±0.3%。

6.2 应力双折射

6.2.1 中部应力

玻璃的应力双折射以其最长边中部单位长度上的光程差δ表示时，分为 4 级，见表 10。

表 10　Table 10　表 10

级别 Grade	玻璃中部光程差δ(nm/cm)　≤ Middle optical path difference
1	2
1a	4
2	6
3	10
注：粗退火条料按合同执行。 Remarks: coarse annealed strips according to the contract.	

6.2.2 边缘应力

玻璃的应力双折射以其距边缘 5%直径或边长处的单位厚度上的最大光程差δ_{max} 表示时，分为 5 级，见表 11。

表 11　Table 11　表 11

级别 Grade	玻璃边缘光程差δ_{max}(nm/cm)　≤ Edge optical path difference
S1	3
S2	5
S3	10
S4	20
S5	80

6.3 条纹度

条纹度用点光源和透镜组成的平行光路条纹仪检查，

通过转动玻璃，检查最容易产生条纹的玻璃切断面方向内部的条纹影像，与标准试样进行比对，分为 4 级，见表 12。

表 12　Table 12　表 12

级别 Grade	条纹特征 Striae feature
A	无条纹影像 Free of striae
B	有细而分散的条纹 Fine and scattering striae
C	有平行细条纹 Parallel and slight striae
D	有平行略粗条纹 Parallel and a bit thick striae

6 Quality definition ガラスの品質

6.1 Tolerances of refractive n_d index and Abbe-number υ_d 屈折率 n_d とアッベ数υ_d の公差

The differences between refractive index n_d, Abbe-number υ_d and standard values for each batch products are generally in the following tolerance ranges:
屈折率 n_d とアッベ数υ_d は標準値に対して、通常に以下の公差範囲内で：
Refractive index n_d: $\pm 30\times10^{-5}$
屈折率 n_d：$\pm 30\times10^{-5}$
Abbe-number υ_d: ±0.5%
アッベ数υ_d：±0.5%
For special request, we can supply according to the following criteria:
特別な要求がある場合は、次の規格公差内の製品も供給可能です。

Strips ストリップ材：
Refractive index 屈折率 n_d：$\pm 2\times10^{-5}$~$\pm 5\times10^{-5}$
Abbe-number アッベ数υ_d：±0.3%

Reheated-press blank プレス品：
Refractive index 屈折率 n_d：$\pm 10\times10^{-5}$~$\pm 20\times10^{-5}$
Abbe-number アッベ数υ_d：±0.3%

Products cut from round rod 丸棒切断品：
Refractive index 屈折率 n_d：$\pm 5\times10^{-5}$~$\pm 20\times10^{-5}$
Abbe-number アッベ数υ_d：±0.3%

6.2 Stress Birefringence 歪み

6.2.1 Middle stress 中部の歪み

When stress birefringence of glass is expressed by the optical path difference δ per unit in the middle section along the longest direction of glass, middle stress is divided into 4 grades as shown in table 10.
ガラスブロックの中央部の歪みの複屈折は最長方向の中央部の単位長さの光路差δで表示します。4 級に分類しています，表 10 のように。

6.2.2 Edge stress 辺部歪み

When stress birefringence of glass is measured by the maximum optical path difference δ_{max} at a distance of 5% of the diameter from the edge or per unit thickness from the side length of glass, edge stress is divided into 5 grades as shown in table 11.
ガラスブロックの辺部の歪みの複屈折は縁から直径の 5%離れる或いは縁の単位厚さの最大光路差δ_{max} で表示して、5 級に分類しています。表 11 のように。

6.3 Striae 脈理

Striae are inspected by a striae scope equipped with a point light source and lens system in a parallel path. Examine the stripe image from direction of the cut surface where striae easily accur by turning round the sample, and then compare with the standard samples. Striae are classified into 4 grades as shown in table 12.
脈理は点光源とレンズからなる平行光路脈理検査装置を用いて検査します。ガラスを動かして、脈理の出やすい切断面方向から、内部脈理の映像を検査し、標準試料と比較して、4 級に分類しています。表 12 のように。

6.4 气泡度

随着光学玻璃制造技术的不断进步，气泡已有明显的改善，但是制造出完全没有气泡的玻璃是非常困难的。玻璃内气泡的直径、个数由玻璃的种类和熔解条件决定。

光学玻璃气泡等级用 100 cm^3 玻璃中所含气泡(直径Φ≥0.03mm)的总截面积来确定，分为 5 级，见表 13。结石、结晶体及其它夹杂物也作气泡计算。扁长气泡取最长轴和最短轴的算术平均值为直径计算截面积。

表 13　Table 13　表 13

级别 Grade	1	2	3	4	5
Φ≥0.03 mm 气泡总截面积 Total cross sectional area of bubbles（$mm^2/100cm^3$）	<0.03	≥0.03 <0.1	≥0.1 <0.25	≥0.25 <0.5	≥0.5

6.5 光吸收系数

玻璃光吸收系数以白光通过玻璃中每厘米路程的内部透过率的自然对数的负值表示。通过测量玻璃的白光内部透过率来计算光吸收系数，分为 8 级，见表 14。

表 14　Table 14　表 14

级别 Grade	光吸收系数≤ Coefficient of light absorption	级别 Grade	光吸收系数≤ Coefficient of light absorption
00	0.001	3	0.008
0	0.002	4	0.010
1	0.004	5	0.015
2	0.006	6	0.030

6.6 光学均匀性

光学均匀性以一块玻璃中各部分折射率偏差最大值Δn_{max}来表示，按照 GB/T7962.2 规定的方法测量（使用平行光管，采用分辨率法测量）。分为 4 级，见表 15。

在高精度光学系统中使用的玻璃，对单块玻璃折射率的变化控制严格，即对光学均匀性要求比较高，需采用特殊的生产方法并使用干涉仪进行检查。如有需要，请另外咨询。

表 15　Table 15　表 15

级别 Grade	光学均匀性Δn_{max} Optical homogeneity
H1	$\pm 2\times10^{-6}$
H2	$\pm 5\times10^{-6}$
H3	$\pm 10\times10^{-6}$
H4	$\pm 20\times10^{-6}$

6.4 Bubbles 泡

With the continuous development of manufacturing technology of optical glass, bubbles have been improved obviously, but it is very difficult to manufacture bubble-free optical glass. The diameters and numbers of bubbles in glass are determined by glass types and melting conditions. Bubble grades are established by specifying the total cross sectional area (in mm^2) of bubbles (diameter $\Phi \geq 0.03$ mm) in 100 cm^3 glass volume, and are divided into 5 grades as shown in table 13.

光学ガラス製造技術の継続的な改善に従って泡が顕著な改善があった。しかし、泡の完全ないガラスを作成するこてが非常に困難です。ガラスの中の泡の直径と個数はガラスの種類と溶融条件によって決まります。光学ガラスの泡のグレードはガラスの中の泡(直径 $\varphi \geq 0.03$ mm) の合計断面積によって決定されます。表 13 に示すように、5 つのレベルに分かれています。

Stones, crystals and other inclusions are treated as bubbles. The cross sectional area of oblate bubbles is obtained by the average value of the longest axis and shortest axis as the diameter.

結石と結晶体のような異物がある場合も、泡と同様と見なし、計算します。丸くない泡は直径の最大値と最小値の平均値を直径として、断面積を計算しています。

6.5 Coefficient of light absorption 光吸収係数

The coefficient of light absorption of glass is expressed by the negative value of the natural logarithm of internal transmission per centimeter distance passed by white light through glass. Coefficient of light absorption is calculated by internal transmittance of white light, and is classified into 8 grades as shown in table 14.

ガラスの白の光透過率を測定することによって光の吸収係数を算出します。光吸収係数は白光がガラスの中に 1cm ごとに光路を通る内部透過率の自然対数の負値で表示しています。表 14 の 8 級によって分類しています。

6.6 Optical homogeneity 光学的均一性

Optical homogeneity is expressed by the maximum value of the variation in the refractive index Δn_{max} within a single piece of glass. It is measured by resolution method with collimator, according to GB/T7962.2 and is classified into 4 grades as shown in table 15.

光学的均一性はガラス中に各部分の屈折率の最大偏差値Δn_{max} で表示します。GB/T 7962.2 の方法で測定しています。表 15 の 4 級に分類しています（並列光管を使用して、解像度メソッドで測定します）。

For glass blanks used in extremely high-precision optical systems, variations in the refractive index within a single piece must be controlled within very narrow limits. Glass blanks with a tight index control or very high optical homogeneity control are manufactured by special manufacturing processes and inspected by an interferometer. Please contact us if required.

高精度な光学システムに使用するガラス、1 つのガラスの屈折率の変化は厳密に制御して、つまり光学的均質性の要件が高く、特別な製法が必要、干渉計が検査に使用されます。必要な場合、別を参照してください。

7 供货形式

7.1 条料

两端面为炸切面，其余四面为自然成型面，经粗退火或精退火。

7.2 压型坯料

7.2.1 一次压型坯料

一次压型坯料是通过熔炼直接滴料压制成型的坯料。

一次型件毛坯的外径及厚度公差见表 16。

表 16　Table 16　表 16　　单位 units: mm

型料外径 Outer diameter of pressing blanks	一次压型坯料 DP products	
	外径公差 Tolerance of outer diameter	中心厚度公差 Tolerance of centre thickness
<12	±0.10	±0.20
12~40	±0.15	±0.20
41~60	±0.20	±0.20
61~90	±0.30	±0.30
91~150	±0.40	±0.40
>150	±0.50	±0.50

7.2.2 二次压型坯料

二次压型坯料是再次通过热加工压制成型的坯料。

二次型件毛坯的外径及厚度公差见表 17。

表 17　Table 17　表 17　　单位 units: mm

型料外径 Outer diameter of pressing blanks	二次压型坯料 RP products	
	外径公差 Tolerance of outer diameter	中心厚度公差 Tolerance of centre thickness
<10	±0.10	+0.6/0
10~20	±0.10	+0.5/0
20~40	±0.15	+0.5/0
40~60	±0.20	+0.5/0
60~150	±0.30	+0.6/0
>150	±1.00	+1.0/0

7.3 圆棒切片品

通过滚圆或二次拉棒，将材料加工成圆棒后进行切断的产品。

圆棒切片品的外径和厚度公差见表 18。

表 18　Table 18　表 18　　单位 units: mm

外径 Outer diameter	外径公差 Tolerance of outer diameter	中心厚度公差 Tolerance of centre thickness
1.5-15	±0.01	±0.01
>15	±0.03	±0.03

7.4 指定形状品

特殊形状（方形、棱镜等）、指定尺寸的产品。

7.5 其它

有特殊要求或大规格玻璃的需求，请联系销售人员。

我们列出了 NHG 的玻璃牌号以及与 HOYA、OHARA、CDGM、SUMITA 和 SCHOTT 的牌号对照表。对照表中同一行内的牌号仅指玻璃代码构成相同或相近，与玻璃组分无关。

7 Forms of supply 製品区分

7.1 Strips ストリップ材

A strip has two cut ends and four naturally formed surfaces. The glass is coarse or fine annealed.
両側面は切断面で、ほかの 4 面は成型したままの面です。ラフアニール或いは精密アニールをします。

7.2 Pressing blanks プレス品

7.2.1 Direct-press blank (DP) ダイレクトプレス品
Direct-press blanks are directly dropped and pressed from melted glass.
DP 品は溶解炉から流れるガラスを直接に金型に入れて、プレスした品です。
Tolerances of outer diameters and thicknesses for DP are shown in Table 16.
プレス品の外径及び厚さの公差は次の表 16 の通りです。

7.2.2 Reheated-press blank(RP) リヒートプレス品

Reheated-press blanks are formed by reheated-press process.
RP 品は、ガラスを再加熱して成型したプレス品です。アニールをします。
Tolerances of outer diameters and thicknesses for RP are shown in Table 17.
プレス品の外径及び厚さの公差は次の表 17 の通りです。

7.3 Products cut from round rod 丸棒切断品

These products are cut from a precisely round rod formed on a center less grinding machine or by secondary drawn rod process.
丸め加工或いは二回に棒状引き加工によって外径を仕上げた後に切断したものです。
Tolerances of outer diameters and thicknesses for products cut from round rod are shown in Table 18.
丸棒切断品の外径及び厚さの公差は次の表 18 の通りです。

7.4 Products with specified shapes 指定型

Products with special shapes (rectangles, prisms, etc.), specified sizes.
特殊な形（方形、プリズム等）、サイズの製品を供応できます。

7.5 Others そのほか

If any optical glass of special specification or large size is needed, please contact the salesman.
特別な要求或いは大きいサイズのガラスをご要望があれば、あらかじめご相談ください。
We have listed NHG's glass types and corresponding types from HOYA, OHARA, CDGM, SUMITA and SCHOTT. In this comparative table, types in the same line are only same or similar in glass codes, have nothing to do with glass composition.
このカタログでは NHG 硝種は HOYA、OHARA、CDGM、SUMITA、SCHOTT の他社材と相当していますが、ガラスの組成がそれぞれ違っていますので、ご了承ください。

说明-红外材料

1 分类和命名

1.1 分类

产品按玻璃透光波段分为：中红外光学玻璃、远红外光学玻璃。

1.2 命名

IRG × ××

表示产品序号

表示玻璃的透光波段：1-表示中红外波段；2-表示远红外波段

表示“红外光学玻璃”

例：IRG203 表示透远红外波段序号为 03 的红外光学玻璃。

2 光学性能

2.1 红外折射率 n_λ

红外折射率是指红外光在空气中传播速度与在介质中传播速度的比值。采用偏折角法测量入射角 i、折射角φ及样品顶角 A，根据公式（1）计算出波长λ的折射率 n_λ，测试精度：$\pm 1\times10^{-4}$。

$$n_\lambda=\frac{\sqrt{\sin^2\varphi+2\sin\varphi\cos A\sin i+\sin^2 i}}{\sin A} \quad \text{（1）}$$

红外光学玻璃 1.5~16μm.没有给出波段的折射率也可用 Herzberger 公式（2）计算：

$$n=A+BL+CL^2+D\lambda^2+E\lambda^4+F\lambda^6 \quad \text{（2）}$$

式中：

$L=\frac{1}{\lambda^2-0.028}$

A、B、C、D、E、F－计算常数。

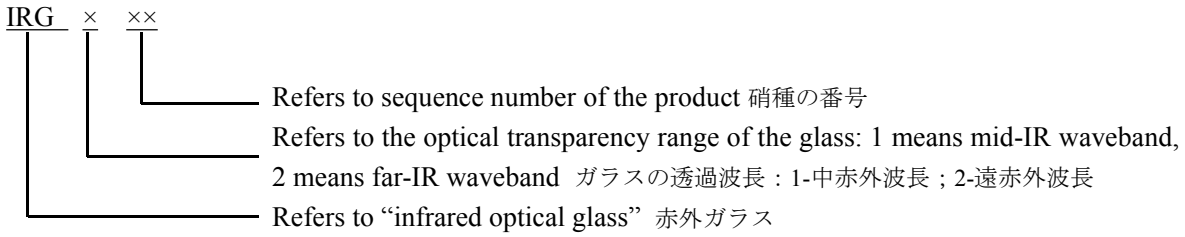
Instructions for Infrared Materials　赤外ガラスの説明

1 Classification and designation 種類と表示

1.1 Classification 種類

Products are classified to mid-IR and far-IR optical glass according to the optical transparency range.
ガラスの透過波長範囲によって、中赤外ガラスと遠赤外ガスを分類されています。

1.2 Designation 表示



For example, IRG203 refers to infrared optical glass which has transmittance at far-IR waveband and the sequence number is 03.
例えば：IRG203 というのは遠赤外波長で番号が 03 の赤外ガラスです。

2 Optical properties 光学の性質

2.1 Infrared refractive index 赤外屈折率 n_λ

Infrared refractive index refers to the velocity of infrared light in the air as compared to that in the medium by the municipality. Deflection angle method is adopted to measure the incident angle i, refraction angle φ and vertex angle A. According to formula (1), we can obtain refractive index n_λ of wavelength λ, and the measuring accuracy is $\pm 1\times10^{-4}$.
赤外屈折率というのは赤外光が空気による伝播スピードと媒質による伝播スピードの比率です。折角法の測定原理で入射角 i、折射角φ及び試料の頂角 A を求めて、公式（1）によって各波長の屈折率 n_λを計算できます。測定精度：$\pm1\times10^{-4}$。

$$n_\lambda=\frac{\sqrt{\sin^2\varphi+2\sin\varphi\cos A\sin i+\sin^2 i}}{\sin A}\quad\text{.....（1）}$$

In the spectral range of 1.5~16μm, the refractive indices not listed in the handbook can be calculated by the Herzberger formula (2):

赤外ガラス 1.5~16μm、バンドの屈折率が与えられない場合は Herzberger 公式（2）で計算する。

$$n=A+BL+CL^2+D\lambda^2+E\lambda^4+F\lambda^6\quad\text{.....（2）}$$

Where ここで:

$L=\frac{1}{\lambda^2-0.028}$

A, B, C, D, E, F－Calculating constants 計算定数.

2.2 红外色散系数

不同红外波长范围内折射率的变化称为红外色散，用红外色散系数表示。本手册中给出了3~5μm和8~12.5μm 两个大气窗口红外色散系数υ_4和$\upsilon_{10.6}$。υ_4和$\upsilon_{10.6}$的色散系数按公式（3）计算：

$$\upsilon_4 = \frac{n_4 - 1}{n_3 - n_5}$$

$$\upsilon_{10.6} = \frac{n_{10.6} - 1}{n_8 - n_{12.5}} \quad \text{……（3）}$$

式中：

υ_4—表示 3~5μm 的红外色散系数；

$\upsilon_{10.6}$—表示 8~12.5μm 的红外色散系数；

$n_\lambda(\lambda=3、4、5、8、10.6、12.5)$—表示特定波长下的红外折射率（单位：μm）。

2.3 绝对折射率的计算常数

光学玻璃手册中所给出的折射率均为 22℃下的相对折射率，而在光学设计时往往需要其它温度下的折射率。利用公式（4）可以计算出温度范围从-40℃至+80℃间的任何波长的折射率。

$$\Delta n_{abs.} = \frac{n^2(\lambda,T_0)-1}{2n(\lambda,T_0)} \cdot \left(D_0 \cdot \Delta T + D_1 \cdot \Delta T^2 + D_2 \cdot \Delta T^3 + \frac{E_0 \cdot \Delta T + E_1 \cdot \Delta T^2}{\lambda^2 - \lambda_{TK}^2}\right) \quad \text{……（4）}$$

式中：

$\Delta n_{abs.}$—绝对折射率的差值；

$n(\lambda,T_0)$—参考温度下的相对折射率；

T_0—参考温度（22 ℃）；

T—目标温度（单位：℃）；

ΔT—相对温度 T 与参考温度 T_0 的差值（单位：℃）；

λ—真空中电磁波的波长（单位：μm）；

D_0、D_1、D_2、E_0、E_1 和λ_{TK}—与玻璃牌号有关的常数；

适用温度范围：–40℃~+80℃；

适用波长范围：1μm ~14μm。

2.4 红外内部透过率τ

测试不同厚度样品（15mm、5mm）的透过率，然后通过公式（5）计算厚度为 d 的样品在波长λ处的内部透过率τ_λ：

$$\tau_\lambda = \left(\frac{T_{1\lambda}}{T_{2\lambda}}\right)^{d/(d_1-d_2)} \quad \text{……（5）}$$

式中：

d_1、d_2—样品厚度，$d_1>d_2$；

$T_{1\lambda}$—厚度为 d_1 的样品在波长λ处的透过率（含表面损失）；

$T_{2\lambda}$—厚度为 d_2 的样品在波长λ处的透过率（含表面损失）。

2.2 Infrared dispersion coefficient 赤外分散係数

Infrared dispersion means the deviations of refractive index at different infrared wavelengths. In this handbook, the infrared dispersion coefficientsυ_4 and $\upsilon_{10.6}$,of two air windows 3μm-5μm and 8μm-12.5μm are given. υ_4 and $\upsilon_{10.6}$ can be calculated by equation (3):

異なる赤外波長範囲内で、屈折率の変化が赤外分散と呼ばれます。赤外分散係数で表示します。3~5μm と 8~12.5μm の 2 つの大気のウィンドウの赤外線分散係数υ_4と$\upsilon_{10.6}$がこのマニュアルで与えられています。υ_4と$\upsilon_{10.6}$の分散係数は、(3) の式で計算されます。

$$\upsilon_4 = \frac{n_4 - 1}{n_3 - n_5}$$

$$\upsilon_{10.6} = \frac{n_{10.6} - 1}{n_8 - n_{12.5}} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{（3）}$$

$\upsilon_4 = \frac{n_4 - 1}{n_3 - n_5}$

$\upsilon_{10.6} = \frac{n_{10.6} - 1}{n_8 - n_{12.5}}$ ……（3） Where ここで:

υ_4—Infrared dispersion coefficient 赤外分散係数 (3 ~ 5μm);

$\upsilon_{10.6}$—Infrared dispersion coefficient 赤外分散係数(8 ~ 12.5μm);

n_λ(λ=3,4,5,8,10.6,12.5)—Infrared refractive index at specific wavelengths 特定な波長の赤外分散係数(μm).

2.3 Calculating constants of n_{abs}.絶対屈折率の計算定数

The refractive indices given in the glass handbook in general are all relative values at 22℃, but refractive indices in other temperatures are always requested by many optic designers. The absolute refractive indices of glass regards to wavelengths and temperatures which are not listed in the handbook can be calculated by the following equation (4).

光学ガラスのカタログに、全部の屈折率が 22℃での相対屈折率ですが、光学設計する時、他の温度での屈折率が要ります。ガラスの屈折率温度係数を通して、公式（4）によって、-40℃～+80℃の温度範囲でのいかなる波長の屈折率を計算できます。

$$\Delta n_{abs} = \frac{n^2(\lambda,T_0)-1}{2n(\lambda,T_0)} \cdot \left(D_0 \cdot \Delta T + D_1 \cdot \Delta T^2 + D_2 \cdot \Delta T^3 + \frac{E_0 \cdot \Delta T + E_1 \cdot \Delta T^2}{\lambda^2 - \lambda_{TK}^2}\right) \quad \cdots\cdots\cdots\cdots\cdots\cdots \text{（4）}$$

Whereここで:

Δn_{abs} —The difference of absolute indices絶対屈折率の差;

$n(\lambda,T_0)$ —Relative index at the reference temperature 参考温度での相対屈折率;

T_0—Reference temperature 参考温度(22 ℃);

T —Targeted temperature目標温度(℃);

ΔT—Temperaturedifference $T-T_0$相対温度Tと参考温度T_0の差(℃);

λ—Vacuum wavelength真空中の電磁波の波長(μm);

D_0, D_1, D_2, E_0, $E_1$and λ_{TK}—Constants depending on glass typesガラス硝種と関係がある定数.

The applied temperature range 温度範囲: –40℃~+80℃;

The applied wavelength range 波長範囲: 1μm~14μm.

2.4 Infrared transmittance 赤外内部透過率τ

The internal transmittance of samples with different thickness (15mm, 5mm) are tested, and then the internal transmittance τ_λ of samples with thickness d at wavelength λ are calculated by equation (5) :

厚み15㎜と5㎜の試料のそれぞれの透過率を測定します。次の式（5）で厚みｄのガラスの波長λ時の内部透過率τλを算出できます。

$$\tau_\lambda = \left(\frac{T_{1\lambda}}{T_{2\lambda}}\right)^{d/(d_1-d_2)} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{（5）}$$

Where ここで:

d_1、d_2—Sample thickness 試料厚み，$d_1 > d_2$;

$T_{1\lambda}$—Transmittance at wavelength λ (including surface loss) for a sample of thickness d_1 厚み d_1 の試料の波長λ時の透過率（表面損失を含む）;

$T_{2\lambda}$—Transmittance at wavelength λ (including surface loss) for a sample of thickness d_2 厚み d_2 の試料の波長λ時の透過率（表面損失を含む）.

3 介电常数

依据 GB/T 1409-2006 测量电气绝缘材料在工频、音频、高频(包括米波波长在内)下电容率和介质损耗因数的推荐方法进行测试。

4 其它指标

本手册中化学稳定性、热性能和机械性能及密度按照无色光学玻璃相应指标测试方法测试。

5 主要质量指标

5.1 折射率和色散系数的允许偏差

每批次产品的折射率 n_λ，色散系数$\upsilon_{10.6}$与标准值的差异一般在以下公差范围内：
折射率 n_λ：$\pm 3\times10^{-4}$；$\upsilon_{10.6}$：±0.8%

5.2 条纹度

红外光学玻璃条纹度按 GB/T 32561.2 规定的测试方法进行测量，以条纹阴影图像的灰度和其所占观察图像的面积进行量化表达，分为 4 级，见表 1。

表 1　Table 1　表 1

级别 Grade	条纹可见度 Striae visibility
A	无明显的条纹阴影存在。 No obvious striae shadow.
B	内有直径≤1mm 的细而分散的条纹影像存在。 Fine and scattering striae shadow exists in side and the diameter is not greater than 1mm
C	内有直径 1～2mm 的细条纹。 Fine striae exists in side and the diameter is between 1mm and 2mm
D	内有直径≥2mm 的粗条纹，但不能密集存在。 Thick striae exists in side but not intensive and the diameter is not less than 2mm

5.3 杂质

红外光学玻璃杂质按 GB/T 52361.3 中规定的方法进行判定和检测，玻璃中允许杂质含量等级用 100cm³玻璃中所含杂质（$\Phi_{杂质}$≥0.1mm）的总截面积来确定，分为 5 级，见表 2。扁长气泡取最长轴和最短轴的算术平均值计算。

表 2　Table 2　表 2

级别 Grade	0	1	2	3	4
每 100cm³ 玻璃的总横截面积 Total cross sectional area S（mm²）	S＜0.05	0.05≤S＜0.2	0.2≤S＜0.4	0.4≤S＜0.6	0.6≤S＜1.2

3 Dielectric constant 誘電率

Measure dielectric constant according to the recommended methods for capacitivity and dielectric loss factor of electro-insulating material at power frequency, audio frequency and high frequency (including meter wavelength) in GB/T 1409-2006.

GB/T 1409-2006 に基づいて、電気絶縁材料が工頻（電縁周波）、音頻（オーディオ周波）、高波（高周波）、米波（メートル波）での誘電率と媒質損耗因数を測定するという推薦方法によって測定します。

4 Others 他の指標

In this handbook, chemical stabilities, thermal properties, mechanical properties and density are measured by the corresponding testing methods of colorless optical glass.
このマニュアルの中で化学的安定性、熱的性質、機械的性質と密度は無色光学ガラスに対応する指標の測定方法によって求められます。

5 Main quality definition 主要な質量指標

5.1 Allowable tolerances of refractive index and dispersion coefficient 屈折率と分散係数の許容差

The differences between refractive index, dispersion coefficient of each batch products and the standard values are generally in the following tolerance ranges:
屈折率 n_λ、分散係数$\upsilon_{10.6}$ は標準値との偏差程度が生産ロットによって違っています。一般に以下の公差範囲内にあります。
Refractive index 屈折率 n_λ：$\pm 3\times10^{-4}$, $\upsilon_{10.6}$: ±0.8%

5.2 Striae 脈理

Striae of infrared optical glass are inspected by the methods specified in GB/T 32561.2. The gray scale of shadow images and its area taking of the observable image are adopted for quantitative expression, and striae are classified into 4 grades as shown in table 1.
赤外光学ガラスの脈理は GB/T 32561.2 の測定方法によって測定しています。脈理の映像の深さは脈理が占めた面積との比率で表示しています。表 1 の 4 級に分類しています。

5.3 Impurities 異物

Impurities in optical glass are inspected by the method specified in GB/T 52361.3. Impurity content is established by specifying the total cross sectional area (in mm^2) of impurities (diameter $\Phi_{impurity}\geq0.1$ mm) in 100 cm^3 glass volume. The impurity grades are classified into 5 grades as shown in table 2. The cross sectional area of oblate impurity is obtained by the average value of the longest axis and shortest axis as the diameter.
GB/T 52361.3 の方法によって、赤外光学ガラス中の異物を測定して判定します。異物の程度は 100 cm^3 のガラス中に含まれている異物（Φ異物≥0.1mm）の断面積の総和で判定します。表 2 の 5 級に分類しています。丸くない泡は直径の最大値と最小値の平均値で算出します。

6 供货形式

6.1 压型坯料

压型坯料是指再次通过热加工压制成型的各种形状的坯料（平片、凹凸件等）。可稳定提供直径Φ7mm~Φ200mm 的产品。

6.2 红外镜片

6.2.1 冷加工镜片

是指经过粗磨、精磨、抛光或单点金刚石车削加工后的球面、非球面镜片。可按客户要求提供直径Φ5mm~Φ160mm 的镜片。

6.2.2 精密模压镜片

是指通过模压成型的产品。可按客户要求提供直径Φ5mm~Φ25mm 的精密模压镜片。

6.3 红外镜头

公司可提供焦距 3.5mm、6.5mm、10mm、13mm、15mm、19mm、25mm、35mm、45mm、50mm 等规格的标准远红外镜头，具体参数请与销售人员联系，其他规格可根据客户需求设计制作。

6.4 其它

如对产品有特殊要求，请联系销售人员。

6 Forms of supply 製品区分

6.1 Pressing blanks プレス品

Blanks of various shapes (plain film, concave-convex part, etc.) are formed by reheated-press process. We can provide products with diameters of Φ7mm~Φ200mm stably.

プレス品は、ガラスを再加熱成型した各種類な形状の製品です（平面品、凸凹品等）。直径はΦ7 mm~Φ200 mm のプレス品を安定に供応できます。

6.2 Infrared lens 赤外レンズ完品

6.2.1 Cold working lens 冷間加工レンズ

Cold working lens refer to spherical, aspheric lens after coarse grinding, fine grinding, polishing or single point diamond turning. We can provide lens with diameters of Φ5mm~Φ160mm according to customers' requirements.
レンズ完品は荒摺して、砂掛け、研磨或いは車削で加工して成型した球面、非球面レンズです。客様の要求でΦ5mm~Φ160mm のレンズ完品を供応できます。

6.2.2 Precision molding lens 精密モールドレンズ

Precision molding lens refer to the products which are obtained by molding process. We can provide precision molding lens with diameters of Φ5mm~Φ25mm according to customers' requirements.
ガラスをプレスして、成型したものです。客様の要求でΦ5 mm~Φ25 mm の精密モールドレンズを供応できます。

6.3 Infrared lens 赤外レンズ

Lens with focal length of 3.5mm, 6.5mm, 10mm, 13mm, 15mm, 19mm, 25mm, 35mm, 45mm, 50mm and standard lens of other sizes are now available. Please contact the salesman for specific parameters. We can also design and manufacture other sizes according to customers' requirements.
会社は焦点距離の 3.5mm、6.5mm、10mm、13mm、15mm、19mm、25mm、35mm、45mm、50mm 等のサイズの赤外レンズが供応できます。特定のパラメーター、営業スタッフにお問い合わせください。その以外のサイズも設計して供応できます。

6.4 Others その他

If you have any special requirement on our products, please contact the salesman.
特別なご要望があれば、あらかじめ営業部へご相談ください。

无色光学玻璃数据表

Colorless Optical Glass Data Sheets

無色光学ガラスのデータ表

H-FK61	497816	n_d = 1.49700	υ_d = 81.61	$n_F - n_C$ = 0.006090
		n_e = 1.49845	υ_e = 81.20	$n_{F'} - n_{C'}$ = 0.006139

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.47950
n_{1970}	1970.09	1.48263
n_{1530}	1529.58	1.48606
n_{1129}	1128.64	1.48910
n_{1064}	1064.00	1.48965
n_t	1013.98	1.49010
n_s	852.11	1.49183
$n_{A'}$	768.19	1.49301
n_r	706.52	1.49407
n_C	656.27	1.49514
$n_{C'}$	643.85	1.49543
n_{He-Ne}	632.80	1.49571
n_D	589.29	1.49694
n_d	587.56	1.49700
n_e	546.07	1.49845
n_F	486.13	1.50123
$n_{F'}$	479.99	1.50157
n_g	435.84	1.50451
n_h	404.66	1.50721
n_i	365.01	1.51173

Constants of Dispersion Formula	
A_0	2.21807952E+00
A_1	-5.67922113E-03
A_2	8.28756139E-03
A_3	9.66891434E-05
A_4	3.56668643E-06
A_5	-3.63065113E-07

Density	
ρ (g/cm^3)	3.67

Solarization	
△λ (%)	-2.4

Relative Partial Dispersion	
$P_{d,C}$	0.3054
$P_{e,d}$	0.2381
$P_{g,F}$	0.5386
$P'_{d,c'}$	0.2557
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4789

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0113
$\triangle P_{g,F}$	0.0305
$\triangle P_{C,t}$	-0.1080
$\triangle P_{C,s}$	-0.0528

Thermal Properties	
Tg (℃)	464
Ts (℃)	489
$T_{10}^{14.5}$ (℃)	421
T_{10}^{13} (℃)	442
$\alpha_{-50/80℃}$ (10^{-7}/K)	124
$\alpha_{100/300℃}$ (10^{-7}/K)	152
λ (W/(m·K))	0.74

Mechanical Properties	
HK (10^7Pa)	350
F_A	385
E (GPa)	71.6
G (GPa)	27.4
μ	0.307
σ_b (MPa)	33
B (10^{-12}/Pa)	0.69

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	115
-40/-30	118
-30/-20	121
-20/-10	123
-10/0	125
0/10	127
10/20	128
20/30	130
30/40	133
40/50	136
50/60	138
60/70	140
70/80	142
80/90	144
90/100	145
100/110	146
110/120	147
120/130	148
130/140	149
140/150	150
150/160	151

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.999	0.998
370	0.995	0.993
360	0.984	0.975
350	0.970	0.948
340	0.942	0.893
330	0.886	0.788
320	0.788	0.621
310	0.643	0.410
300	0.466	0.212
290	0.298	0.086
280	0.176	0.031

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-5.4	-5.3	-5.3	-5.2	-5.1	-5.0	-4.9	-4.6	-4.6	-4.5
-40～-20	-5.6	-5.4	-5.3	-5.3	-5.3	-5.3	-5.2	-5.1	-5.0	-4.8
-20～0	-5.8	-5.8	-5.7	-5.7	-5.7	-5.6	-5.5	-5.2	-5.2	-5.1
0～20	-6.1	-6.0	-5.9	-5.9	-5.9	-5.9	-5.8	-5.7	-5.6	-5.5
20～40	-6.4	-6.3	-6.2	-6.2	-6.2	-6.0	-6.0	-5.9	-5.8	-5.7
40～60	-6.6	-6.5	-6.4	-6.4	-6.5	-6.4	-6.3	-6.0	-6.0	-5.9
60～80	-6.8	-6.8	-6.7	-6.6	-6.6	-6.6	-6.5	-6.3	-6.2	-6.0
80～100	-7.0	-6.9	-6.9	-6.9	-6.9	-6.9	-6.8	-6.5	-6.4	-6.1
100～120	-7.2	-7.2	-7.1	-7.1	-7.1	-7.1	-6.9	-6.8	-6.7	-6.4
120～140	-7.5	-7.5	-7.4	-7.4	-7.4	-7.3	-7.1	-7.1	-7.0	-6.8
140～160	-7.9	-7.8	-7.7	-7.6	-7.6	-7.5	-7.4	-7.3	-7.2	-7.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/285
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	332/284

Constants of dn/dt		
D_0	D_1	D_2
-1.90E-05	-2.71E-09	-2.90E-11
E_0	E_1	λ_{TK}
3.52E-07	9.31E-11	2.28E-01

H-FK69	593686	n_d = 1.59282	υ_d = 68.63	$n_F - n_C$ = 0.008638
		n_e = 1.59489	υ_e = 68.25	$n_{F'} - n_{C'}$ = 0.008716

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.57002
n_{1970}	1970.09	1.57383
n_{1530}	1529.58	1.57808
n_{1129}	1128.64	1.58198
n_{1064}	1064.00	1.58269
n_t	1013.98	1.58328
n_s	852.11	1.58561
$n_{A'}$	768.19	1.58723
n_r	706.52	1.58873
n_C	656.27	1.59021
$n_{C'}$	643.85	1.59062
n_{He-Ne}	632.80	1.59101
n_D	589.29	1.59275
n_d	587.56	1.59282
n_e	546.07	1.59489
n_F	486.13	1.59884
$n_{F'}$	479.99	1.59934
n_g	435.84	1.60354
n_h	404.66	1.60740
n_i	365.01	1.61397

Constants of Dispersion Formula	
A_0	2.50210584E+00
A_1	-7.29437368E-03
A_2	1.22873858E-02
A_3	2.57463363E-04
A_4	-1.16391265E-05
A_5	6.15553004E-07

Density	
ρ (g/cm^3)	4.07

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.3022
$P_{e,d}$	0.2396
$P_{g,F}$	0.5441
$P'_{d,c'}$	0.2524
$P'_{e,d}$	0.2375
$P'_{g,F'}$	0.4819

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0050
$\triangle P_{g,F}$	0.0145
$\triangle P_{C,t}$	-0.0704
$\triangle P_{C,s}$	-0.0326

Thermal Properties	
Tg (℃)	584
Ts (℃)	608
$T_{10}^{14.5}$ (℃)	564
T_{10}^{13} (℃)	575
$\alpha_{-50/80℃}$ (10^{-7}/K)	113
$\alpha_{100/300℃}$ (10^{-7}/K)	136
λ (W/(m·K))	0.64

Mechanical Properties	
HK (10^7Pa)	390
F_A	365
E (GPa)	73.3
G (GPa)	28.2
μ	0.298
σ_b (MPa)	42
B (10^{-12}/Pa)	0.44

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	103
-40/-30	105
-30/-20	107
-20/-10	108
-10/0	109
0/10	110
10/20	111
20/30	112
30/40	113
40/50	114
50/60	115
60/70	116
70/80	117
80/90	118
90/100	119
100/110	120
110/120	122
120/130	123
130/140	124
140/150	125
150/160	127

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.998	0.996
400	0.997	0.994
390	0.995	0.990
380	0.990	0.978
370	0.978	0.956
360	0.955	0.909
350	0.912	0.829
340	0.839	0.702
330	0.728	0.530
320	0.591	0.350
310	0.448	0.201
300	0.325	0.107
290	0.235	0.056
280	0.175	0.032

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-5.0	-4.9	-4.8	-4.8	-4.8	-4.7	-4.6	-4.5	-4.5	-4.3
-40～-20	-5.4	-5.3	-5.2	-5.2	-5.2	-5.1	-5.0	-4.9	-4.8	-4.6
-20～0	-5.6	-5.5	-5.5	-5.5	-5.5	-5.4	-5.2	-5.1	-5.1	-4.9
0～20	-5.7	-5.6	-5.6	-5.6	-5.6	-5.5	-5.4	-5.3	-5.3	-5.1
20～40	-5.8	-5.7	-5.7	-5.7	-5.7	-5.6	-5.5	-5.4	-5.4	-5.2
40～60	-6.0	-5.9	-5.9	-5.9	-5.8	-5.7	-5.6	-5.5	-5.5	-5.3
60～80	-6.1	-6.0	-5.9	-5.9	-5.9	-5.7	-5.6	-5.6	-5.5	-5.3
80～100	-6.2	-6.1	-6.0	-6.0	-6.0	-5.8	-5.7	-5.6	-5.6	-5.3
100～120	-6.3	-6.2	-6.1	-6.1	-6.1	-6.0	-5.8	-5.7	-5.6	-5.4
120～140	-6.4	-6.3	-6.2	-6.2	-6.2	-6.1	-5.9	-5.8	-5.7	-5.5
140～160	-6.6	-6.5	-6.4	-6.3	-6.3	-6.2	-6.1	-6.0	-5.9	-5.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	345/281

Constants of dn/dt		
D_0	D_1	D_2
-1.56E-05	2.44E-09	-1.24E-11
E_0	E_1	λ_{TK}
2.89E-07	2.96E-10	2.33E-01

H-FK76	550755	n_d = 1.55032	υ_d = 75.50	$n_F - n_C$ = 0.007289
		n_e = 1.55206	υ_e = 75.12	$n_{F'} - n_{C'}$ = 0.007349

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.53051
n_{1970}	1970.09	1.53391
n_{1530}	1529.58	1.53766
n_{1129}	1128.64	1.54106
n_{1064}	1064.00	1.54168
n_t	1013.98	1.54220
n_s	852.11	1.54420
$n_{A'}$	768.19	1.54558
n_r	706.52	1.54684
n_C	656.27	1.54810
$n_{C'}$	643.85	1.54845
n_{He-Ne}	632.80	1.54878
n_D	589.29	1.55025
n_d	587.56	1.55032
n_e	546.07	1.55206
n_F	486.13	1.55539
$n_{F'}$	479.99	1.55580
n_g	435.84	1.55932
n_h	404.66	1.56256
n_i	365.01	1.56803

Constants of Dispersion Formula	
A_0	2.37490887E+00
A_1	-6.34594354E-03
A_2	1.00559237E-02
A_3	2.32696930E-04
A_4	-1.51093626E-05
A_5	7.74351892E-07

Density	
ρ (g/cm^3)	4.13

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.3046
$P_{e,d}$	0.2387
$P_{g,F}$	0.5392
$P'_{d,c'}$	0.2545
$P'_{e,d}$	0.2368
$P'_{g,F'}$	0.4790

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0083
$\triangle P_{g,F}$	0.0210
$\triangle P_{C,t}$	-0.0965
$\triangle P_{C,s}$	-0.0465

Thermal Properties	
Tg (℃)	553
Ts (℃)	576
$T_{10}^{14.5}$ (℃)	509
T_{10}^{13} (℃)	531
$\alpha_{-50/80℃}$ (10^{-7}/K)	122
$\alpha_{100/300℃}$ (10^{-7}/K)	145
λ (W/(m·K))	0.56

Mechanical Properties	
HK (10^7Pa)	385
F_A	420
E (GPa)	75.8
G (GPa)	29.1
μ	0.306
σ_b (MPa)	66
B (10^{-12}/Pa)	0.43

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	112
-40/-30	114
-30/-20	115
-20/-10	118
-10/0	120
0/10	120
10/20	122
20/30	124
30/40	124
40/50	126
50/60	126
60/70	129
70/80	129
80/90	130
90/100	131
100/110	132
110/120	135
120/130	136
130/140	138
140/150	138
150/160	142

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.979	0.958
2200	0.984	0.968
2000	0.991	0.982
1800	0.995	0.989
1600	0.998	0.996
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.998	0.996
380	0.997	0.994
370	0.995	0.990
360	0.989	0.978
350	0.976	0.952
340	0.953	0.908
330	0.912	0.832
320	0.850	0.723
310	0.766	0.587
300	0.671	0.450
290	0.580	0.336
280	0.503	0.253

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-7.1	-6.8	-6.6	-6.5	-6.5	-6.4	-6.3	-6.2	-6.1	-5.8
-40～-20	-6.8	-6.5	-6.4	-6.3	-6.3	-6.2	-6.2	-6.1	-6.0	-5.6
-20～0	-6.4	-6.2	-6.3	-6.2	-6.2	-6.2	-6.1	-5.9	-5.8	-5.5
0～20	-6.4	-6.3	-6.1	-6.1	-6.1	-5.9	-5.8	-5.6	-5.6	-5.3
20～40	-6.4	-6.3	-6.0	-6.0	-6.0	-5.8	-5.6	-5.5	-5.4	-5.0
40～60	-6.2	-6.1	-5.8	-5.8	-5.8	-5.6	-5.5	-5.4	-5.3	-4.9
60～80	-6.0	-6.0	-5.8	-5.7	-5.6	-5.5	-5.3	-5.2	-5.1	-4.8
80～100	-6.0	-5.8	-5.6	-5.6	-5.5	-5.4	-5.2	-4.9	-4.9	-4.7
100～120	-5.9	-5.7	-5.6	-5.5	-5.5	-5.4	-5.1	-4.9	-4.8	-4.5
120～140	-5.8	-5.5	-5.4	-5.4	-5.4	-5.2	-5.0	-4.9	-4.8	-4.2
140～160	-5.5	-5.3	-5.2	-5.2	-5.2	-5.1	-4.9	-4.8	-4.7	-4.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/285
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	327/280

Constants of dn/dt		
D_0	D_1	D_2
-1.79E-05	1.92E-08	-3.61E-11
E_0	E_1	λ_{TK}
4.81E-07	3.20E-10	2.11E-01

H-FK90	459902	n_d = 1.45860	υ_d = 90.19	$n_F - n_C$ = 0.005085
		n_e = 1.45981	υ_e = 89.77	$n_{F'} - n_{C'}$ = 0.005122

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.44358
n_{1970}	1970.09	1.44630
n_{1530}	1529.58	1.44928
n_{1129}	1128.64	1.45191
n_{1064}	1064.00	1.45238
n_t	1013.98	1.45277
n_s	852.11	1.45425
$n_{A'}$	768.19	1.45524
n_r	706.52	1.45615
n_C	656.27	1.45704
$n_{C'}$	643.85	1.45729
n_{He-Ne}	632.80	1.45752
n_D	589.29	1.45855
n_d	587.56	1.45860
n_e	546.07	1.45981
n_F	486.13	1.46212
$n_{F'}$	479.99	1.46241
n_g	435.84	1.46486
n_h	404.66	1.46710
n_i	365.01	1.47085

Constants of Dispersion Formula	
A_0	2.10866977E+00
A_1	-4.81589397E-03
A_2	7.02478609E-03
A_3	-2.48667024E-05
A_4	1.78185408E-05
A_5	-1.09874507E-06

Density	
ρ (g/cm^3)	3.64

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3068
$P_{e,d}$	0.2380
$P_{g,F}$	0.5388
$P'_{d,c'}$	0.2558
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4783

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0139
$\triangle P_{g,F}$	0.0450
$\triangle P_{C,t}$	-0.1374
$\triangle P_{C,s}$	-0.0682

Thermal Properties	
Tg (℃)	442
Ts (℃)	467
$T_{10}^{14.5}$ (℃)	423
T_{10}^{13} (℃)	436
$\alpha_{-50/80℃}$ (10^{-7}/K)	134
$\alpha_{100/300℃}$ (10^{-7}/K)	164
λ (W/(m·K))	0.71

Mechanical Properties	
HK (10^7Pa)	354
F_A	459
E (GPa)	68.9
G (GPa)	26.2
μ	0.313
σ_b (MPa)	48
B (10^{-12}/Pa)	0.60

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	2
D_A	3
R_{OH} (S)	4
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	123
-40/-30	126
-30/-20	128
-20/-10	130
-10/0	132
0/10	133
10/20	135
20/30	138
30/40	140
40/50	143
50/60	144
60/70	145
70/80	146
80/90	147
90/100	149
100/110	150
110/120	151
120/130	153
130/140	155
140/150	157
150/160	160

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.999	0.998
370	0.999	0.998
360	0.998	0.996
350	0.997	0.994
340	0.993	0.986
330	0.984	0.968
320	0.967	0.935
310	0.935	0.874
300	0.883	0.779
290	0.809	0.654
280	0.721	0.520

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-7.0	-6.7	-6.5	-6.4	-6.2	-6.0	-5.9	-5.6	-5.6	-5.3
-40～-20	-7.2	-6.8	-6.5	-6.5	-6.4	-6.2	-6.0	-5.8	-5.8	-5.5
-20～0	-7.3	-6.9	-6.7	-6.7	-6.6	-6.4	-6.3	-6.0	-5.9	-5.7
0～20	-7.3	-7.0	-6.8	-6.8	-6.7	-6.5	-6.5	-6.1	-6.1	-6.0
20～40	-7.5	-7.1	-7.0	-6.9	-6.8	-6.5	-6.5	-6.2	-6.2	-6.2
40～60	-7.6	-7.3	-7.2	-7.2	-7.1	-6.7	-6.6	-6.5	-6.5	-6.3
60～80	-7.9	-7.6	-7.5	-7.5	-7.4	-7.0	-7.0	-6.8	-6.7	-6.6
80～100	-8.0	-7.8	-7.7	-7.6	-7.4	-7.2	-7.1	-6.9	-6.8	-6.7
100～120	-8.1	-8.1	-8.0	-7.9	-7.8	-7.6	-7.4	-7.2	-7.2	-7.0
120～140	-8.2	-8.0	-8.0	-8.0	-7.9	-7.8	-7.7	-7.5	-7.5	-7.3
140～160	-8.4	-8.3	-8.3	-8.2	-8.2	-8.0	-8.0	-7.9	-7.8	-7.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	310/260
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	300/260

Constants of dn/dt		
D_0	D_1	D_2
-2.37E-05	5.32E-09	-4.63E-11
E_0	E_1	λ_{TK}
9.51E-07	-1.08E-09	2.02E-08

H-FK95	437951	n_d = 1.43700	υ_d = 95.10	$n_F - n_C$ = 0.004595
		n_e = 1.43810	υ_e = 94.66	$n_{F'} - n_{C'}$ = 0.004628

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.42310
n_{1970}	1970.09	1.42566
n_{1530}	1529.58	1.42846
n_{1129}	1128.64	1.43091
n_{1064}	1064.00	1.43134
n_t	1013.98	1.43170
n_s	852.11	1.43306
$n_{A'}$	768.19	1.43396
n_r	706.52	1.43478
n_C	656.27	1.43559
$n_{C'}$	643.85	1.43582
n_{He-Ne}	632.80	1.43603
n_D	589.29	1.43696
n_d	587.56	1.43700
n_e	546.07	1.43810
n_F	486.13	1.44019
$n_{F'}$	479.99	1.44044
n_g	435.84	1.44264
n_h	404.66	1.44466
n_i	365.01	1.44803

Constants of Dispersion Formula	
A_0	2.04831817E+00
A_1	-4.48612591E-03
A_2	6.22248873E-03
A_3	-7.98581030E-06
A_4	1.22118495E-05
A_5	-7.39464344E-07

Density	
ρ (g/cm^3)	3.56

Solarization	
△λ (%)	-3.2

Relative Partial Dispersion	
$P_{d,C}$	0.3069
$P_{e,d}$	0.2394
$P_{g,F}$	0.5332
$P'_{d,c'}$	0.2550
$P'_{e,d}$	0.2377
$P'_{g,F'}$	0.4754

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0171
$\triangle P_{g,F}$	0.0475
$\triangle P_{C,t}$	-0.1544
$\triangle P_{C,s}$	-0.0780

Thermal Properties	
Tg (℃)	409
Ts (℃)	433
$T_{10}^{14.5}$ (℃)	377
T_{10}^{13} (℃)	390
$\alpha_{-50/80℃}$ (10^{-7}/K)	143
$\alpha_{100/300℃}$ (10^{-7}/K)	170
λ (W/(m·K))	0.97

Mechanical Properties	
HK (10^7Pa)	358
F_A	449
E (GPa)	71.4
G (GPa)	26.8
μ	0.333
σ_b (MPa)	32
B (10^{-12}/Pa)	0.59

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	2
D_A	3
R_{OH} (S)	4
RP (S)	3

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	132
-40/-30	134
-30/-20	136
-20/-10	138
-10/0	140
0/10	142
10/20	143
20/30	145
30/40	147
40/50	149
50/60	151
60/70	153
70/80	154
80/90	155
90/100	156
100/110	157
110/120	158
120/130	159
130/140	161
140/150	163
150/160	164

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.997
440	0.998	0.997
420	0.998	0.997
400	0.998	0.997
390	0.998	0.997
380	0.998	0.997
370	0.997	0.995
360	0.994	0.988
350	0.986	0.973
340	0.965	0.932
330	0.925	0.856
320	0.845	0.714
310	0.716	0.513
300	0.535	0.286
290	0.367	0.135
280	0.205	0.042

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-5.5	-5.3	-5.2	-5.2	-5.1	-5.0	-4.9	-4.8	-4.8	-4.5
-40～-20	-6.0	-5.8	-5.7	-5.7	-5.6	-5.5	-5.3	-5.1	-5.1	-4.9
-20～0	-6.4	-6.2	-6.0	-6.0	-5.9	-5.8	-5.7	-5.5	-5.5	-5.3
0～20	-6.7	-6.5	-6.4	-6.4	-6.3	-6.2	-6.1	-5.8	-5.8	-5.6
20～40	-7.0	-6.8	-6.7	-6.7	-6.6	-6.4	-6.4	-6.2	-6.1	-5.9
40～60	-7.2	-7.0	-6.9	-6.9	-6.8	-6.7	-6.6	-6.5	-6.4	-6.2
60～80	-7.3	-7.2	-7.1	-7.1	-7.0	-6.9	-6.8	-6.7	-6.6	-6.4
80～100	-7.3	-7.2	-7.1	-7.1	-7.0	-6.9	-6.8	-6.7	-6.7	-6.5
100～120	-7.3	-7.2	-7.1	-7.1	-7.1	-7.0	-6.9	-6.7	-6.7	-6.6
120～140	-7.4	-7.3	-7.2	-7.1	-7.1	-7.0	-6.8	-6.7	-6.7	-6.6
140～160	-7.5	-7.4	-7.2	-7.2	-7.1	-7.0	-6.9	-6.8	-6.7	-6.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	330/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	326/280

Constants of dn/dt		
D_0	D_1	D_2
-2.28E-05	-4.73E-09	3.04E-11
E_0	E_1	λ_{TK}
6.79E-07	-1.59E-10	1.98E-07

H-QK3L	487704	n_d = 1.48749	υ_d = 70.44	$n_F - n_C$ = 0.006921
		n_e = 1.48914	υ_e = 70.24	$n_{F'} - n_{C'}$ = 0.006964

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.46249
n_{1970}	1970.09	1.46773
n_{1530}	1529.58	1.47329
n_{1129}	1128.64	1.47783
n_{1064}	1064.00	1.47859
n_t	1013.98	1.47919
n_s	852.11	1.48141
$n_{A'}$	768.19	1.48284
n_r	706.52	1.48411
n_C	656.27	1.48535
$n_{C'}$	643.85	1.48569
n_{He-Ne}	632.80	1.48601
n_D	589.29	1.48743
n_d	587.56	1.48749
n_e	546.07	1.48914
n_F	486.13	1.49227
$n_{F'}$	479.99	1.49266
n_g	435.84	1.49594
n_h	404.66	1.49896
n_i	365.01	1.50405

Constants of Dispersion Formula	
A_0	2.18954799E+00
A_1	-9.65634602E-03
A_2	8.30751905E-03
A_3	3.65672497E-04
A_4	-3.54722930E-05
A_5	1.87564584E-06

Density	
ρ (g/cm^3)	2.48

Solarization	
△λ (%)	-10.9

Relative Partial Dispersion	
$P_{d,C}$	0.3092
$P_{e,d}$	0.2384
$P_{g,F}$	0.5303
$P'_{d,c'}$	0.2585
$P'_{e,d}$	0.2369
$P'_{g,F'}$	0.4710

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0009
$\triangle P_{g,F}$	0.0037
$\triangle P_{C,t}$	0.0086
$\triangle P_{C,s}$	-0.0002

Thermal Properties	
Tg (℃)	500
Ts (℃)	580
$T_{10}^{14.5}$ (℃)	424
T_{10}^{13} (℃)	463
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	1.11

Mechanical Properties	
HK (10^7Pa)	457
F_A	109
E (GPa)	61.9
G (GPa)	25.3
μ	0.225
σ_b (MPa)	50
B (10^{-12}/Pa)	2.71

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	4
D_A	4
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	87
-40/-30	88
-30/-20	89
-20/-10	90
-10/0	91
0/10	92
10/20	92
20/30	93
30/40	93
40/50	94
50/60	94
60/70	95
70/80	96
80/90	96
90/100	97
100/110	97
110/120	98
120/130	99
130/140	100
140/150	101
150/160	102

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.925	0.856
2200	0.943	0.889
2000	0.986	0.972
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.999	0.998
370	0.999	0.998
360	0.999	0.998
350	0.998	0.996
340	0.996	0.992
330	0.989	0.979
320	0.987	0.975
310	0.965	0.932
300	0.920	0.846
290	0.813	0.661
280	0.620	0.384

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-1.9	-1.8	-1.8	-1.8	-1.8	-1.7	-1.6	-1.3	-1.3	-1.2
-40～-20	-1.9	-1.8	-1.7	-1.7	-1.7	-1.6	-1.5	-1.3	-1.3	-1.2
-20～0	-1.9	-1.8	-1.7	-1.7	-1.7	-1.6	-1.5	-1.3	-1.3	-1.2
0～20	-1.8	-1.8	-1.7	-1.7	-1.6	-1.6	-1.5	-1.3	-1.2	-1.1
20～40	-1.8	-1.7	-1.7	-1.6	-1.6	-1.5	-1.4	-1.2	-1.2	-1.0
40～60	-1.7	-1.6	-1.6	-1.5	-1.5	-1.5	-1.3	-1.0	-1.0	-0.9
60～80	-1.6	-1.5	-1.4	-1.4	-1.4	-1.3	-1.2	-0.9	-0.9	-0.8
80～100	-1.4	-1.3	-1.2	-1.2	-1.2	-1.1	-1.0	-0.8	-0.8	-0.7
100～120	-1.4	-1.1	-1.0	-1.0	-1.0	-0.9	-0.8	-0.7	-0.7	-0.5
120～140	-1.2	-1.0	-0.9	-0.9	-0.9	-0.8	-0.6	-0.7	-0.6	-0.4
140～160	-1.2	-0.9	-0.9	-0.8	-0.8	-0.7	-0.5	-0.5	-0.5	-0.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	300/265
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	295/265

Constants of dn/dt		
D_0	D_1	D_2
-8.43E-06	1.76E-08	-1.61E-11
E_0	E_1	λ_{TK}
4.36E-07	-4.66E-11	1.20E-01

H-PK60	593670	n_d = 1.59349	υ_d = 67.00	$n_F - n_C$ = 0.008858
		n_e = 1.59561	υ_e = 66.74	$n_{F'} - n_{C'}$ = 0.008924

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.56575
n_{1970}	1970.09	1.57107
n_{1530}	1529.58	1.57682
n_{1129}	1128.64	1.58173
n_{1064}	1064.00	1.58259
n_t	1013.98	1.58329
n_s	852.11	1.58591
$n_{A'}$	768.19	1.58765
n_r	706.52	1.58923
n_C	656.27	1.59078
$n_{C'}$	643.85	1.59121
n_{He-Ne}	632.80	1.59162
n_D	589.29	1.59341
n_d	587.56	1.59349
n_e	546.07	1.59561
n_F	486.13	1.59964
$n_{F'}$	479.99	1.60014
n_g	435.84	1.60439
n_h	404.66	1.60831
n_i	365.01	1.61494

Relative Partial Dispersion	
$P_{d,C}$	0.3059
$P_{e,d}$	0.2393
$P_{g,F}$	0.5362
$P'_{d,c'}$	0.2555
$P'_{e,d}$	0.2376
$P'_{g,F'}$	0.4762

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0017
$\triangle P_{g,F}$	0.0039
$\triangle P_{C,t}$	-0.0192
$\triangle P_{C,s}$	-0.0114

Thermal Properties	
Tg (℃)	509
Ts (℃)	538
$T_{10}^{14.5}$ (℃)	481
T_{10}^{13} (℃)	502
$\alpha_{-50/80℃}$ (10^{-7}/K)	87
$\alpha_{100/300℃}$ (10^{-7}/K)	113
λ (W/(m·K))	0.86

Mechanical Properties	
HK (10^7Pa)	426
F_A	299
E (GPa)	80.4
G (GPa)	31.0
μ	0.297
σ_b (MPa)	57
B (10^{-12}/Pa)	1.30

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	79
-40/-30	81
-30/-20	85
-20/-10	87
-10/0	89
0/10	90
10/20	91
20/30	93
30/40	93
40/50	95
50/60	96
60/70	96
70/80	98
80/90	100
90/100	102
100/110	102
110/120	103
120/130	104
130/140	106
140/150	106
150/160	108

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.915	0.837
2200	0.947	0.897
2000	0.977	0.955
1800	0.990	0.980
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.995
420	0.996	0.992
400	0.994	0.988
390	0.992	0.984
380	0.990	0.980
370	0.985	0.972
360	0.978	0.952
350	0.967	0.930
340	0.945	0.889
330	0.908	0.821
320	0.848	0.716
310	0.762	0.579
300	0.657	0.433
290	0.542	0.297
280	0.422	0.182

Constants of Dispersion Formula	
A_0	2.50540910E+00
A_1	-1.03738928E-02
A_2	1.20696135E-02
A_3	3.48394725E-04
A_4	-2.40306361E-05
A_5	1.23924095E-06

Density	
ρ (g/cm^3)	3.27

Solarization	
△λ (%)	-1.8

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-1.8	-1.7	-1.5	-1.5	-1.5	-1.4	-1.3	-1.1	-1.1	-0.9
-40～-20	-1.9	-1.8	-1.6	-1.6	-1.6	-1.5	-1.4	-1.2	-1.2	-1.0
-20～0	-2.0	-1.9	-1.8	-1.7	-1.7	-1.6	-1.4	-1.3	-1.3	-1.1
0～20	-2.1	-1.9	-1.8	-1.8	-1.8	-1.7	-1.6	-1.4	-1.4	-1.1
20～40	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.7	-1.4	-1.4	-1.2
40～60	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.6	-1.4	-1.4	-1.2
60～80	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.6	-1.4	-1.4	-1.1
80～100	-2.2	-2.0	-2.0	-2.0	-2.0	-1.9	-1.7	-1.5	-1.5	-1.2
100～120	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.8	-1.4	-1.4	-1.1
120～140	-2.1	-2.0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.4	-1.4	-1.1
140～160	-2.1	-2.0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.4	-1.4	-1.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/265
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	328/264

Constants of dn/dt		
D_0	D_1	D_2
-7.70E-06	8.43E-09	-1.72E-11
E_0	E_1	λ_{TK}
2.66E-07	1.07E-10	2.75E-01

H-PK62A	618634	n_d = 1.61800	υ_d = 63.39	$n_F - n_C$ = 0.009749
		n_e = 1.62033	υ_e = 63.12	$n_{F'} - n_{C'}$ = 0.009828

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.59079
n_{1970}	1970.09	1.59567
n_{1530}	1529.58	1.60096
n_{1129}	1128.64	1.60561
n_{1064}	1064.00	1.60646
n_t	1013.98	1.60715
n_s	852.11	1.60983
$n_{A'}$	768.19	1.61167
n_r	706.52	1.61335
n_C	656.27	1.61503
$n_{C'}$	643.85	1.61550
n_{He-Ne}	632.80	1.61594
n_D	589.29	1.61791
n_d	587.56	1.61800
n_e	546.07	1.62033
n_F	486.13	1.62478
$n_{F'}$	479.99	1.62533
n_g	435.84	1.63004
n_h	404.66	1.63439
n_i	365.01	1.64180

Constants of Dispersion Formula	
A_0	2.57978592E+00
A_1	-9.52472897E-03
A_2	1.26301504E-02
A_3	8.06546409E-04
A_4	-9.53388389E-05
A_5	5.37975011E-06

Density	
ρ (g/cm^3)	3.53

Solarization	
△λ (%)	-1.9

Relative Partial Dispersion	
$P_{d,C}$	0.3046
$P_{e,d}$	0.2390
$P_{g,F}$	0.5395
$P'_{d,c'}$	0.2544
$P'_{e,d}$	0.2371
$P'_{g,F'}$	0.4792

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0012
$\triangle P_{g,F}$	0.0012
$\triangle P_{C,t}$	-0.0390
$\triangle P_{C,s}$	-0.0191

Thermal Properties	
Tg (℃)	616
Ts (℃)	649
$T_{10}^{14.5}$ (℃)	557
T_{10}^{13} (℃)	598
$\alpha_{-50/80℃}$ (10^{-7}/K)	94
$\alpha_{100/300℃}$ (10^{-7}/K)	111
λ (W/(m·K))	1.15

Mechanical Properties	
HK (10^7Pa)	391
F_A	320
E (GPa)	71.1
G (GPa)	27.0
μ	0.317
σ_b (MPa)	48
B (10^{-12}/Pa)	1.17

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	85
-40/-30	87
-30/-20	89
-20/-10	90
-10/0	90
0/10	91
10/20	91
20/30	92
30/40	93
40/50	93
50/60	93
60/70	94
70/80	94
80/90	95
90/100	95
100/110	96
110/120	97
120/130	99
130/140	100
140/150	104
150/160	105

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.930	0.865
2200	0.953	0.908
2000	0.980	0.960
1800	0.990	0.980
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.996
420	0.997	0.994
400	0.995	0.990
390	0.992	0.984
380	0.985	0.973
370	0.971	0.950
360	0.948	0.906
350	0.911	0.837
340	0.849	0.730
330	0.759	0.586
320	0.641	0.420
310	0.506	0.264
300	0.369	0.142
290	0.241	0.062
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-2.6	-2.4	-2.3	-2.2	-2.2	-2.1	-2.0	-1.7	-1.7	-1.4
-40～-20	-2.7	-2.5	-2.4	-2.3	-2.3	-2.2	-2.1	-1.8	-1.8	-1.7
-20～0	-2.8	-2.6	-2.4	-2.4	-2.4	-2.3	-2.2	-1.9	-1.9	-1.8
0～20	-2.8	-2.6	-2.5	-2.4	-2.4	-2.3	-2.2	-1.9	-1.9	-1.8
20～40	-2.8	-2.6	-2.5	-2.4	-2.4	-2.4	-2.3	-2.0	-2.0	-1.8
40～60	-2.8	-2.6	-2.5	-2.4	-2.4	-2.4	-2.3	-2.0	-2.0	-1.6
60～80	-2.8	-2.6	-2.5	-2.5	-2.5	-2.4	-2.3	-2.1	-2.0	-1.6
80～100	-2.9	-2.6	-2.5	-2.5	-2.5	-2.4	-2.3	-2.1	-2.0	-1.5
100～120	-2.8	-2.6	-2.5	-2.5	-2.5	-2.4	-2.3	-2.1	-2.0	-1.6
120～140	-2.9	-2.6	-2.5	-2.5	-2.4	-2.4	-2.4	-2.1	-2.0	-1.6
140～160	-2.8	-2.6	-2.5	-2.4	-2.4	-2.4	-2.4	-2.1	-2.1	-1.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	348/276

Constants of dn/dt		
D_0	D_1	D_2
-9.02E-06	9.55E-09	-2.00E-11
E_0	E_1	λ_{TK}
3.79E-07	3.28E-11	2.20E-01

H-PK63	603654	n_d = 1.60300	υ_d = 65.44	$n_F - n_C$ = 0.009214
		n_e = 1.60520	υ_e = 65.20	$n_{F'} - n_{C'}$ = 0.009282

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.57538
n_{1970}	1970.09	1.58054
n_{1530}	1529.58	1.58614
n_{1129}	1128.64	1.59099
n_{1064}	1064.00	1.59183
n_t	1013.98	1.59252
n_s	852.11	1.59517
$n_{A'}$	768.19	1.59696
n_r	706.52	1.59858
n_C	656.27	1.60019
$n_{C'}$	643.85	1.60064
n_{He-Ne}	632.80	1.60106
n_D	589.29	1.60292
n_d	587.56	1.60300
n_e	546.07	1.60520
n_F	486.13	1.60940
$n_{F'}$	479.99	1.60992
n_g	435.84	1.61435
n_h	404.66	1.61845
n_i	365.01	1.62538

Constants of Dispersion Formula	
A_0	2.53403512E+00
A_1	-1.00840331E-02
A_2	1.24087634E-02
A_3	4.77201613E-04
A_4	-4.35207709E-05
A_5	2.38050740E-06

Density	
ρ (g/cm^3)	3.64

Solarization	
△λ (%)	-2.6

Relative Partial Dispersion	
$P_{d,C}$	0.3050
$P_{e,d}$	0.2388
$P_{g,F}$	0.5372
$P'_{d,c'}$	0.2543
$P'_{e,d}$	0.2370
$P'_{g,F'}$	0.4773

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0018
$\triangle P_{g,F}$	0.0023
$\triangle P_{C,t}$	-0.0248
$\triangle P_{C,s}$	-0.0126

Thermal Properties	
Tg (℃)	604
Ts (℃)	632
$T_{10}^{14.5}$ (℃)	561
T_{10}^{13} (℃)	588
$\alpha_{-50/80℃}$ (10^{-7}/K)	93
$\alpha_{100/300℃}$ (10^{-7}/K)	110
λ (W/(m·K))	0.48

Mechanical Properties	
HK (10^7Pa)	361
F_A	351
E (GPa)	64.8
G (GPa)	24.7
μ	0.309
σ_b (MPa)	42
B (10^{-12}/Pa)	1.05

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	4
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	73
-40/-30	76
-30/-20	77
-20/-10	79
-10/0	81
0/10	81
10/20	82
20/30	82
30/40	83
40/50	83
50/60	84
60/70	84
70/80	84
80/90	85
90/100	86
100/110	87
110/120	87
120/130	89
130/140	90
140/150	91
150/160	92

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.804	0.646
2200	0.854	0.730
2000	0.931	0.867
1800	0.967	0.935
1600	0.990	0.980
1400	0.995	0.990
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.994
400	0.994	0.988
390	0.990	0.981
380	0.984	0.974
370	0.973	0.961
360	0.961	0.936
350	0.941	0.899
340	0.907	0.835
330	0.848	0.728
320	0.754	0.575
310	0.620	0.390
300	0.457	0.212
290	0.286	0.084
280	0.143	0.022

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-3.8	-3.6	-3.5	-3.5	-3.5	-3.4	-3.3	-3.2	-3.1	-2.9
-40～-20	-3.7	-3.5	-3.4	-3.4	-3.4	-3.3	-3.3	-3.1	-3.1	-2.8
-20～0	-3.7	-3.5	-3.5	-3.5	-3.5	-3.3	-3.3	-3.1	-3.1	-2.8
0～20	-3.7	-3.5	-3.5	-3.5	-3.5	-3.4	-3.4	-3.2	-3.2	-2.9
20～40	-3.7	-3.4	-3.5	-3.5	-3.5	-3.4	-3.4	-3.2	-3.2	-2.9
40～60	-3.7	-3.5	-3.5	-3.5	-3.5	-3.4	-3.4	-3.2	-3.2	-2.8
60～80	-3.6	-3.5	-3.5	-3.4	-3.4	-3.3	-3.3	-3.0	-3.0	-2.8
80～100	-3.6	-3.6	-3.5	-3.4	-3.4	-3.3	-3.1	-2.9	-2.8	-2.7
100～120	-3.6	-3.6	-3.4	-3.4	-3.4	-3.2	-3.0	-2.8	-2.7	-2.6
120～140	-3.7	-3.5	-3.4	-3.4	-3.4	-3.2	-3.1	-2.8	-2.7	-2.6
140～160	-3.6	-3.6	-3.4	-3.4	-3.4	-3.3	-3.1	-2.8	-2.7	-2.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	345/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	333/274

Constants of dn/dt		
D_0	D_1	D_2
-1.10E-05	1.08E-08	-2.38E-11
E_0	E_1	λ_{TK}
2.86E-07	3.72E-10	2.46E-01

H-PK65	620639	n_d = 1.61997	υ_d = 63.88	$n_F - n_C$ = 0.009705
		n_e = 1.62228	υ_e = 63.58	$n_{F'} - n_{C'}$ = 0.009787

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.59263
n_{1970}	1970.09	1.59750
n_{1530}	1529.58	1.60283
n_{1129}	1128.64	1.60756
n_{1064}	1064.00	1.60841
n_t	1013.98	1.60912
n_s	852.11	1.61182
$n_{A'}$	768.19	1.61366
n_r	706.52	1.61534
n_C	656.27	1.61701
$n_{C'}$	643.85	1.61748
n_{He-Ne}	632.80	1.61792
n_D	589.29	1.61988
n_d	587.56	1.61997
n_e	546.07	1.62228
n_F	486.13	1.62672
$n_{F'}$	479.99	1.62727
n_g	435.84	1.63198
n_h	404.66	1.63633
n_i	365.01	1.64372

Constants of Dispersion Formula	
A_0	2.58545747E+00
A_1	-9.52904974E-03
A_2	1.36602628E-02
A_3	3.41551059E-04
A_4	-1.52997403E-05
A_5	7.30579296E-07

Density	
ρ (g/cm^3)	3.52

Solarization	
△λ (%)	-1.9

Relative Partial Dispersion	
$P_{d,C}$	0.3050
$P_{e,d}$	0.2380
$P_{g,F}$	0.5420
$P'_{d,c'}$	0.2544
$P'_{e,d}$	0.2360
$P'_{g,F'}$	0.4813

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0026
$\triangle P_{g,F}$	0.0045
$\triangle P_{C,t}$	-0.0367
$\triangle P_{C,s}$	-0.0189

Thermal Properties	
Tg (℃)	568
Ts (℃)	594
$T_{10}^{14.5}$ (℃)	515
T_{10}^{13} (℃)	555
$\alpha_{-50/80℃}$ (10^{-7}/K)	103
$\alpha_{100/300℃}$ (10^{-7}/K)	118
λ (W/(m·K))	0.61

Mechanical Properties	
HK (10^7Pa)	420
F_A	315
E (GPa)	77.8
G (GPa)	29.5
μ	0.317
σ_b (MPa)	38
B (10^{-12}/Pa)	1.03

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	94
-40/-30	96
-30/-20	97
-20/-10	98
-10/0	99
0/10	99
10/20	100
20/30	100
30/40	102
40/50	102
50/60	103
60/70	103
70/80	104
80/90	104
90/100	105
100/110	105
110/120	106
120/130	107
130/140	108
140/150	109
150/160	110

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.957	0.916
2200	0.979	0.958
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.992
460	0.995	0.986
440	0.993	0.980
420	0.991	0.974
400	0.989	0.967
390	0.982	0.952
380	0.966	0.922
370	0.943	0.871
360	0.897	0.785
350	0.821	0.655
340	0.711	0.489
330	0.577	0.320
320	0.437	0.183
310	0.320	0.097
300	0.235	0.053
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-3.0	-3.0	-2.8	-2.8	-2.7	-2.7	-2.5	-2.3	-2.3	-2.0
-40～-20	-3.1	-3.1	-2.9	-2.9	-2.8	-2.8	-2.6	-2.3	-2.3	-2.1
-20～0	-3.2	-3.0	-3.0	-3.0	-2.9	-2.8	-2.7	-2.4	-2.4	-2.1
0～20	-3.2	-3.2	-3.0	-3.0	-2.9	-2.9	-2.8	-2.4	-2.4	-2.2
20～40	-3.3	-3.2	-3.1	-3.1	-3.0	-2.9	-2.8	-2.5	-2.5	-2.2
40～60	-3.4	-3.3	-3.2	-3.1	-3.0	-3.0	-2.8	-2.5	-2.4	-2.2
60～80	-3.3	-3.2	-3.1	-3.1	-3.0	-3.0	-2.7	-2.4	-2.4	-2.1
80～100	-3.3	-3.2	-3.2	-3.1	-3.1	-3.1	-2.8	-2.4	-2.4	-2.2
100～120	-3.4	-3.3	-3.2	-3.2	-3.1	-3.1	-2.8	-2.5	-2.5	-2.2
120～140	-3.4	-3.3	-3.2	-3.2	-3.2	-3.2	-2.9	-2.6	-2.6	-2.3
140～160	-3.5	-3.3	-3.3	-3.3	-3.2	-3.2	-3.0	-2.7	-2.7	-2.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	365/295
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	335/278

Constants of dn/dt		
D_0	D_1	D_2
-1.00E-05	9.01E-09	-2.64E-11
E_0	E_1	λ_{TK}
3.58E-07	1.03E-10	2.54E-01

H-PK71	569713	n_d = 1.56907	υ_d = 71.30	$n_F - n_C$ = 0.007981
		n_e = 1.57097	υ_e = 70.90	$n_{F'} - n_{C'}$ = 0.008053

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.55914
n_{1064}	1064.00	1.55976
n_t	1013.98	1.56028
n_s	852.11	1.56240
$n_{A'}$	768.19	1.56389
n_r	706.52	1.56527
n_C	656.27	1.56665
$n_{C'}$	643.85	1.56703
n_{He-Ne}	632.80	1.56739
n_D	589.29	1.56900
n_d	587.56	1.56907
n_e	546.07	1.57097
n_F	486.13	1.57463
$n_{F'}$	479.99	1.57508
n_g	435.84	1.57898
n_h	404.66	1.58260
n_i	365.01	1.58869

Constants of Dispersion Formula	
A_0	2.42613257E+00
A_1	-4.57004276E-03
A_2	1.39177172E-02
A_3	-6.13250165E-04
A_4	1.09104778E-04
A_5	-5.55700744E-06

Density	
ρ (g/cm^3)	4.27

Solarization	
△λ (%)	-1.9

Relative Partial Dispersion	
$P_{d,C}$	0.3032
$P_{e,d}$	0.2381
$P_{g,F}$	0.5450
$P'_{d,c'}$	0.2533
$P'_{e,d}$	0.2359
$P'_{g,F'}$	0.4843

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0077
$\triangle P_{g,F}$	0.0199
$\triangle P_{C,t}$	-0.0875
$\triangle P_{C,s}$	-0.0390

Thermal Properties	
Tg (℃)	480
Ts (℃)	509
$T_{10}^{14.5}$ (℃)	442
T_{10}^{13} (℃)	463
$\alpha_{-50/80℃}$ (10^{-7}/K)	123
$\alpha_{100/300℃}$ (10^{-7}/K)	152
λ (W/(m·K))	0.46

Mechanical Properties	
HK (10^7Pa)	359
F_A	435
E (GPa)	65.5
G (GPa)	25.0
μ	0.313
σ_b (MPa)	
B (10^{-12}/Pa)	0.23

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	116
-40/-30	119
-30/-20	120
-20/-10	120
-10/0	121
0/10	122
10/20	123
20/30	124
30/40	125
40/50	127
50/60	128
60/70	129
70/80	130
80/90	132
90/100	134
100/110	136
110/120	139
120/130	140
130/140	142
140/150	144
150/160	146

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.997	0.994
370	0.995	0.990
360	0.991	0.983
350	0.982	0.965
340	0.970	0.940
330	0.933	0.871
320	0.879	0.773
310	0.769	0.592
300	0.679	0.461
290	0.565	0.319
280	0.435	0.189

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-9.4	-9.2	-9.1	-9.0	-8.9	-8.8	-8.4	-8.2	-8.1	-7.9
-40～-20	-9.5	-9.4	-9.3	-9.2	-9.1	-9.0	-8.8	-8.5	-8.3	-8.3
-20～0	-9.6	-9.5	-9.4	-9.3	-9.2	-9.1	-8.9	-8.8	-8.6	-8.6
0～20	-9.8	-9.7	-9.6	-9.5	-9.4	-9.3	-9.2	-8.9	-8.9	-8.9
20～40	-10.0	-9.9	-9.7	-9.6	-9.6	-9.5	-9.4	-9.3	-9.2	-9.1
40～60	-10.1	-10.0	-9.9	-9.9	-9.8	-9.7	-9.7	-9.5	-9.4	-9.3
60～80	-10.3	-10.1	-10.1	-9.9	-9.8	-9.8	-9.8	-9.6	-9.5	-9.4
80～100	-10.5	-10.3	-10.3	-10.1	-10.0	-9.9	-9.8	-9.8	-9.4	-9.4
100～120	-10.5	-10.3	-10.3	-10.2	-10.1	-9.9	-9.9	-10.0	-9.7	-9.6
120～140	-10.5	-10.3	-10.3	-10.3	-10.2	-10.1	-10.0	-10.1	-9.8	-9.7
140～160	-10.6	-10.4	-10.3	-10.3	-10.3	-10.4	-10.3	-10.1	-10.0	-9.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	330/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	318/267

Constants of dn/dt		
D_0	D_1	D_2
-2.55E-05	4.39E-09	-1.28E-11
E_0	E_1	λ_{TK}
6.70E-07	-7.70E-10	3.16E-08

H-K6	511605	n_d = 1.51112	υ_d = 60.46	$n_F - n_C$ = 0.008454
		n_e = 1.51314	υ_e = 60.21	$n_{F'} - n_{C'}$ = 0.008523

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.48663
n_{1970}	1970.09	1.49101
n_{1530}	1529.58	1.49582
n_{1129}	1128.64	1.50010
n_{1064}	1064.00	1.50087
n_t	1013.98	1.50151
n_s	852.11	1.50394
$n_{A'}$	768.19	1.50558
n_r	706.52	1.50707
n_C	656.27	1.50855
$n_{C'}$	643.85	1.50896
n_{He-Ne}	632.80	1.50934
n_D	589.29	1.51105
n_d	587.56	1.51112
n_e	546.07	1.51314
n_F	486.13	1.51700
$n_{F'}$	479.99	1.51748
n_g	435.84	1.52159
n_h	404.66	1.52540
n_i	365.01	1.53188

Constants of Dispersion Formula	
A_0	2.25095310E+00
A_1	-7.97694290E-03
A_2	1.21729170E-02
A_3	-9.99979160E-05
A_4	4.17761640E-05
A_5	-2.09126230E-06

Density	
ρ (g/cm^3)	2.53

Solarization	
△λ (%)	-3.5

Relative Partial Dispersion	
$P_{d,C}$	0.3041
$P_{e,d}$	0.2391
$P_{g,F}$	0.5432
$P'_{d,c'}$	0.2535
$P'_{e,d}$	0.2371
$P'_{g,F'}$	0.4824

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	0.0000
$\triangle P_{C,t}$	0.0000
$\triangle P_{C,s}$	0.0001

Thermal Properties	
Tg (℃)	530
Ts (℃)	619
$T_{10}^{14.5}$ (℃)	473
T_{10}^{13} (℃)	522
$\alpha_{-50/80℃}$ (10^{-7}/K)	84
$\alpha_{100/300℃}$ (10^{-7}/K)	100
λ (W/(m·K))	

Mechanical Properties	
HK (10^7Pa)	469
F_A	107
E (GPa)	67.2
G (GPa)	27.6
μ	0.219
σ_b (MPa)	
B (10^{-12}/Pa)	3.05

Chemical Properties (grade)	
RC (S)	3
RA (S)	1
D_W	2
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	76
-40/-30	79
-30/-20	81
-20/-10	82
-10/0	83
0/10	84
10/20	84
20/30	85
30/40	85
40/50	86
50/60	87
60/70	87
70/80	88
80/90	88
90/100	89
100/110	89
110/120	90
120/130	91
130/140	92
140/150	94
150/160	94

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.861	0.741
2200	0.898	0.807
2000	0.951	0.904
1800	0.978	0.957
1600	0.995	0.990
1400	0.996	0.992
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.997
480	0.998	0.997
460	0.998	0.997
440	0.998	0.997
420	0.998	0.997
400	0.998	0.997
390	0.998	0.997
380	0.998	0.996
370	0.998	0.996
360	0.997	0.994
350	0.994	0.989
340	0.990	0.981
330	0.982	0.964
320	0.951	0.905
310	0.875	0.766
300	0.696	0.485
290	0.404	0.163
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.2	0.4	0.6	0.6	0.6	0.8	1.0	1.3	1.3	1.6
-40～-20	0.2	0.4	0.6	0.6	0.6	0.8	1.1	1.4	1.4	1.7
-20～0	0.1	0.3	0.6	0.6	0.7	0.9	1.1	1.4	1.4	1.6
0～20	0.2	0.4	0.7	0.7	0.8	0.9	1.0	1.3	1.4	1.6
20～40	0.2	0.4	0.6	0.7	0.7	0.8	1.1	1.4	1.4	1.7
40～60	0.3	0.5	0.7	0.7	0.7	0.9	1.2	1.4	1.5	1.8
60～80	0.3	0.5	0.7	0.7	0.7	0.9	1.2	1.5	1.5	1.8
80～100	0.4	0.6	0.8	0.8	0.8	1.0	1.3	1.6	1.6	1.9
100～120	0.4	0.7	0.9	0.9	1.0	1.0	1.4	1.6	1.7	2.0
120～140	0.5	0.7	0.9	1.0	1.0	1.1	1.4	1.7	1.7	2.1
140～160	0.6	0.8	1.0	1.1	1.1	1.2	1.5	1.7	1.7	2.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	330/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	312/283

Constants of dn/dt		
D_0	D_1	D_2
-3.51E-06	1.40E-08	-2.33E-11
E_0	E_1	λ_{TK}
7.26E-07	1.47E-10	1.23E-01

H-K9L	517642	n_d = 1.51680	υ_d = 64.20	$n_F - n_C$ = 0.008050
		n_e = 1.51872	υ_e = 64.00	$n_{F'} - n_{C'}$ = 0.008105

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.48969
n_{1970}	1970.09	1.49515
n_{1530}	1529.58	1.50098
n_{1129}	1128.64	1.50585
n_{1064}	1064.00	1.50668
n_t	1013.98	1.50735
n_s	852.11	1.50983
$n_{A'}$	768.19	1.51145
n_r	706.52	1.51290
n_C	656.27	1.51432
$n_{C'}$	643.85	1.51472
n_{He-Ne}	632.80	1.51509
n_D	589.29	1.51673
n_d	587.56	1.51680
n_e	546.07	1.51872
n_F	486.13	1.52237
$n_{F'}$	479.99	1.52282
n_g	435.84	1.52670
n_h	404.66	1.53027
n_i	365.01	1.53629

Constants of Dispersion Formula	
A_0	2.27223852E+00
A_1	-1.01682613E-02
A_2	1.03945607E-02
A_3	2.29862391E-04
A_4	-4.30423477E-06
A_5	5.00107200E-08

Density	
ρ (g/cm^3)	2.49

Solarization	
△λ (%)	-20.0

Relative Partial Dispersion	
$P_{d,C}$	0.3081
$P_{e,d}$	0.2385
$P_{g,F}$	0.5379
$P'_{d,c'}$	0.2566
$P'_{e,d}$	0.2369
$P'_{g,F'}$	0.4787

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0013
$\triangle P_{g,F}$	0.0009
$\triangle P_{C,t}$	0.0146
$\triangle P_{C,s}$	0.0033

Thermal Properties	
Tg (℃)	582
Ts (℃)	630
$T_{10}^{14.5}$ (℃)	519
T_{10}^{13} (℃)	548
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	92
λ (W/(m·K))	1.22

Mechanical Properties	
HK (10^7Pa)	581
F_A	100
E (GPa)	76.9
G (GPa)	32.3
μ	0.189
σ_b (MPa)	92
B (10^{-12}/Pa)	2.53

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	2
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	67
-40/-30	69
-30/-20	70
-20/-10	71
-10/0	72
0/10	73
10/20	73
20/30	74
30/40	75
40/50	75
50/60	76
60/70	77
70/80	78
80/90	79
90/100	79
100/110	80
110/120	81
120/130	82
130/140	84
140/150	85
150/160	87

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.907	0.823
2200	0.933	0.870
2000	0.980	0.960
1800	0.992	0.985
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.998	0.997
380	0.997	0.995
370	0.997	0.994
360	0.996	0.993
350	0.990	0.980
340	0.980	0.960
330	0.964	0.929
320	0.927	0.859
310	0.851	0.724
300	0.722	0.521
290	0.543	0.295
280	0.274	0.075

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.6	1.7	1.9	1.9	1.9	2.0	2.3	2.6	2.7	2.9
-40～-20	1.8	2.0	2.2	2.3	2.3	2.4	2.5	2.9	3.0	3.2
-20～0	2.0	2.2	2.3	2.3	2.5	2.5	2.6	3.0	3.0	3.3
0～20	2.2	2.3	2.4	2.4	2.5	2.6	2.7	3.0	3.0	3.3
20～40	2.3	2.4	2.4	2.5	2.6	2.6	2.8	3.1	3.1	3.4
40～60	2.3	2.4	2.5	2.6	2.7	2.8	3.0	3.3	3.3	3.5
60～80	2.4	2.5	2.6	2.7	2.7	2.8	3.0	3.3	3.3	3.6
80～100	2.5	2.6	2.7	2.8	2.9	2.9	3.0	3.3	3.3	3.5
100～120	2.5	2.6	2.8	2.9	3.0	3.0	3.0	3.3	3.3	3.5
120～140	2.5	2.6	2.9	3.0	3.0	3.0	3.0	3.3	3.4	3.6
140～160	2.5	2.7	3.0	3.1	3.1	3.1	3.1	3.4	3.4	3.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	325/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	317/280

Constants of dn/dt		
D_0	D_1	D_2
1.32E-06	2.02E-08	-4.68E-11
E_0	E_1	λ_{TK}
4.63E-07	-4.16E-10	2.04E-01

H-K10	518590	n_d = 1.51818	υ_d = 58.95	$n_F - n_C$ = 0.008790
		n_e = 1.52027	υ_e = 58.69	$n_{F'} - n_{C'}$ = 0.008865

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.49188
n_{1970}	1970.09	1.49679
n_{1530}	1529.58	1.50212
n_{1129}	1128.64	1.50673
n_{1064}	1064.00	1.50754
n_t	1013.98	1.50821
n_s	852.11	1.51074
$n_{A'}$	768.19	1.51243
n_r	706.52	1.51397
n_C	656.27	1.51549
$n_{C'}$	643.85	1.51592
n_{He-Ne}	632.80	1.51633
n_D	589.29	1.51810
n_d	587.56	1.51818
n_e	546.07	1.52027
n_F	486.13	1.52428
$n_{F'}$	479.99	1.52479
n_g	435.84	1.52908
n_h	404.66	1.53306
n_i	365.01	1.53987

Constants of Dispersion Formula	
A_0	2.27263886E+00
A_1	-9.07293538E-03
A_2	1.14409318E-02
A_3	2.89379329E-04
A_4	-1.16567157E-05
A_5	7.94218946E-07

Density	
ρ (g/cm^3)	2.52

Solarization	
△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.3060
$P_{e,d}$	0.2378
$P_{g,F}$	0.5461
$P'_{d,c'}$	0.2549
$P'_{e,d}$	0.2358
$P'_{g,F'}$	0.4839

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0015
$\triangle P_{g,F}$	0.0004
$\triangle P_{C,t}$	0.0024
$\triangle P_{C,s}$	-0.0015

Thermal Properties	
Tg (℃)	518
Ts (℃)	575
$T_{10}^{14.5}$ (℃)	460
T_{10}^{13} (℃)	495
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	110
λ (W/(m·K))	1.16

Mechanical Properties	
HK (10^7Pa)	454
F_A	118
E (GPa)	73.1
G (GPa)	29.7
μ	0.230
σ_b (MPa)	90
B (10^{-12}/Pa)	2.55

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	81
-40/-30	84
-30/-20	86
-20/-10	87
-10/0	88
0/10	89
10/20	90
20/30	90
30/40	91
40/50	91
50/60	92
60/70	93
70/80	94
80/90	95
90/100	96
100/110	97
110/120	98
120/130	100
130/140	101
140/150	103
150/160	105

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.862	0.745
2200	0.902	0.814
2000	0.960	0.920
1800	0.984	0.968
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.994	0.988
370	0.987	0.974
360	0.974	0.944
350	0.945	0.889
340	0.875	0.758
330	0.711	0.499
320	0.392	0.149
310	0.085	0.012
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.2	1.3	1.4	1.5	1.5	1.5	1.8	2.0	2.0	2.4
-40～-20	1.1	1.2	1.4	1.5	1.5	1.6	1.8	2.0	2.1	2.4
-20～0	1.1	1.3	1.4	1.5	1.5	1.6	1.8	2.1	2.1	2.5
0～20	1.1	1.3	1.5	1.5	1.5	1.6	1.8	2.1	2.1	2.5
20～40	1.1	1.3	1.5	1.5	1.5	1.6	1.8	2.1	2.2	2.5
40～60	1.1	1.3	1.6	1.6	1.6	1.7	1.9	2.1	2.2	2.6
60～80	1.2	1.4	1.6	1.6	1.6	1.7	1.9	2.1	2.2	2.6
80～100	1.2	1.4	1.6	1.6	1.7	1.8	2.0	2.2	2.3	2.7
100～120	1.3	1.5	1.6	1.6	1.7	1.8	2.0	2.3	2.3	2.7
120～140	1.3	1.5	1.6	1.6	1.7	1.8	2.0	2.3	2.4	2.8
140～160	1.3	1.5	1.6	1.7	1.7	1.9	2.1	2.3	2.4	2.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	345/315
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	342/315

Constants of dn/dt		
D_0	D_1	D_2
-9.83E-07	1.34E-08	-2.97E-11
E_0	E_1	λ_{TK}
4.25E-07	1.90E-10	2.52E-01

H-K12	534555	n_d = 1.53359	υ_d = 55.47	$n_F - n_C$ = 0.009619
		n_e = 1.53588	υ_e = 55.17	$n_{F'} - n_{C'}$ = 0.009713

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.50814
n_{1970}	1970.09	1.51249
n_{1530}	1529.58	1.51727
n_{1129}	1128.64	1.52160
n_{1064}	1064.00	1.52239
n_t	1013.98	1.52305
n_s	852.11	1.52562
$n_{A'}$	768.19	1.52740
n_r	706.52	1.52904
n_C	656.27	1.53068
$n_{C'}$	643.85	1.53114
n_{He-Ne}	632.80	1.53157
n_D	589.29	1.53350
n_d	587.56	1.53359
n_e	546.07	1.53588
n_F	486.13	1.54030
$n_{F'}$	479.99	1.54085
n_g	435.84	1.54557
n_h	404.66	1.54996
n_i	365.01	1.55752

Constants of Dispersion Formula	
A_0	2.31544050E+00
A_1	-7.99936583E-03
A_2	1.23689469E-02
A_3	5.07443369E-04
A_4	-4.38673524E-05
A_5	2.71548041E-06

Density	
ρ (g/cm^3)	2.73

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3025
$P_{e,d}$	0.2381
$P_{g,F}$	0.5479
$P'_{d,c'}$	0.2522
$P'_{e,d}$	0.2358
$P'_{g,F'}$	0.4859

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0001
$\triangle P_{g,F}$	-0.0036
$\triangle P_{C,t}$	-0.0157
$\triangle P_{C,s}$	-0.0075

Thermal Properties	
Tg (℃)	495
Ts (℃)	549
$T_{10}^{14.5}$ (℃)	450
T_{10}^{13} (℃)	488
$\alpha_{-50/80℃}$ (10^{-7}/K)	98
$\alpha_{100/300℃}$ (10^{-7}/K)	113
λ (W/(m·K))	1.01

Mechanical Properties	
HK (10^7Pa)	485
F_A	98
E (GPa)	69.7
G (GPa)	27.4
μ	0.271
σ_b (MPa)	79
B (10^{-12}/Pa)	2.75

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	83
-40/-30	86
-30/-20	88
-20/-10	89
-10/0	91
0/10	92
10/20	93
20/30	94
30/40	94
40/50	94
50/60	95
60/70	96
70/80	97
80/90	99
90/100	100
100/110	102
110/120	104
120/130	106
130/140	108
140/150	109
150/160	112

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.874	0.764
2200	0.898	0.806
2000	0.955	0.909
1800	0.977	0.953
1600	0.994	0.988
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.998	0.996
400	0.997	0.994
390	0.994	0.989
380	0.990	0.980
370	0.980	0.960
360	0.956	0.914
350	0.905	0.820
340	0.797	0.635
330	0.574	0.329
320	0.260	0.067
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.1	0.4	1.0	1.1	1.2	1.4	1.7	2.0	2.1	2.3
-40～-20	0.4	0.8	1.3	1.4	1.5	1.7	1.8	2.1	2.2	2.4
-20～0	0.6	1.0	1.3	1.4	1.5	1.9	2.0	2.3	2.3	2.4
0～20	0.6	1.2	1.4	1.5	1.6	2.0	2.2	2.5	2.5	2.7
20～40	0.7	1.3	1.6	1.6	1.7	2.0	2.4	2.6	2.7	3.0
40～60	0.7	1.5	1.7	1.8	1.8	2.0	2.5	2.8	2.9	3.2
60～80	0.7	1.5	1.7	1.8	1.9	2.1	2.6	2.9	3.0	3.3
80～100	0.8	1.6	1.8	1.9	2.0	2.3	2.7	3.0	3.1	3.5
100～120	0.8	1.6	1.8	1.9	2.0	2.3	2.9	3.2	3.2	3.7
120～140	0.9	1.8	2.1	2.2	2.2	2.4	3.0	3.4	3.4	3.9
140～160	0.9	1.9	2.2	2.3	2.4	2.6	3.1	3.5	3.6	4.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	355/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	347/318

Constants of dn/dt		
D_0	D_1	D_2
-2.45E-06	1.63E-08	-3.64E-11
E_0	E_1	λ_{TK}
1.14E-06	1.20E-09	1.33E-08

H-K51	523586	n_d = 1.52307	υ_d = 58.63	$n_F - n_C$ = 0.008921
		n_e = 1.52520	υ_e = 58.39	$n_{F'} - n_{C'}$ = 0.008995

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.49748
n_{1970}	1970.09	1.50215
n_{1530}	1529.58	1.50724
n_{1129}	1128.64	1.51167
n_{1064}	1064.00	1.51246
n_t	1013.98	1.51310
n_s	852.11	1.51559
$n_{A'}$	768.19	1.51728
n_r	706.52	1.51883
n_C	656.27	1.52037
$n_{C'}$	643.85	1.52080
n_{He-Ne}	632.80	1.52120
n_D	589.29	1.52299
n_d	587.56	1.52307
n_e	546.07	1.52520
n_F	486.13	1.52929
$n_{F'}$	479.99	1.52980
n_g	435.84	1.53411
n_h	404.66	1.53811
n_i	365.01	1.54495

Constants of Dispersion Formula	
A_0	2.28724008E+00
A_1	-8.66259828E-03
A_2	1.09312658E-02
A_3	6.19326901E-04
A_4	-6.62977052E-05
A_5	3.74341463E-06

Density	
ρ (g/cm^3)	2.52

Solarization	
△λ (%)	-2.2

Relative Partial Dispersion	
$P_{d,C}$	0.3027
$P_{e,d}$	0.2388
$P_{g,F}$	0.5403
$P'_{d,c'}$	0.2524
$P'_{e,d}$	0.2368
$P'_{g,F'}$	0.4792

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	-0.0059
$\triangle P_{C,t}$	-0.0093
$\triangle P_{C,s}$	-0.0053

Thermal Properties	
Tg (℃)	564
Ts (℃)	610
$T_{10}^{14.5}$ (℃)	497
T_{10}^{13} (℃)	530
$\alpha_{-50/80℃}$ (10^{-7}/K)	80
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	1.18

Mechanical Properties	
HK (10^7Pa)	517
F_A	102
E (GPa)	73.0
G (GPa)	29.9
μ	0.218
σ_b (MPa)	52
B (10^{-12}/Pa)	2.50

Chemical Properties (grade)	
RC (S)	2
RA (S)	1
D_W	2
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	79
-40/-30	80
-30/-20	82
-20/-10	83
-10/0	83
0/10	84
10/20	84
20/30	85
30/40	85
40/50	86
50/60	87
60/70	87
70/80	88
80/90	88
90/100	90
100/110	91
110/120	92
120/130	92
130/140	94
140/150	95
150/160	96

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.900	0.810
2200	0.915	0.837
2000	0.963	0.927
1800	0.984	0.968
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.997
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.996	0.992
370	0.996	0.992
360	0.989	0.978
350	0.970	0.941
340	0.926	0.857
330	0.826	0.682
320	0.648	0.420
310	0.375	0.141
300	0.107	0.011
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.9	1.0	1.0	1.0	1.1	1.4	1.7	1.9	1.9	2.2
-40～-20	1.0	1.0	1.1	1.1	1.2	1.5	1.8	2.0	2.0	2.4
-20～0	1.1	1.1	1.2	1.2	1.3	1.6	2.0	2.2	2.2	2.6
0～20	1.2	1.3	1.3	1.3	1.4	1.7	2.1	2.4	2.4	2.7
20～40	1.3	1.4	1.4	1.4	1.5	1.8	2.2	2.6	2.6	2.8
40～60	1.4	1.4	1.5	1.5	1.6	1.9	2.3	2.7	2.7	3.0
60～80	1.4	1.5	1.6	1.6	1.7	2.0	2.4	2.8	2.8	3.1
80～100	1.4	1.5	1.7	1.7	1.8	2.2	2.6	2.9	2.9	3.2
100～120	1.5	1.6	1.7	1.7	1.8	2.3	2.7	3.0	3.0	3.3
120～140	1.5	1.7	1.7	1.8	1.9	2.4	2.9	3.0	3.1	3.5
140～160	1.6	1.7	1.8	1.9	2.0	2.5	2.9	3.0	3.1	3.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/310
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	337/304

Constants of dn/dt		
D_0	D_1	D_2
-1.39E-06	1.68E-08	-3.96E-11
E_0	E_1	λ_{TK}
6.34E-07	6.47E-10	2.23E-01

H-BaK2	540597	n_d = 1.53996	υ_d = 59.72	$n_F - n_C$ = 0.009041
		n_e = 1.54212	υ_e = 59.45	$n_{F'} - n_{C'}$ = 0.009119

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.51376
n_{1970}	1970.09	1.51856
n_{1530}	1529.58	1.52378
n_{1129}	1128.64	1.52833
n_{1064}	1064.00	1.52914
n_t	1013.98	1.52981
n_s	852.11	1.53235
$n_{A'}$	768.19	1.53407
n_r	706.52	1.53565
n_C	656.27	1.53721
$n_{C'}$	643.85	1.53765
n_{He-Ne}	632.80	1.53806
n_D	589.29	1.53988
n_d	587.56	1.53996
n_e	546.07	1.54212
n_F	486.13	1.54625
$n_{F'}$	479.99	1.54677
n_g	435.84	1.55117
n_h	404.66	1.55525
n_i	365.01	1.56225

Constants of Dispersion Formula	
A_0	2.33787692E+00
A_1	-8.98050049E-03
A_2	1.15593975E-02
A_3	4.92789833E-04
A_4	-4.58314132E-05
A_5	2.77373664E-06

Density	
ρ (g/cm^3)	2.85

Solarization	
△λ (%)	-29.0

Relative Partial Dispersion	
$P_{d,C}$	0.3042
$P_{e,d}$	0.2389
$P_{g,F}$	0.5442
$P'_{d,c'}$	0.2533
$P'_{e,d}$	0.2369
$P'_{g,F'}$	0.4825

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0004
$\triangle P_{g,F}$	-0.0002
$\triangle P_{C,t}$	-0.0110
$\triangle P_{C,s}$	-0.0062

Thermal Properties	
Tg (℃)	560
Ts (℃)	623
$T_{10}^{14.5}$ (℃)	491
T_{10}^{13} (℃)	534
$\alpha_{-50/80℃}$ (10^{-7}/K)	78
$\alpha_{100/300℃}$ (10^{-7}/K)	93
λ (W/(m·K))	1.02

Mechanical Properties	
HK (10^7Pa)	532
F_A	103
E (GPa)	71.1
G (GPa)	28.1
μ	0.266
σ_b (MPa)	79
B (10^{-12}/Pa)	2.51

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	1
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	69
-40/-30	71
-30/-20	73
-20/-10	74
-10/0	75
0/10	76
10/20	77
20/30	77
30/40	78
40/50	79
50/60	80
60/70	80
70/80	81
80/90	82
90/100	83
100/110	83
110/120	84
120/130	88
130/140	89
140/150	90
150/160	92

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.917	0.842
2200	0.937	0.880
2000	0.974	0.947
1800	0.987	0.976
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.998	0.997
370	0.998	0.996
360	0.997	0.993
350	0.994	0.988
340	0.988	0.976
330	0.973	0.947
320	0.940	0.885
310	0.863	0.745
300	0.707	0.500
290	0.478	0.228
280	0.260	0.068

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.4	0.6	0.7	0.7	0.8	0.9	1.0	1.3	1.4	2.0
-40～-20	0.6	0.8	0.9	0.9	1.0	1.1	1.2	1.4	1.5	2.1
-20～0	0.8	0.9	1.0	1.1	1.2	1.3	1.5	1.5	1.6	2.3
0～20	0.9	1.1	1.2	1.2	1.4	1.5	1.8	1.9	2.1	2.6
20～40	1.4	1.4	1.5	1.5	1.6	1.7	2.0	2.2	2.3	2.6
40～60	1.5	1.6	1.7	1.7	1.8	1.9	2.1	2.3	2.4	2.7
60～80	1.6	1.7	1.8	1.8	2.0	2.1	2.4	2.5	2.5	2.9
80～100	1.7	1.8	1.9	2.0	2.1	2.3	2.5	2.6	2.7	3.1
100～120	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7	2.9	3.3
120～140	2.1	2.1	2.2	2.3	2.4	2.7	2.8	2.8	2.9	3.5
140～160	2.2	2.3	2.3	2.4	2.5	2.8	2.9	2.9	3.0	3.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	330/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	313/281

Constants of dn/dt		
D_0	D_1	D_2
-1.01E-06	2.38E-08	-4.15E-11
E_0	E_1	λ_{TK}
3.35E-07	-1.37E-10	3.01E-01

H-BaK7B	569560	n_d = 1.56883	υ_d = 56.04	$n_F - n_C$ = 0.010150
		n_e = 1.57125	υ_e = 55.78	$n_{F'} - n_{C'}$ = 0.010242

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.54079
n_{1970}	1970.09	1.54574
n_{1530}	1529.58	1.55115
n_{1129}	1128.64	1.55598
n_{1064}	1064.00	1.55686
n_t	1013.98	1.55758
n_s	852.11	1.56036
$n_{A'}$	768.19	1.56227
n_r	706.52	1.56401
n_C	656.27	1.56575
$n_{C'}$	643.85	1.56624
n_{He-Ne}	632.80	1.56670
n_D	589.29	1.56874
n_d	587.56	1.56883
n_e	546.07	1.57125
n_F	486.13	1.57590
$n_{F'}$	479.99	1.57648
n_g	435.84	1.58147
n_h	404.66	1.58611
n_i	365.01	1.59408

Constants of Dispersion Formula	
A_0	2.42201339E+00
A_1	-9.34171338E-03
A_2	1.36739157E-02
A_3	3.76328562E-04
A_4	-1.74732935E-05
A_5	1.22001270E-06

Density		Solarization	
ρ (g/cm^3)	2.85	△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3034
$P_{e,d}$	0.2384
$P_{g,F}$	0.5488
$P'_{d,c'}$	0.2529
$P'_{e,d}$	0.2363
$P'_{g,F'}$	0.4872

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0011
$\triangle P_{g,F}$	-0.0017
$\triangle P_{C,t}$	-0.0067
$\triangle P_{C,s}$	-0.0039

Thermal Properties	
Tg (℃)	587
Ts (℃)	634
$T_{10}^{14.5}$ (℃)	530
T_{10}^{13} (℃)	565
$\alpha_{-50/80℃}$ (10^{-7}/K)	71
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	1.08

Mechanical Properties	
HK (10^7Pa)	553
F_A	123
E (GPa)	80.1
G (GPa)	33.1
μ	0.210
σ_b (MPa)	78
B (10^{-12}/Pa)	2.52

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	66
-40/-30	67
-30/-20	69
-20/-10	70
-10/0	70
0/10	71
10/20	72
20/30	73
30/40	74
40/50	76
50/60	76
60/70	77
70/80	78
80/90	79
90/100	80
100/110	81
110/120	81
120/130	82
130/140	84
140/150	85
150/160	86

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.934	0.872
2200	0.953	0.908
2000	0.979	0.958
1800	0.988	0.976
1600	0.997	0.994
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.994
420	0.996	0.992
400	0.994	0.990
390	0.992	0.986
380	0.988	0.980
370	0.982	0.965
360	0.961	0.928
350	0.917	0.845
340	0.808	0.654
330	0.560	0.315
320	0.192	0.039
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.0	3.2	3.3	3.4	3.4	3.5	3.8	4.2	4.2	4.4
-40～-20	3.1	3.3	3.4	3.4	3.5	3.7	3.9	4.2	4.3	4.5
-20～0	3.1	3.3	3.4	3.5	3.5	3.6	3.8	4.2	4.2	4.5
0～20	3.0	3.4	3.4	3.5	3.5	3.6	3.8	4.2	4.3	4.5
20～40	3.0	3.3	3.4	3.5	3.6	3.6	3.8	4.2	4.2	4.6
40～60	3.0	3.3	3.5	3.6	3.6	3.6	3.8	4.3	4.3	4.7
60～80	3.1	3.4	3.5	3.6	3.7	3.7	3.9	4.4	4.4	4.9
80～100	3.2	3.3	3.6	3.6	3.7	3.9	4.1	4.5	4.5	5.0
100～120	3.2	3.4	3.6	3.7	3.7	3.8	4.0	4.4	4.5	5.1
120～140	3.2	3.4	3.6	3.7	3.7	3.8	4.0	4.4	4.5	5.0
140～160	3.2	3.5	3.6	3.7	3.7	3.9	4.1	4.4	4.6	5.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	355/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	347/321

Constants of dn/dt		
D_0	D_1	D_2
3.18E-06	1.21E-08	-2.72E-11
E_0	E_1	λ_{TK}
4.09E-07	3.53E-10	2.69E-01

H-BaK8	573575	n_d = 1.57250	υ_d = 57.49	$n_F - n_C$ = 0.009959
		n_e = 1.57487	υ_e = 57.20	$n_{F'} - n_{C'}$ = 0.010051

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.54549
n_{1970}	1970.09	1.55016
n_{1530}	1529.58	1.55531
n_{1129}	1128.64	1.55993
n_{1064}	1064.00	1.56078
n_t	1013.98	1.56148
n_s	852.11	1.56419
$n_{A'}$	768.19	1.56606
n_r	706.52	1.56777
n_C	656.27	1.56948
$n_{C'}$	643.85	1.56996
n_{He-Ne}	632.80	1.57041
n_D	589.29	1.57241
n_d	587.56	1.57250
n_e	546.07	1.57487
n_F	486.13	1.57944
$n_{F'}$	479.99	1.58001
n_g	435.84	1.58490
n_h	404.66	1.58941
n_i	365.01	1.59715

Constants of Dispersion Formula	
A_0	2.43375651E+00
A_1	-8.82982376E-03
A_2	1.35916939E-02
A_3	3.60922117E-04
A_4	-1.79584197E-05
A_5	1.11930116E-06

Density	
ρ (g/cm^3)	3.17

Solarization	
△λ (%)	-13.3

Relative Partial Dispersion	
$P_{d,C}$	0.3032
$P_{e,d}$	0.2380
$P_{g,F}$	0.5482
$P'_{d,c'}$	0.2527
$P'_{e,d}$	0.2358
$P'_{g,F'}$	0.4865

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0004
$\triangle P_{g,F}$	0.0001
$\triangle P_{C,t}$	-0.0154
$\triangle P_{C,s}$	-0.0072

Thermal Properties	
Tg (℃)	614
Ts (℃)	664
$T_{10}^{14.5}$ (℃)	549
T_{10}^{13} (℃)	592
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	86
λ (W/(m·K))	0.94

Mechanical Properties	
HK (10^7Pa)	527
F_A	127
E (GPa)	72.3
G (GPa)	29.1
μ	0.243
σ_b (MPa)	78
B (10^{-12}/Pa)	2.56

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	66
-40/-30	68
-30/-20	69
-20/-10	70
-10/0	71
0/10	72
10/20	72
20/30	73
30/40	74
40/50	74
50/60	74
60/70	75
70/80	75
80/90	76
90/100	77
100/110	77
110/120	78
120/130	79
130/140	80
140/150	82
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.931	0.866
2200	0.952	0.910
2000	0.984	0.966
1800	0.992	0.985
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.997	0.995
370	0.995	0.990
360	0.991	0.983
350	0.983	0.967
340	0.964	0.930
330	0.930	0.866
320	0.863	0.744
310	0.751	0.558
300	0.576	0.329
290	0.344	0.120
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.0	2.2	2.4	2.4	2.4	2.5	2.8	3.1	3.1	3.3
-40～-20	2.1	2.2	2.5	2.5	2.5	2.5	2.8	3.1	3.1	3.4
-20～0	2.0	2.2	2.5	2.5	2.5	2.6	2.8	3.1	3.1	3.5
0～20	2.0	2.1	2.5	2.5	2.5	2.6	2.8	3.1	3.1	3.6
20～40	2.1	2.3	2.6	2.6	2.7	2.8	2.9	3.3	3.3	3.6
40～60	2.2	2.5	2.7	2.8	2.8	2.9	3.1	3.4	3.4	3.8
60～80	2.4	2.6	2.8	2.9	2.9	3.0	3.3	3.5	3.6	3.9
80～100	2.5	2.7	2.9	3.0	3.0	3.2	3.3	3.6	3.7	4.0
100～120	2.6	2.8	3.1	3.2	3.2	3.3	3.5	3.7	3.8	4.1
120～140	2.8	3.0	3.2	3.3	3.4	3.5	3.6	3.7	3.8	4.2
140～160	2.9	3.1	3.3	3.3	3.4	3.5	3.6	3.7	3.8	4.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	335/285
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	324/284

Constants of dn/dt		
D_0	D_1	D_2
9.63E-07	1.65E-08	-1.99E-11
E_0	E_1	λ_{TK}
5.81E-07	-1.28E-10	1.29E-01

H-ZK3A	589613	n_d = 1.58913	υ_d = 61.25	$n_F - n_C$ = 0.009618
		n_e = 1.59142	υ_e = 61.01	$n_{F'} - n_{C'}$ = 0.009694

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.55975
n_{1970}	1970.09	1.56532
n_{1530}	1529.58	1.57133
n_{1129}	1128.64	1.57650
n_{1064}	1064.00	1.57741
n_t	1013.98	1.57815
n_s	852.11	1.58095
$n_{A'}$	768.19	1.58282
n_r	706.52	1.58451
n_C	656.27	1.58619
$n_{C'}$	643.85	1.58666
n_{He-Ne}	632.80	1.58709
n_D	589.29	1.58903
n_d	587.56	1.58913
n_e	546.07	1.59142
n_F	486.13	1.59581
$n_{F'}$	479.99	1.59635
n_g	435.84	1.60102
n_h	404.66	1.60533
n_i	365.01	1.61266

Relative Partial Dispersion	
$P_{d,C}$	0.3057
$P_{e,d}$	0.2381
$P_{g,F}$	0.5417
$P'_{d,c'}$	0.2548
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4817

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	-0.0002
$\triangle P_{C,t}$	-0.0010
$\triangle P_{C,s}$	-0.0026

Thermal Properties	
Tg (℃)	681
Ts (℃)	722
$T_{10}^{14.5}$ (℃)	609
T_{10}^{13} (℃)	650
$\alpha_{-50/80℃}$ (10^{-7}/K)	55
$\alpha_{100/300℃}$ (10^{-7}/K)	67
λ (W/(m·K))	1.05

Mechanical Properties	
HK (10^7Pa)	550
F_A	119
E (GPa)	81.3
G (GPa)	32.7
μ	0.244
σ_b (MPa)	72
B (10^{-12}/Pa)	2.06

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	2
D_A	3
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	48
-40/-30	50
-30/-20	53
-20/-10	54
-10/0	56
0/10	56
10/20	56
20/30	57
30/40	57
40/50	58
50/60	58
60/70	59
70/80	59
80/90	60
90/100	61
100/110	62
110/120	62
120/130	63
130/140	63
140/150	65
150/160	66

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.917	0.842
2200	0.973	0.947
2000	0.991	0.982
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.998	0.996
390	0.997	0.994
380	0.995	0.990
370	0.989	0.978
360	0.977	0.954
350	0.957	0.915
340	0.924	0.853
330	0.866	0.749
320	0.773	0.598
310	0.637	0.406
300	0.463	0.214
290	0.290	0.084
280	0.168	0.028

Constants of Dispersion Formula	
A_0	2.48859886E+00
A_1	-1.07631038E-02
A_2	1.30844889E-02
A_3	3.33048453E-04
A_4	-1.29820178E-05
A_5	6.37252025E-07

Density	
ρ (g/cm^3)	3.31

Solarization	
△λ (%)	-5.9

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.0	3.1	3.3	3.3	3.4	3.5	3.5	3.8	3.9	4.2
-40～-20	3.0	3.2	3.3	3.3	3.3	3.5	3.7	3.8	3.9	4.2
-20～0	3.1	3.3	3.4	3.4	3.4	3.5	3.7	3.9	3.9	4.2
0～20	3.1	3.3	3.4	3.4	3.5	3.5	3.6	3.9	3.9	4.3
20～40	3.1	3.3	3.4	3.4	3.5	3.6	3.7	4.0	4.0	4.4
40～60	3.2	3.3	3.5	3.5	3.6	3.7	3.8	4.1	4.2	4.5
60～80	3.3	3.5	3.6	3.7	3.8	3.9	4.0	4.3	4.4	4.7
80～100	3.4	3.6	3.7	3.8	3.9	4.1	4.2	4.4	4.5	4.9
100～120	3.5	3.6	3.8	3.9	4.0	4.3	4.5	4.6	4.7	5.2
120～140	3.6	3.8	4.0	4.1	4.2	4.4	4.6	4.8	4.9	5.4
140～160	3.7	3.9	4.1	4.2	4.3	4.6	4.9	5.1	5.2	5.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	345/295
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	336/285

Constants of dn/dt		
D_0	D_1	D_2
3.00E-06	1.29E-08	-9.66E-12
E_0	E_1	λ_{TK}
3.80E-07	7.20E-10	2.31E-01

H-ZK6	613586	n_d = 1.61272	υ_d = 58.58	$n_F - n_C$ = 0.010460
		n_e = 1.61521	υ_e = 58.30	$n_{F'} - n_{C'}$ = 0.010552

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58370
n_{1970}	1970.09	1.58884
n_{1530}	1529.58	1.59446
n_{1129}	1128.64	1.59947
n_{1064}	1064.00	1.60038
n_t	1013.98	1.60112
n_s	852.11	1.60399
$n_{A'}$	768.19	1.60595
n_r	706.52	1.60774
n_C	656.27	1.60954
$n_{C'}$	643.85	1.61005
n_{He-Ne}	632.80	1.61052
n_D	589.29	1.61263
n_d	587.56	1.61272
n_e	546.07	1.61521
n_F	486.13	1.62000
$n_{F'}$	479.99	1.62060
n_g	435.84	1.62571
n_h	404.66	1.63044
n_i	365.01	1.63849

Relative Partial Dispersion	
$P_{d,C}$	0.3040
$P_{e,d}$	0.2380
$P_{g,F}$	0.5459
$P'_{d,c'}$	0.2530
$P'_{e,d}$	0.2360
$P'_{g,F'}$	0.4843

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0001
$\triangle P_{g,F}$	-0.0004
$\triangle P_{C,t}$	-0.0190
$\triangle P_{C,s}$	-0.0104

Thermal Properties	
Tg (℃)	672
Ts (℃)	713
$T_{10}^{14.5}$ (℃)	597
T_{10}^{13} (℃)	644
$\alpha_{-50/80℃}$ (10^{-7}/K)	63
$\alpha_{100/300℃}$ (10^{-7}/K)	81
λ (W/(m·K))	0.94

Mechanical Properties	
HK (10^7Pa)	520
F_A	140
E (GPa)	81.9
G (GPa)	31.6
μ	0.296
σ_b (MPa)	65
B (10^{-12}/Pa)	1.73

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	60
-30/-20	61
-20/-10	62
-10/0	63
0/10	63
10/20	64
20/30	64
30/40	65
40/50	65
50/60	65
60/70	66
70/80	66
80/90	67
90/100	67
100/110	67
110/120	68
120/130	69
130/140	70
140/150	71
150/160	71

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.922	0.844
2200	0.967	0.927
2000	0.993	0.986
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.995
400	0.997	0.990
390	0.995	0.982
380	0.989	0.971
370	0.980	0.952
360	0.958	0.908
350	0.911	0.830
340	0.842	0.709
330	0.730	0.536
320	0.570	0.326
310	0.377	0.145
300	0.197	0.041
290		
280		

Constants of Dispersion Formula	
A_0	2.55955140E+00
A_1	-1.00093149E-02
A_2	1.42930361E-02
A_3	4.66646324E-04
A_4	-2.70113303E-05
A_5	1.35057919E-06

Density	
ρ (g/cm^3)	3.59

Solarization	
△λ (%)	-7.7

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.6	1.6	1.7	1.7	1.8	1.9	2.3	2.5	2.6	3.0
-40～-20	1.6	1.7	1.8	1.8	1.9	2.1	2.4	2.7	2.8	3.1
-20～0	1.9	1.8	1.9	1.9	2.0	2.1	2.5	2.8	2.9	3.2
0～20	1.9	1.9	1.9	1.9	2.0	2.2	2.6	2.9	2.9	3.3
20～40	2.0	2.0	2.1	2.1	2.2	2.4	2.7	3.0	3.1	3.6
40～60	1.9	2.0	2.2	2.2	2.3	2.5	2.8	3.3	3.4	3.9
60～80	2.1	2.3	2.5	2.5	2.6	2.8	3.1	3.5	3.6	4.2
80～100	2.3	2.5	2.7	2.7	2.8	3.1	3.4	3.9	4.0	4.6
100～120	2.4	2.7	2.9	3.0	3.1	3.4	3.7	4.2	4.3	4.9
120～140	2.5	2.8	3.1	3.2	3.3	3.6	3.9	4.4	4.5	5.1
140～160	2.6	2.9	3.3	3.4	3.4	3.8	4.0	4.5	4.6	5.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/300
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	345/299

Constants of dn/dt		
D_0	D_1	D_2
-6.10E-08	1.58E-08	-1.22E-11
E_0	E_1	λ_{TK}
4.83E-07	8.41E-10	2.69E-01

H-ZK7	613606	n_d = 1.61309	υ_d = 60.58	$n_F - n_C$ = 0.010120
		n_e = 1.61551	υ_e = 60.34	$n_{F'} - n_{C'}$ = 0.010201

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58169
n_{1970}	1970.09	1.58773
n_{1530}	1529.58	1.59423
n_{1129}	1128.64	1.59978
n_{1064}	1064.00	1.60074
n_t	1013.98	1.60153
n_s	852.11	1.60449
$n_{A'}$	768.19	1.60646
n_r	706.52	1.60824
n_C	656.27	1.61001
$n_{C'}$	643.85	1.61050
n_{He-Ne}	632.80	1.61096
n_D	589.29	1.61300
n_d	587.56	1.61309
n_e	546.07	1.61551
n_F	486.13	1.62013
$n_{F'}$	479.99	1.62070
n_g	435.84	1.62560
n_h	404.66	1.63013
n_i	365.01	1.63783

Relative Partial Dispersion	
$P_{d,C}$	0.3043
$P_{e,d}$	0.2391
$P_{g,F}$	0.5405
$P'_{d,c'}$	0.2539
$P'_{e,d}$	0.2372
$P'_{g,F'}$	0.4803

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	2
D_A	4
R_{OH} (S)	2
RP (S)	2

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.841	0.707
2200	0.925	0.857
2000	0.981	0.963
1800	0.992	0.986
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.994
390	0.999	0.989
380	0.994	0.979
370	0.985	0.966
360	0.970	0.935
350	0.939	0.877
340	0.889	0.784
330	0.807	0.650
320	0.689	0.472
310	0.529	0.280
300	0.348	0.123
290	0.181	0.037
280		

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	-0.0025
$\triangle P_{C,t}$	0.0043
$\triangle P_{C,s}$	-0.0003

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	52
-40/-30	54
-30/-20	56
-20/-10	57
-10/0	57
0/10	58
10/20	59
20/30	60
30/40	61
40/50	61
50/60	62
60/70	63
70/80	63
80/90	64
90/100	64
100/110	65
110/120	65
120/130	66
130/140	68
140/150	69
150/160	71

Thermal Properties	
Tg (℃)	651
Ts (℃)	685
$T_{10}^{14.5}$ (℃)	582
T_{10}^{13} (℃)	623
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	73
λ (W/(m·K))	1.03

Mechanical Properties	
HK (10^7Pa)	539
F_A	149
E (GPa)	86.2
G (GPa)	33.8
μ	0.275
σ_b (MPa)	74
B (10^{-12}/Pa)	2.00

Constants of Dispersion Formula	
A_0	2.56343719E+00
A_1	-1.18778982E-02
A_2	1.36592937E-02
A_3	4.36395177E-04
A_4	-2.37642691E-05
A_5	1.12532867E-06

Density	
ρ (g/cm^3)	3.50

Solarization	
△λ (%)	-2.1

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.0	1.1	1.1	1.1	1.2	1.3	1.4	1.6	1.7	2.0
-40～-20	1.0	1.1	1.1	1.1	1.2	1.3	1.5	1.8	1.9	2.3
-20～0	1.1	1.1	1.2	1.3	1.4	1.6	1.8	1.9	2.0	2.4
0～20	1.2	1.3	1.3	1.4	1.5	1.6	1.9	2.0	2.1	2.6
20～40	1.3	1.4	1.4	1.5	1.6	1.7	1.9	2.1	2.2	2.8
40～60	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.3	2.4	2.9
60～80	1.5	1.5	1.6	1.7	1.8	2.0	2.1	2.4	2.5	3.1
80～100	1.6	1.6	1.7	1.7	1.8	2.0	2.2	2.5	2.6	3.3
100～120	1.6	1.7	1.8	1.8	1.9	2.1	2.4	2.7	2.8	3.5
120～140	1.6	1.8	1.9	1.9	1.9	2.1	2.6	2.8	2.9	3.6
140～160	1.6	1.8	1.9	1.9	2.0	2.2	2.7	3.0	3.1	3.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	344/289

Constants of dn/dt		
D_0	D_1	D_2
-9.28E-07	1.47E-08	-3.06E-11
E_0	E_1	λ_{TK}
2.76E-07	5.01E-10	3.19E-01

H-ZK9	620603	n_d = 1.62041	υ_d = 60.34	$n_F - n_C$ = 0.010281
		n_e = 1.62286	υ_e = 60.10	$n_{F'} - n_{C'}$ = 0.010363

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58900
n_{1970}	1970.09	1.59500
n_{1530}	1529.58	1.60147
n_{1129}	1128.64	1.60697
n_{1064}	1064.00	1.60793
n_t	1013.98	1.60871
n_s	852.11	1.61168
$n_{A'}$	768.19	1.61367
n_r	706.52	1.61547
n_C	656.27	1.61727
$n_{C'}$	643.85	1.61777
n_{He-Ne}	632.80	1.61824
n_D	589.29	1.62032
n_d	587.56	1.62041
n_e	546.07	1.62286
n_F	486.13	1.62755
$n_{F'}$	479.99	1.62813
n_g	435.84	1.63310
n_h	404.66	1.63768
n_i	365.01	1.64550

Constants of Dispersion Formula	
A_0	2.58664805E+00
A_1	-1.18712170E-02
A_2	1.32307928E-02
A_3	7.82598611E-04
A_4	-8.48132791E-05
A_5	4.75039380E-06

Density	
ρ (g/cm^3)	3.57

Solarization	
△λ (%)	-4.9

Relative Partial Dispersion	
$P_{d,C}$	0.3054
$P_{e,d}$	0.2383
$P_{g,F}$	0.5398
$P'_{d,c'}$	0.2548
$P'_{e,d}$	0.2364
$P'_{g,F'}$	0.4796

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0007
$\triangle P_{g,F}$	-0.0035
$\triangle P_{C,t}$	0.0001
$\triangle P_{C,s}$	-0.0015

Thermal Properties	
Tg (℃)	652
Ts (℃)	685
$T_{10}^{14.5}$ (℃)	585
T_{10}^{13} (℃)	620
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	76
λ (W/(m·K))	0.96

Mechanical Properties	
HK (10^7Pa)	543
F_A	131
E (GPa)	86.2
G (GPa)	36.6
μ	0.281
σ_b (MPa)	87
B (10^{-12}/Pa)	1.99

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	2
D_A	4
R_{OH} (S)	3
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	55
-40/-30	57
-30/-20	59
-20/-10	60
-10/0	61
0/10	63
10/20	63
20/30	64
30/40	65
40/50	65
50/60	66
60/70	67
70/80	67
80/90	68
90/100	68
100/110	69
110/120	70
120/130	70
130/140	71
140/150	72
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.861	0.741
2200	0.943	0.889
2000	0.985	0.970
1800	0.996	0.992
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.995	0.990
400	0.992	0.984
390	0.989	0.978
380	0.986	0.972
370	0.979	0.958
360	0.962	0.925
350	0.929	0.863
340	0.887	0.787
330	0.825	0.681
320	0.730	0.533
310	0.599	0.359
300	0.443	0.196
290	0.286	0.082
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.7	1.9	2.1	2.1	2.1	2.2	2.4	2.6	2.6	2.8
-40～-20	1.8	1.9	2.1	2.2	2.3	2.3	2.3	2.6	2.6	2.9
-20～0	1.8	1.9	2.2	2.2	2.2	2.3	2.4	2.6	2.6	2.9
0～20	1.8	2.0	2.2	2.2	2.2	2.3	2.4	2.6	2.7	2.9
20～40	1.9	2.1	2.2	2.2	2.2	2.4	2.6	2.8	2.8	3.0
40～60	2.0	2.1	2.3	2.3	2.3	2.5	2.7	2.9	2.9	3.1
60～80	2.0	2.1	2.3	2.3	2.4	2.6	2.8	2.9	2.9	3.1
80～100	2.1	2.1	2.5	2.5	2.5	2.7	2.9	3.0	3.0	3.2
100～120	2.1	2.2	2.5	2.6	2.7	2.8	3.1	3.1	3.1	3.3
120～140	2.3	2.3	2.5	2.6	2.7	2.8	3.2	3.3	3.4	3.5
140～160	2.3	2.4	2.7	2.7	2.7	2.9	3.3	3.5	3.7	3.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/300
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	342/287

Constants of dn/dt		
D_0	D_1	D_2
1.99E-07	1.26E-08	-1.82E-11
E_0	E_1	λ_{TK}
4.96E-07	5.23E-10	2.17E-08

H-ZK9A	620603	n_d = 1.62041	υ_d = 60.34	$n_F - n_C$ = 0.010281
		n_e = 1.62286	υ_e = 60.10	$n_{F'} - n_{C'}$ = 0.010363

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58878
n_{1970}	1970.09	1.59483
n_{1530}	1529.58	1.60134
n_{1129}	1128.64	1.60692
n_{1064}	1064.00	1.60789
n_t	1013.98	1.60868
n_s	852.11	1.61168
$n_{A'}$	768.19	1.61367
n_r	706.52	1.61548
n_C	656.27	1.61727
$n_{C'}$	643.85	1.61777
n_{He-Ne}	632.80	1.61824
n_D	589.29	1.62032
n_d	587.56	1.62041
n_e	546.07	1.62286
n_F	486.13	1.62755
$n_{F'}$	479.99	1.62813
n_g	435.84	1.63310
n_h	404.66	1.63768
n_i	365.01	1.64549

Relative Partial Dispersion	
$P_{d,C}$	0.3054
$P_{e,d}$	0.2383
$P_{g,F}$	0.5398
$P'_{d,c'}$	0.2548
$P'_{e,d}$	0.2364
$P'_{g,F'}$	0.4796

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	2
D_A	4
R_{OH} (S)	3
RP (S)	2

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.864	0.746
2200	0.944	0.891
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.998	0.996
400	0.997	0.994
390	0.996	0.992
380	0.993	0.987
370	0.988	0.977
360	0.978	0.957
350	0.959	0.919
340	0.925	0.855
330	0.866	0.750
320	0.771	0.594
310	0.620	0.385
300	0.411	0.169
290		
280		

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0007
$\triangle P_{g,F}$	-0.0035
$\triangle P_{C,t}$	0.0030
$\triangle P_{C,s}$	-0.0015

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	56
-40/-30	59
-30/-20	61
-20/-10	62
-10/0	63
0/10	64
10/20	64
20/30	65
30/40	65
40/50	66
50/60	66
60/70	67
70/80	67
80/90	68
90/100	68
100/110	69
110/120	70
120/130	71
130/140	72
140/150	73
150/160	74

Thermal Properties	
Tg (℃)	663
Ts (℃)	695
$T_{10}^{14.5}$ (℃)	600
T_{10}^{13} (℃)	640
$\alpha_{-50/80℃}$ (10^{-7}/K)	64
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	1.02

Constants of Dispersion Formula	
A_0	2.58626893E+00
A_1	-1.19483745E-02
A_2	1.37737392E-02
A_3	5.49112685E-04
A_4	-4.52101305E-05
A_5	2.44542790E-06

Mechanical Properties	
HK (10^7Pa)	550
F_A	105
E (GPa)	89.5
G (GPa)	34.5
μ	0.297
σ_b (MPa)	87
B (10^{-12}/Pa)	1.82

Density	
ρ (g/cm^3)	3.55

Solarization	
△λ (%)	-2.0

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.8	2.1	2.2	2.2	2.2	2.4	2.5	2.6	2.6	2.7
-40～-20	1.9	2.2	2.2	2.2	2.3	2.4	2.6	2.6	2.7	2.7
-20～0	1.9	2.2	2.3	2.3	2.4	2.5	2.7	2.7	2.8	2.8
0～20	2.0	2.3	2.4	2.4	2.4	2.5	2.7	2.8	2.8	2.9
20～40	2.0	2.3	2.4	2.4	2.4	2.6	2.7	2.8	2.9	2.9
40～60	2.1	2.3	2.5	2.5	2.5	2.6	2.8	3.0	3.1	3.1
60～80	2.2	2.3	2.5	2.5	2.6	2.7	2.9	3.0	3.2	3.3
80～100	2.2	2.5	2.5	2.5	2.6	2.8	3.0	3.2	3.4	3.6
100～120	2.4	2.6	2.6	2.6	2.7	2.8	3.0	3.3	3.5	3.6
120～140	2.5	2.6	2.7	2.7	2.7	2.8	3.2	3.3	3.5	3.7
140～160	2.5	2.6	2.7	2.7	2.7	2.9	3.3	3.5	3.7	3.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	345/285
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	334/284

Constants of dn/dt		
D_0	D_1	D_2
7.48E-07	1.25E-08	-2.50E-11
E_0	E_1	λ_{TK}
4.11E-07	7.77E-10	7.84E-02

H-ZK10	622567	n_d = 1.62210	υ_d = 56.71	$n_F - n_C$ = 0.010970
		n_e = 1.62470	υ_e = 56.38	$n_{F'} - n_{C'}$ = 0.011080

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.59235
n_{1970}	1970.09	1.59753
n_{1530}	1529.58	1.60321
n_{1129}	1128.64	1.60830
n_{1064}	1064.00	1.60923
n_t	1013.98	1.61000
n_s	852.11	1.61297
$n_{A'}$	768.19	1.61501
n_r	706.52	1.61689
n_C	656.27	1.61877
$n_{C'}$	643.85	1.61929
n_{He-Ne}	632.80	1.61979
n_D	589.29	1.62199
n_d	587.56	1.62210
n_e	546.07	1.62470
n_F	486.13	1.62974
$n_{F'}$	479.99	1.63037
n_g	435.84	1.63575
n_h	404.66	1.64074
n_i	365.01	1.64931

Relative Partial Dispersion	
$P_{d,C}$	0.3036
$P_{e,d}$	0.2370
$P_{g,F}$	0.5479
$P'_{d,c'}$	0.2536
$P'_{e,d}$	0.2347
$P'_{g,F'}$	0.4856

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0005
$\triangle P_{g,F}$	-0.0015
$\triangle P_{C,t}$	-0.0155
$\triangle P_{C,s}$	-0.0078

Thermal Properties	
Tg (℃)	664
Ts (℃)	704
$T_{10}^{14.5}$ (℃)	597
T_{10}^{13} (℃)	635
$\alpha_{-50/80℃}$ (10^{-7}/K)	64
$\alpha_{100/300℃}$ (10^{-7}/K)	78
λ (W/(m·K))	0.94

Mechanical Properties	
HK (10^7Pa)	528
F_A	147
E (GPa)	79.5
G (GPa)	31.9
μ	0.248
σ_b (MPa)	75
B (10^{-12}/Pa)	1.80

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	4
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	55
-40/-30	57
-30/-20	58
-20/-10	59
-10/0	60
0/10	61
10/20	62
20/30	63
30/40	64
40/50	65
50/60	65
60/70	66
70/80	67
80/90	68
90/100	69
100/110	69
110/120	70
120/130	71
130/140	72
140/150	73
150/160	74

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.912	0.832
2200	0.962	0.925
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.995
400	0.995	0.992
390	0.990	0.984
380	0.983	0.968
370	0.969	0.941
360	0.933	0.876
350	0.867	0.757
340	0.730	0.537
330	0.473	0.228
320	0.154	0.027
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.58741488E+00
A_1	-1.01011954E-02
A_2	1.49670832E-02
A_3	5.68916443E-04
A_4	-4.40176529E-05
A_5	2.64008379E-06

Density	
ρ (g/cm^3)	3.63

Solarization	
△λ (%)	-1.0

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.3	1.5	1.7	1.8	1.9	2.0	2.1	2.5	2.6	3.0
-40～-20	1.3	1.5	1.7	1.8	1.9	2.1	2.2	2.6	2.7	3.2
-20～0	1.3	1.5	1.7	1.8	2.0	2.1	2.3	2.6	2.7	3.2
0～20	1.3	1.5	1.7	1.8	2.0	2.1	2.3	2.6	2.7	3.2
20～40	1.3	1.6	1.8	1.9	2.0	2.2	2.4	2.7	2.8	3.3
40～60	1.5	1.7	1.8	1.9	2.0	2.2	2.4	2.8	2.8	3.4
60～80	1.6	1.8	1.9	2.0	2.1	2.3	2.6	2.8	2.9	3.6
80～100	1.6	1.9	2.0	2.1	2.2	2.4	2.7	2.9	3.0	3.7
100～120	1.6	1.9	2.0	2.1	2.2	2.4	2.8	3.0	3.1	3.8
120～140	1.7	1.9	2.0	2.2	2.3	2.4	2.8	3.0	3.1	3.8
140～160	1.7	1.9	2.1	2.2	2.3	2.5	2.9	3.1	3.2	4.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	365/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	353/322

Constants of dn/dt		
D_0	D_1	D_2
-7.55E-07	1.29E-08	-2.51E-11
E_0	E_1	λ_{TK}
5.33E-07	3.07E-10	2.48E-01

H-ZK10N	623570	n_d = 1.62280	υ_d = 56.98	$n_F - n_C$ = 0.010931
		n_e = 1.62541	υ_e = 56.74	$n_{F'} - n_{C'}$ = 0.011023

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.59301
n_{1970}	1970.09	1.59824
n_{1530}	1529.58	1.60395
n_{1129}	1128.64	1.60905
n_{1064}	1064.00	1.60998
n_t	1013.98	1.61074
n_s	852.11	1.61371
$n_{A'}$	768.19	1.61574
n_r	706.52	1.61761
n_C	656.27	1.61948
$n_{C'}$	643.85	1.62002
n_{He-Ne}	632.80	1.62051
n_D	589.29	1.62270
n_d	587.56	1.62280
n_e	546.07	1.62541
n_F	486.13	1.63042
$n_{F'}$	479.99	1.63104
n_g	435.84	1.63639
n_h	404.66	1.64136
n_i	365.01	1.64991

Relative Partial Dispersion	
$P_{d,C}$	0.3037
$P_{e,d}$	0.2388
$P_{g,F}$	0.5462
$P'_{d,c'}$	0.2522
$P'_{e,d}$	0.2368
$P'_{g,F'}$	0.4853

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0004
$\triangle P_{g,F}$	-0.0028
$\triangle P_{C,t}$	-0.0167
$\triangle P_{C,s}$	-0.0093

Thermal Properties	
Tg (℃)	661
Ts (℃)	705
$T_{10}^{14.5}$ (℃)	595
T_{10}^{13} (℃)	638
$\alpha_{-50/80℃}$ (10^{-7}/K)	66
$\alpha_{100/300℃}$ (10^{-7}/K)	80
λ (W/(m·K))	0.80

Mechanical Properties	
HK (10^7Pa)	521
F_A	153
E (GPa)	81.9
G (GPa)	32.4
μ	0.265
σ_b (MPa)	62
B (10^{-12}/Pa)	1.88

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	4
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	57
-40/-30	59
-30/-20	61
-20/-10	62
-10/0	62
0/10	63
10/20	64
20/30	64
30/40	65
40/50	66
50/60	67
60/70	67
70/80	68
80/90	69
90/100	70
100/110	71
110/120	72
120/130	73
130/140	74
140/150	76
150/160	77

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.914	0.825
2200	0.963	0.923
2000	0.996	0.984
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.995
400	0.994	0.992
390	0.991	0.981
380	0.986	0.972
370	0.971	0.943
360	0.942	0.888
350	0.860	0.740
340	0.740	0.547
330	0.515	0.265
320	0.221	0.049
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.59016969E+00
A_1	-1.02103680E-02
A_2	1.46213934E-02
A_3	6.92375177E-04
A_4	-6.66173315E-05
A_5	4.03789352E-06

Density	
ρ (g/cm^3)	3.64

Solarization	
△λ (%)	-0.7

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.0	2.2	2.3	2.3	2.4	2.5	2.7	3.0	3.1	3.2
-40～-20	2.1	2.2	2.3	2.3	2.4	2.5	2.7	3.0	3.1	3.3
-20～0	2.1	2.3	2.3	2.3	2.4	2.5	2.7	3.1	3.1	3.4
0～20	2.1	2.3	2.4	2.4	2.5	2.6	2.8	3.2	3.2	3.5
20～40	2.1	2.3	2.5	2.5	2.6	2.7	2.9	3.2	3.3	3.6
40～60	2.1	2.4	2.6	2.6	2.7	2.8	2.9	3.4	3.4	3.7
60～80	2.2	2.5	2.6	2.7	2.8	3.0	3.0	3.4	3.4	3.7
80～100	2.3	2.6	2.7	2.8	2.9	3.0	3.1	3.5	3.5	3.8
100～120	2.4	2.7	2.8	2.9	3.0	3.1	3.2	3.6	3.6	3.8
120～140	2.4	2.7	2.9	2.9	3.0	3.1	3.2	3.6	3.6	3.8
140～160	2.5	2.8	2.9	3.0	3.1	3.3	3.4	3.7	3.7	4.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	353/320

Constants of dn/dt		
D_0	D_1	D_2
6.89E-07	1.42E-08	-2.56E-11
E_0	E_1	λ_{TK}
3.07E-10	1.53E-10	1.41E-01

H-ZK11	639555	n_d = 1.63854	υ_d = 55.45	$n_F - n_C$ = 0.011516
		n_e = 1.64129	υ_e = 55.18	$n_{F'} - n_{C'}$ = 0.011621

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.60803
n_{1970}	1970.09	1.61325
n_{1530}	1529.58	1.61900
n_{1129}	1128.64	1.62419
n_{1064}	1064.00	1.62514
n_t	1013.98	1.62593
n_s	852.11	1.62900
$n_{A'}$	768.19	1.63114
n_r	706.52	1.63310
n_C	656.27	1.63505
$n_{C'}$	643.85	1.63561
n_{He-Ne}	632.80	1.63613
n_D	589.29	1.63844
n_d	587.56	1.63854
n_e	546.07	1.64129
n_F	486.13	1.64657
$n_{F'}$	479.99	1.64723
n_g	435.84	1.65291
n_h	404.66	1.65819
n_i	365.01	1.66725

Constants of Dispersion Formula	
A_0	2.63821944E+00
A_1	-1.02473310E-02
A_2	1.58983043E-02
A_3	5.77973503E-04
A_4	-3.90220391E-05
A_5	2.35832993E-06

Density	
ρ (g/cm^3)	3.67

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3031
$P_{e,d}$	0.2388
$P_{g,F}$	0.5505
$P'_{d,c'}$	0.2521
$P'_{e,d}$	0.2366
$P'_{g,F'}$	0.4888

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0011
$\triangle P_{g,F}$	-0.0010
$\triangle P_{C,t}$	-0.0169
$\triangle P_{C,s}$	-0.0081

Thermal Properties	
Tg (℃)	649
Ts (℃)	685
$T_{10}^{14.5}$ (℃)	591
T_{10}^{13} (℃)	624
$\alpha_{-50/80℃}$ (10^{-7}/K)	71
$\alpha_{100/300℃}$ (10^{-7}/K)	85
λ (W/(m·K))	1.03

Mechanical Properties	
HK (10^7Pa)	510
F_A	160
E (GPa)	86.2
G (GPa)	33.0
μ	0.307
σ_b (MPa)	53
B (10^{-12}/Pa)	1.69

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	63
-40/-30	67
-30/-20	68
-20/-10	70
-10/0	72
0/10	73
10/20	73
20/30	73
30/40	74
40/50	74
50/60	75
60/70	75
70/80	76
80/90	77
90/100	78
100/110	78
110/120	79
120/130	80
130/140	81
140/150	82
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.903	0.815
2200	0.950	0.903
2000	0.987	0.974
1800	0.994	0.989
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.994
400	0.995	0.990
390	0.993	0.985
380	0.991	0.979
370	0.985	0.968
360	0.970	0.940
350	0.944	0.892
340	0.895	0.801
330	0.799	0.639
320	0.622	0.388
310	0.348	0.123
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.3	1.5	1.7	1.8	1.9	1.9	2.1	2.3	2.5	2.9
-40～-20	1.3	1.5	1.7	1.8	1.9	2.0	2.2	2.5	2.7	2.9
-20～0	1.3	1.5	1.7	1.8	2.0	2.0	2.3	2.6	2.7	2.9
0～20	1.3	1.5	1.7	1.8	2.0	2.0	2.4	2.7	2.8	3.0
20～40	1.3	1.5	1.8	1.9	2.0	2.0	2.4	2.7	2.8	3.1
40～60	1.5	1.7	1.7	1.9	2.0	2.1	2.4	2.7	2.8	3.1
60～80	1.5	1.8	1.8	1.9	2.0	2.2	2.4	2.7	2.8	3.1
80～100	1.5	1.9	1.9	1.9	2.0	2.2	2.5	2.8	2.9	3.3
100～120	1.6	1.9	1.9	1.9	2.0	2.2	2.7	2.9	3.0	3.4
120～140	1.8	1.9	1.9	2.0	2.1	2.3	2.7	2.9	3.0	3.4
140～160	1.8	1.9	2.0	2.0	2.1	2.3	2.7	3.0	3.1	3.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/305
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	340/305

Constants of dn/dt		
D_0	D_1	D_2
-8.12E-07	1.25E-08	-2.55E-11
E_0	E_1	λ_{TK}
5.57E-07	2.06E-10	1.96E-01

H-ZK14	603606	n_d = 1.60311	υ_d = 60.60	$n_F - n_C$ = 0.009952
		n_e = 1.60548	υ_e = 60.35	$n_{F'} - n_{C'}$ = 0.010033

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.57307
n_{1970}	1970.09	1.57874
n_{1530}	1529.58	1.58486
n_{1129}	1128.64	1.59014
n_{1064}	1064.00	1.59106
n_t	1013.98	1.59182
n_s	852.11	1.59469
$n_{A'}$	768.19	1.59661
n_r	706.52	1.59835
n_C	656.27	1.60007
$n_{C'}$	643.85	1.60056
n_{He-Ne}	632.80	1.60101
n_D	589.29	1.60302
n_d	587.56	1.60311
n_e	546.07	1.60548
n_F	486.13	1.61003
$n_{F'}$	479.99	1.61059
n_g	435.84	1.61541
n_h	404.66	1.61987
n_i	365.01	1.62743

Relative Partial Dispersion	
$P_{d,C}$	0.3055
$P_{e,d}$	0.2381
$P_{g,F}$	0.5406
$P'_{d,c'}$	0.2542
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4804

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0004
$\triangle P_{g,F}$	-0.0023
$\triangle P_{C,t}$	-0.0048
$\triangle P_{C,s}$	-0.0052

Thermal Properties	
Tg (℃)	666
Ts (℃)	704
$T_{10}^{14.5}$ (℃)	583
T_{10}^{13} (℃)	625
$\alpha_{-50/80℃}$ (10^{-7}/K)	57
$\alpha_{100/300℃}$ (10^{-7}/K)	73
λ (W/(m·K))	0.93

Mechanical Properties	
HK (10^7Pa)	567
F_A	131
E (GPa)	85.1
G (GPa)	33.3
μ	0.278
σ_b (MPa)	85
B (10^{-12}/Pa)	1.84

Chemical Properties (grade)	
RC (S)	3
RA (S)	3
D_W	2
D_A	4
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	50
-40/-30	52
-30/-20	54
-20/-10	55
-10/0	56
0/10	57
10/20	58
20/30	59
30/40	59
40/50	60
50/60	61
60/70	61
70/80	62
80/90	62
90/100	63
100/110	63
110/120	64
120/130	65
130/140	66
140/150	67
150/160	68

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.879	0.774
2200	0.939	0.880
2000	0.983	0.967
1800	0.993	0.984
1600	0.999	0.996
1400	0.999	0.997
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.995
400	0.996	0.995
390	0.994	0.990
380	0.992	0.985
370	0.985	0.976
360	0.976	0.957
350	0.954	0.916
340	0.919	0.852
330	0.862	0.747
320	0.762	0.588
310	0.615	0.385
300	0.419	0.180
290	0.210	0.050
280		

Constants of Dispersion Formula	
A_0	2.53182995E+00
A_1	-1.10534989E-02
A_2	1.34222293E-02
A_3	4.21021754E-04
A_4	-2.24912138E-05
A_5	1.01669782E-06

Density	
ρ (g/cm^3)	3.42

Solarization	
△λ (%)	-5.0

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.6	2.7	2.9	2.9	2.9	3.0	3.3	3.3	3.3	3.8
-40～-20	2.7	2.7	2.9	2.9	3.0	3.1	3.4	3.5	3.5	3.8
-20～0	2.7	2.8	2.9	3.0	3.0	3.1	3.4	3.7	3.7	3.8
0～20	2.8	2.9	3.1	3.1	3.2	3.3	3.5	3.7	3.7	3.9
20～40	2.8	2.9	3.1	3.2	3.2	3.3	3.5	3.7	3.7	4.0
40～60	3.0	3.0	3.2	3.2	3.2	3.4	3.7	3.8	3.9	4.3
60～80	3.1	3.2	3.2	3.3	3.4	3.6	3.8	3.9	4.0	4.4
80～100	3.2	3.3	3.3	3.4	3.5	3.7	4.1	4.1	4.2	4.6
100～120	3.3	3.4	3.4	3.5	3.5	3.7	4.4	4.3	4.4	4.9
120～140	3.5	3.5	3.5	3.6	3.6	3.9	4.5	4.4	4.5	5.0
140～160	3.5	3.6	3.7	3.7	3.8	4.1	4.5	4.6	4.7	5.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/295
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	334/290

Constants of dn/dt		
D_0	D_1	D_2
2.35E-06	1.42E-08	-1.91E-11
E_0	E_1	λ_{TK}
3.40E-07	4.95E-10	2.58E-01

H-ZK20	617539	n_d = 1.61720	υ_d = 53.91	$n_F - n_C$ = 0.011448
		n_e = 1.61993	υ_e = 53.62	$n_{F'} - n_{C'}$ = 0.011561

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58879
n_{1970}	1970.09	1.59335
n_{1530}	1529.58	1.59844
n_{1129}	1128.64	1.60320
n_{1064}	1064.00	1.60410
n_t	1013.98	1.60485
n_s	852.11	1.60781
$n_{A'}$	768.19	1.60989
n_r	706.52	1.61181
n_C	656.27	1.61375
$n_{C'}$	643.85	1.61430
n_{He-Ne}	632.80	1.61481
n_D	589.29	1.61710
n_d	587.56	1.61720
n_e	546.07	1.61993
n_F	486.13	1.62520
$n_{F'}$	479.99	1.62586
n_g	435.84	1.63150
n_h	404.66	1.63676
n_i	365.01	1.64578

Constants of Dispersion Formula	
A_0	2.56855897E+00
A_1	-8.74295850E-03
A_2	1.59604033E-02
A_3	4.91034285E-04
A_4	-2.77331960E-05
A_5	1.72056496E-06

Density	
ρ (g/cm^3)	3.60

Solarization	
△λ (%)	-11.8

Relative Partial Dispersion	
$P_{d,C}$	0.3014
$P_{e,d}$	0.2385
$P_{g,F}$	0.5503
$P'_{d,c'}$	0.2508
$P'_{e,d}$	0.2361
$P'_{g,F'}$	0.4878

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0001
$\triangle P_{g,F}$	-0.0037
$\triangle P_{C,t}$	-0.0239
$\triangle P_{C,s}$	-0.0109

Thermal Properties	
Tg (℃)	555
Ts (℃)	592
$T_{10}^{14.5}$ (℃)	501
T_{10}^{13} (℃)	535
$\alpha_{-50/80℃}$ (10^{-7}/K)	87
$\alpha_{100/300℃}$ (10^{-7}/K)	99
λ (W/(m·K))	0.85

Mechanical Properties	
HK (10^7Pa)	525
F_A	158
E (GPa)	76.6
G (GPa)	30.9
μ	0.241
σ_b (MPa)	57
B (10^{-12}/Pa)	2.06

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	77
-40/-30	79
-30/-20	81
-20/-10	82
-10/0	82
0/10	83
10/20	84
20/30	85
30/40	85
40/50	86
50/60	86
60/70	87
70/80	88
80/90	89
90/100	91
100/110	92
110/120	93
120/130	93
130/140	95
140/150	97
150/160	98

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.911	0.830
2200	0.957	0.916
2000	0.987	0.974
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.998	0.996
400	0.997	0.994
390	0.996	0.992
380	0.994	0.989
370	0.988	0.976
360	0.977	0.952
350	0.954	0.905
340	0.907	0.821
330	0.830	0.689
320	0.711	0.508
310	0.551	0.307
300	0.371	0.141
290	0.209	0.046
280	0.093	0.011

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.9	2.2	2.4	2.5	2.6	2.9	3.3	3.7	3.8	4.5
-40～-20	2.1	2.3	2.4	2.5	2.6	3.0	3.5	3.8	3.9	4.6
-20～0	2.1	2.3	2.5	2.6	2.7	3.0	3.6	3.9	4.0	4.7
0～20	2.3	2.4	2.5	2.6	2.7	3.1	3.6	4.0	4.1	4.9
20～40	2.4	2.6	2.7	2.8	2.8	3.2	3.8	4.2	4.3	4.9
40～60	2.5	2.7	2.9	2.9	3.0	3.4	4.0	4.5	4.6	5.1
60～80	2.6	2.9	3.1	3.1	3.2	3.7	4.2	4.6	4.8	5.3
80～100	2.7	3.1	3.3	3.3	3.4	4.0	4.5	4.8	4.9	5.5
100～120	2.9	3.2	3.4	3.5	3.5	4.2	4.7	5.0	5.1	5.6
120～140	3.0	3.3	3.5	3.6	3.6	4.3	4.8	5.1	5.2	5.7
140～160	3.0	3.4	3.6	3.6	3.7	4.4	5.0	5.3	5.3	5.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/295
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	337/290

Constants of dn/dt		
D_0	D_1	D_2
4.73E-07	1.71E-08	-2.20E-11
E_0	E_1	λ_{TK}
8.83E-07	2.84E-10	2.17E-01

H-ZK21	623581	n_d = 1.62299	υ_d = 58.12	$n_F - n_C$ = 0.010719
		n_e = 1.62555	υ_e = 57.87	$n_{F'} - n_{C'}$ = 0.010809

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.59235
n_{1970}	1970.09	1.59795
n_{1530}	1529.58	1.60402
n_{1129}	1128.64	1.60931
n_{1064}	1064.00	1.61026
n_t	1013.98	1.61103
n_s	852.11	1.61401
$n_{A'}$	768.19	1.61603
n_r	706.52	1.61787
n_C	656.27	1.61973
$n_{C'}$	643.85	1.62025
n_{He-Ne}	632.80	1.62074
n_D	589.29	1.62290
n_d	587.56	1.62299
n_e	546.07	1.62555
n_F	486.13	1.63045
$n_{F'}$	479.99	1.63106
n_g	435.84	1.63629
n_h	404.66	1.64113
n_i	365.01	1.64946

Relative Partial Dispersion	
$P_{d,C}$	0.3041
$P_{e,d}$	0.2388
$P_{g,F}$	0.5448
$P'_{d,c'}$	0.2535
$P'_{e,d}$	0.2368
$P'_{g,F'}$	0.4839

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0010
$\triangle P_{g,F}$	-0.0022
$\triangle P_{C,t}$	-0.0101
$\triangle P_{C,s}$	-0.0063

Thermal Properties	
Tg (℃)	664
Ts (℃)	706
$T_{10}^{14.5}$ (℃)	605
T_{10}^{13} (℃)	651
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	79
λ (W/(m·K))	0.76

Mechanical Properties	
HK (10^7Pa)	551
F_A	138
E (GPa)	85.3
G (GPa)	33.3
μ	0.279
σ_b (MPa)	87
B (10^{-12}/Pa)	1.81

Chemical Properties (grade)	
RC (S)	3
RA (S)	3
D_W	2
D_A	4
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	61
-40/-30	63
-30/-20	65
-20/-10	66
-10/0	66
0/10	67
10/20	67
20/30	68
30/40	68
40/50	69
50/60	69
60/70	70
70/80	70
80/90	70
90/100	71
100/110	71
110/120	72
120/130	73
130/140	74
140/150	75
150/160	76

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.882	0.778
2200	0.948	0.899
2000	0.980	0.960
1800	0.988	0.976
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.996	0.992
400	0.992	0.985
390	0.988	0.976
380	0.982	0.965
370	0.962	0.926
360	0.924	0.854
350	0.850	0.723
340	0.698	0.487
330	0.421	0.177
320	0.071	0.005
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.59254654E+00
A_1	-1.10129354E-02
A_2	1.38896553E-02
A_3	8.21371542E-04
A_4	-8.84083953E-05
A_5	5.19951049E-06

Density	
ρ (g/cm^3)	3.61

Solarization	
△λ (%)	-0.8

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.9	2.1	2.2	2.2	2.3	2.4	2.5	2.8	2.8	3.1
-40～-20	1.9	2.1	2.2	2.2	2.3	2.4	2.5	2.8	2.8	3.2
-20～0	1.9	2.1	2.2	2.2	2.3	2.4	2.5	2.8	2.8	3.1
0～20	1.9	2.1	2.3	2.3	2.4	2.4	2.6	2.9	2.9	3.2
20～40	2.0	2.2	2.3	2.3	2.4	2.5	2.7	3.0	3.0	3.3
40～60	2.1	2.3	2.4	2.4	2.5	2.6	2.7	3.1	3.1	3.5
60～80	2.1	2.3	2.5	2.5	2.6	2.7	2.9	3.2	3.2	3.7
80～100	2.3	2.5	2.7	2.7	2.7	2.9	3.1	3.4	3.4	3.9
100～120	2.4	2.6	2.8	2.8	2.8	3.1	3.3	3.5	3.5	4.0
120～140	2.4	2.7	2.9	2.9	2.9	3.2	3.5	3.6	3.7	4.2
140～160	2.5	2.8	3.0	3.1	3.1	3.4	3.6	3.7	3.8	4.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	350/323

Constants of dn/dt		
D_0	D_1	D_2
5.19E-07	1.33E-08	-1.46E-11
E_0	E_1	λ_{TK}
4.16E-07	4.90E-10	2.14E-01

H-ZK50	607567	n_d = 1.60738	υ_d = 56.65	$n_F - n_C$ = 0.010721
		n_e = 1.60994	υ_e = 56.38	$n_{F'} - n_{C'}$ = 0.010819

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.57933
n_{1970}	1970.09	1.58405
n_{1530}	1529.58	1.58926
n_{1129}	1128.64	1.59403
n_{1064}	1064.00	1.59491
n_t	1013.98	1.59564
n_s	852.11	1.59850
$n_{A'}$	768.19	1.60048
n_r	706.52	1.60230
n_C	656.27	1.60414
$n_{C'}$	643.85	1.60465
n_{He-Ne}	632.80	1.60513
n_D	589.29	1.60729
n_d	587.56	1.60738
n_e	546.07	1.60994
n_F	486.13	1.61486
$n_{F'}$	479.99	1.61547
n_g	435.84	1.62073
n_h	404.66	1.62562
n_i	365.01	1.63393

Relative Partial Dispersion	
$P_{d,C}$	0.3022
$P_{e,d}$	0.2388
$P_{g,F}$	0.5475
$P'_{d,c'}$	0.2523
$P'_{e,d}$	0.2366
$P'_{g,F'}$	0.4862

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	-0.0020
$\triangle P_{C,t}$	-0.0218
$\triangle P_{C,s}$	-0.0103

Thermal Properties	
Tg (℃)	594
Ts (℃)	637
$T_{10}^{14.5}$ (℃)	532
T_{10}^{13} (℃)	570
$\alpha_{-50/80℃}$ (10^{-7}/K)	80
$\alpha_{100/300℃}$ (10^{-7}/K)	95
λ (W/(m·K))	0.87

Mechanical Properties	
HK (10^7Pa)	489
F_A	210
E (GPa)	83.7
G (GPa)	31.5
μ	0.328
σ_b (MPa)	84
B (10^{-12}/Pa)	1.77

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	72
-40/-30	75
-30/-20	77
-20/-10	78
-10/0	79
0/10	80
10/20	80
20/30	81
30/40	82
40/50	82
50/60	83
60/70	84
70/80	85
80/90	86
90/100	89
100/110	90
110/120	91
120/130	92
130/140	94
140/150	96
150/160	97

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.917	0.841
2200	0.952	0.904
2000	0.983	0.966
1800	0.993	0.986
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.995
400	0.995	0.991
390	0.992	0.986
380	0.990	0.981
370	0.983	0.968
360	0.971	0.944
350	0.948	0.898
340	0.903	0.813
330	0.824	0.673
320	0.698	0.482
310	0.515	0.262
300	0.312	0.095
290	0.145	0.021
280		

Constants of Dispersion Formula	
A_0	2.54047355E+00
A_1	-9.05535161E-03
A_2	1.49621725E-02
A_3	3.92388778E-04
A_4	-1.51543800E-05
A_5	7.76341926E-07

Density	
ρ (g/cm^3)	3.47

Solarization	
△λ (%)	-10.0

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.9	1.1	1.2	1.2	1.3	1.3	1.5	1.8	1.8	2.2
-40～-20	0.9	1.1	1.2	1.2	1.3	1.3	1.6	1.8	1.9	2.3
-20～0	0.9	1.0	1.2	1.2	1.2	1.3	1.6	1.8	1.9	2.3
0～20	0.8	1.0	1.1	1.2	1.2	1.2	1.6	1.8	1.9	2.3
20～40	0.8	1.1	1.2	1.3	1.3	1.3	1.7	1.9	1.9	2.3
40～60	0.9	1.1	1.3	1.3	1.3	1.3	1.7	1.9	1.9	2.4
60～80	0.9	1.2	1.4	1.4	1.5	1.5	1.9	2.0	2.1	2.5
80～100	1.0	1.3	1.5	1.5	1.5	1.5	2.0	2.1	2.1	2.7
100～120	1.1	1.4	1.6	1.6	1.6	1.6	2.1	2.3	2.4	2.8
120～140	1.3	1.4	1.7	1.7	1.7	1.8	2.3	2.4	2.5	3.0
140～160	1.3	1.5	1.8	1.8	1.9	1.9	2.3	2.6	2.7	3.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/295
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	335/292

Constants of dn/dt		
D_0	D_1	D_2
-1.74E-06	1.22E-08	-1.24E-11
E_0	E_1	λ_{TK}
4.12E-07	3.48E-10	2.52E-01

H-LaK1	660574	n_d = 1.65950	υ_d = 57.35	$n_F - n_C$ = 0.011500
		n_e = 1.66224	υ_e = 57.13	$n_{F'} - n_{C'}$ = 0.011592

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.62649
n_{1970}	1970.09	1.63247
n_{1530}	1529.58	1.63901
n_{1129}	1128.64	1.64475
n_{1064}	1064.00	1.64577
n_t	1013.98	1.64660
n_s	852.11	1.64983
$n_{A'}$	768.19	1.65202
n_r	706.52	1.65403
n_C	656.27	1.65600
$n_{C'}$	643.85	1.65655
n_{He-Ne}	632.80	1.65707
n_D	589.29	1.65939
n_d	587.56	1.65950
n_e	546.07	1.66224
n_F	486.13	1.66750
$n_{F'}$	479.99	1.66814
n_g	435.84	1.67376
n_h	404.66	1.67897
n_i	365.01	1.68783

Constants of Dispersion Formula	
A_0	2.70733270E+00
A_1	-1.20058561E-02
A_2	1.64047722E-02
A_3	4.17032662E-04
A_4	-1.43172608E-05
A_5	7.78703513E-07

Density	
ρ (g/cm^3)	3.64

Solarization	
△λ (%)	-2.8

Relative Partial Dispersion	
$P_{d,C}$	0.3043
$P_{e,d}$	0.2383
$P_{g,F}$	0.5443
$P'_{d,c'}$	0.2545
$P'_{e,d}$	0.2364
$P'_{g,F'}$	0.4848

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0012
$\triangle P_{g,F}$	-0.0040
$\triangle P_{C,t}$	-0.0006
$\triangle P_{C,s}$	-0.0015

Thermal Properties	
Tg (℃)	651
Ts (℃)	685
$T_{10}^{14.5}$ (℃)	588
T_{10}^{13} (℃)	617
$\alpha_{-50/80℃}$ (10^{-7}/K)	65
$\alpha_{100/300℃}$ (10^{-7}/K)	81
λ (W/(m·K))	0.82

Mechanical Properties	
HK (10^7Pa)	581
F_A	112
E (GPa)	90.9
G (GPa)	35.7
μ	0.273
σ_b (MPa)	85
B (10^{-12}/Pa)	1.50

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	3
D_A	4
R_{OH} (S)	1
RP (S)	3

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	59
-40/-30	61
-30/-20	63
-20/-10	64
-10/0	64
0/10	65
10/20	65
20/30	66
30/40	67
40/50	67
50/60	67
60/70	68
70/80	68
80/90	69
90/100	70
100/110	71
110/120	72
120/130	73
130/140	74
140/150	75
150/160	76

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.873	0.762
2200	0.954	0.910
2000	0.993	0.986
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.995
400	0.995	0.992
390	0.993	0.987
380	0.990	0.981
370	0.981	0.970
360	0.968	0.947
350	0.950	0.910
340	0.918	0.852
330	0.868	0.762
320	0.796	0.641
310	0.697	0.495
300	0.581	0.346
290	0.460	0.217
280	0.343	0.122

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.6	1.9	2.1	2.1	2.1	2.2	2.3	2.5	2.6	3.0
-40～-20	1.7	1.9	2.0	2.0	2.0	2.1	2.3	2.6	2.7	3.0
-20～0	1.6	1.9	2.1	2.1	2.1	2.2	2.3	2.6	2.7	3.0
0～20	1.6	1.9	2.1	2.2	2.2	2.2	2.3	2.6	2.7	3.1
20～40	1.6	1.9	2.1	2.1	2.1	2.1	2.4	2.7	2.8	3.1
40～60	1.6	2.0	2.2	2.2	2.2	2.3	2.4	2.7	2.8	3.2
60～80	1.8	2.1	2.2	2.2	2.2	2.4	2.5	2.7	2.9	3.3
80～100	1.9	2.1	2.2	2.2	2.2	2.4	2.5	2.8	2.9	3.4
100～120	1.9	2.2	2.3	2.3	2.3	2.5	2.6	2.9	3.0	3.5
120～140	2.0	2.3	2.4	2.4	2.4	2.6	2.7	3.0	3.1	3.6
140～160	2.1	2.4	2.5	2.5	2.5	2.7	2.8	3.1	3.2	3.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	334/272

Constants of dn/dt		
D_0	D_1	D_2
1.09E-07	1.22E-08	-1.85E-11
E_0	E_1	λ_{TK}
2.95E-07	1.37E-10	2.81E-01

H-LaK2	691547	n_d = 1.69100	υ_d = 54.70	$n_F - n_C$ = 0.012633
		n_e = 1.69401	υ_e = 54.48	$n_{F'} - n_{C'}$ = 0.012739

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65330
n_{1970}	1970.09	1.66043
n_{1530}	1529.58	1.66812
n_{1129}	1128.64	1.67471
n_{1064}	1064.00	1.67587
n_t	1013.98	1.67681
n_s	852.11	1.68039
$n_{A'}$	768.19	1.68280
n_r	706.52	1.68499
n_C	656.27	1.68715
$n_{C'}$	643.85	1.68776
n_{He-Ne}	632.80	1.68833
n_D	589.29	1.69088
n_d	587.56	1.69100
n_e	546.07	1.69401
n_F	486.13	1.69978
$n_{F'}$	479.99	1.70050
n_g	435.84	1.70665
n_h	404.66	1.71235
n_i	365.01	1.72209

Constants of Dispersion Formula	
A_0	2.80955685E+00
A_1	-1.46673580E-02
A_2	1.68842607E-02
A_3	9.16821494E-04
A_4	-7.97191507E-05
A_5	4.19772399E-06

Density	
ρ (g/cm^3)	3.63

Solarization	
△λ (%)	-0.8

Relative Partial Dispersion	
$P_{d,C}$	0.3048
$P_{e,d}$	0.2383
$P_{g,F}$	0.5438
$P'_{d,c'}$	0.2543
$P'_{e,d}$	0.2363
$P'_{g,F'}$	0.4828

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0033
$\triangle P_{g,F}$	-0.0089
$\triangle P_{C,t}$	0.0133
$\triangle P_{C,s}$	0.0034

Thermal Properties	
Tg (℃)	630
Ts (℃)	661
$T_{10}^{14.5}$ (℃)	585
T_{10}^{13} (℃)	602
$\alpha_{-50/80℃}$ (10^{-7}/K)	57
$\alpha_{100/300℃}$ (10^{-7}/K)	73
λ (W/(m·K))	0.94

Mechanical Properties	
HK (10^7Pa)	528
F_A	94
E (GPa)	107.4
G (GPa)	41.7
μ	0.287
σ_b (MPa)	92
B (10^{-12}/Pa)	1.96

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	3

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	54
-30/-20	56
-20/-10	57
-10/0	57
0/10	58
10/20	58
20/30	59
30/40	59
40/50	59
50/60	60
60/70	60
70/80	61
80/90	61
90/100	62
100/110	62
110/120	63
120/130	64
130/140	64
140/150	65
150/160	66

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.766	0.579
2200	0.919	0.846
2000	0.973	0.955
1800	0.989	0.986
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.995
420	0.999	0.991
400	0.994	0.985
390	0.987	0.979
380	0.980	0.965
370	0.969	0.943
360	0.948	0.906
350	0.916	0.838
340	0.867	0.757
330	0.801	0.645
320	0.712	0.509
310	0.599	0.360
300	0.449	0.202
290	0.245	0.063
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.0	3.1	3.3	3.4	3.5	3.6	3.7	3.9	4.0	4.2
-40～-20	3.1	3.4	3.5	3.6	3.6	3.8	3.9	4.1	4.1	4.4
-20～0	3.2	3.5	3.5	3.6	3.7	3.8	3.9	4.2	4.2	4.6
0～20	3.2	3.6	3.7	3.7	3.9	4.0	4.1	4.3	4.3	4.8
20～40	3.2	3.8	3.8	3.8	3.9	4.1	4.1	4.6	4.6	4.9
40～60	3.5	3.9	3.9	3.9	4.0	4.1	4.3	4.6	4.6	4.9
60～80	3.5	3.9	3.9	3.9	4.1	4.2	4.4	4.6	4.6	5.1
80～100	3.7	3.8	3.9	3.9	4.1	4.4	4.5	4.8	4.8	5.2
100～120	3.8	4.0	4.1	4.1	4.4	4.4	4.5	4.8	4.8	5.2
120～140	3.9	4.2	4.3	4.3	4.4	4.4	4.6	4.8	4.8	5.3
140～160	4.0	4.2	4.3	4.4	4.6	4.6	4.7	4.9	5.0	5.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	335/287

Constants of dn/dt		
D_0	D_1	D_2
2.98E-06	1.59E-08	-3.12E-11
E_0	E_1	λ_{TK}
4.05E-07	-4.14E-11	1.83E-01

H-LaK2H	692545	n_d = 1.69211	υ_d = 54.54	$n_F - n_C$ = 0.012690
		n_e = 1.69514	υ_e = 54.29	$n_{F'} - n_{C'}$ = 0.012804

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65358
n_{1970}	1970.09	1.66092
n_{1530}	1529.58	1.66884
n_{1129}	1128.64	1.67561
n_{1064}	1064.00	1.67679
n_t	1013.98	1.67775
n_s	852.11	1.68140
$n_{A'}$	768.19	1.68384
n_r	706.52	1.68606
n_C	656.27	1.68827
$n_{C'}$	643.85	1.68888
n_{He-Ne}	632.80	1.68945
n_D	589.29	1.69201
n_d	587.56	1.69211
n_e	546.07	1.69514
n_F	486.13	1.70096
$n_{F'}$	479.99	1.70168
n_g	435.84	1.70783
n_h	404.66	1.71355
n_i	365.01	1.72334

Constants of Dispersion Formula	
A_0	2.81281207E+00
A_1	-1.51090486E-02
A_2	1.73324917E-02
A_3	8.29325128E-04
A_4	-7.29570094E-05
A_5	4.13913961E-06

Density	
ρ (g/cm^3)	3.53

Solarization	
△λ (%)	-3.1

Relative Partial Dispersion	
$P_{d,C}$	0.3026
$P_{e,d}$	0.2388
$P_{g,F}$	0.5414
$P'_{d,c'}$	0.2523
$P'_{e,d}$	0.2366
$P'_{g,F'}$	0.4803

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0015
$\triangle P_{g,F}$	-0.0116
$\triangle P_{C,t}$	0.0246
$\triangle P_{C,s}$	0.0101

Thermal Properties	
Tg (℃)	636
Ts (℃)	662
$T_{10}^{14.5}$ (℃)	599
T_{10}^{13} (℃)	635
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	0.92

Mechanical Properties	
HK (10^7Pa)	665
F_A	77
E (GPa)	111.3
G (GPa)	42.0
μ	0.325
σ_b (MPa)	67
B (10^{-12}/Pa)	2.00

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	3

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	54
-30/-20	55
-20/-10	56
-10/0	56
0/10	57
10/20	58
20/30	60
30/40	61
40/50	61
50/60	62
60/70	62
70/80	63
80/90	63
90/100	64
100/110	64
110/120	64
120/130	65
130/140	66
140/150	67
150/160	68

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.754	0.568
2200	0.915	0.837
2000	0.980	0.960
1800	0.990	0.980
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.997	0.995
420	0.995	0.991
400	0.993	0.986
390	0.991	0.981
380	0.987	0.973
370	0.980	0.959
360	0.964	0.928
350	0.943	0.889
340	0.910	0.828
330	0.862	0.744
320	0.800	0.639
310	0.724	0.523
300	0.638	0.406
290	0.542	0.295
280	0.433	0.189

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.9	4.1	4.2	4.2	4.3	4.4	4.7	5.1	5.1	5.5
-40～-20	3.9	4.1	4.2	4.3	4.4	4.5	4.7	5.1	5.1	5.6
-20～0	3.9	4.1	4.2	4.3	4.4	4.5	4.8	5.1	5.1	5.6
0～20	4.0	4.2	4.4	4.4	4.4	4.5	4.8	5.1	5.2	5.6
20～40	3.9	4.2	4.4	4.5	4.5	4.5	4.9	5.2	5.2	5.7
40～60	4.1	4.3	4.5	4.6	4.6	4.7	4.9	5.3	5.3	5.8
60～80	4.2	4.4	4.6	4.7	4.7	4.9	5.0	5.5	5.5	6.1
80～100	4.3	4.5	4.7	4.8	4.8	5.2	5.3	5.6	5.7	6.4
100～120	4.4	4.6	4.8	4.9	4.9	5.3	5.4	5.7	5.8	6.6
120～140	4.4	4.6	4.8	5.0	5.0	5.4	5.5	5.8	5.9	6.7
140～160	4.5	4.7	5.0	5.1	5.2	5.5	5.7	6.0	6.1	6.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	333/265

Constants of dn/dt		
D_0	D_1	D_2
4.09E-06	1.29E-08	-1.66E-11
E_0	E_1	λ_{TK}
3.70E-07	3.58E-10	2.77E-01

H-LaK3	747510	n_d = 1.74693	υ_d = 50.95	$n_F - n_C$ = 0.014660
		n_e = 1.75042	υ_e = 50.72	$n_{F'} - n_{C'}$ = 0.014794

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70600
n_{1970}	1970.09	1.71332
n_{1530}	1529.58	1.72133
n_{1129}	1128.64	1.72838
n_{1064}	1064.00	1.72965
n_t	1013.98	1.73069
n_s	852.11	1.73471
$n_{A'}$	768.19	1.73747
n_r	706.52	1.73998
n_C	656.27	1.74250
$n_{C'}$	643.85	1.74320
n_{He-Ne}	632.80	1.74386
n_D	589.29	1.74680
n_d	587.56	1.74693
n_e	546.07	1.75042
n_F	486.13	1.75716
$n_{F'}$	479.99	1.75799
n_g	435.84	1.76523
n_h	404.66	1.77195
n_i	365.01	1.78350

Constants of Dispersion Formula	
A_0	2.98964410E+00
A_1	-1.53853950E-02
A_2	2.14098946E-02
A_3	7.35181833E-04
A_4	-3.80789614E-05
A_5	2.29046629E-06

Density		Solarization	
ρ (g/cm^3)	4.10	△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.3022
$P_{e,d}$	0.2381
$P_{g,F}$	0.5505
$P'_{d,c'}$	0.2521
$P'_{e,d}$	0.2359
$P'_{g,F'}$	0.4894

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0023
$\triangle P_{g,F}$	-0.0085
$\triangle P_{C,t}$	0.0186
$\triangle P_{C,s}$	0.0087

Thermal Properties	
Tg (℃)	674
Ts (℃)	695
$T_{10}^{14.5}$ (℃)	603
T_{10}^{13} (℃)	641
$\alpha_{-50/80℃}$ (10^{-7}/K)	53
$\alpha_{100/300℃}$ (10^{-7}/K)	66
λ (W/(m·K))	0.80

Mechanical Properties	
HK (10^7Pa)	769
F_A	50
E (GPa)	120.3
G (GPa)	45.3
μ	0.328
σ_b (MPa)	96
B (10^{-12}/Pa)	1.56

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	49
-40/-30	51
-30/-20	53
-20/-10	54
-10/0	54
0/10	54
10/20	55
20/30	56
30/40	56
40/50	56
50/60	57
60/70	57
70/80	57
80/90	58
90/100	58
100/110	59
110/120	59
120/130	60
130/140	61
140/150	62
150/160	63

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.779	0.612
2200	0.931	0.868
2000	0.986	0.963
1800	0.997	0.994
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.997
440	0.997	0.994
420	0.994	0.990
400	0.990	0.981
390	0.987	0.974
380	0.980	0.959
370	0.968	0.935
360	0.946	0.891
350	0.907	0.817
340	0.850	0.724
330	0.767	0.589
320	0.640	0.410
310	0.420	0.180
300	0.155	0.034
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.8	2.1	2.3	2.3	2.4	2.6	3.1	3.4	3.4	3.8
-40～-20	2.2	2.4	2.7	2.7	2.8	3.0	3.4	3.8	3.9	4.3
-20～0	2.9	3.1	3.2	3.2	3.3	3.4	4.0	4.4	4.5	4.7
0～20	3.1	3.5	3.7	3.7	3.8	4.0	4.7	4.9	5.0	5.4
20～40	3.7	4.0	4.3	4.3	4.4	4.5	4.7	5.1	5.1	5.8
40～60	4.0	4.2	4.5	4.5	4.6	4.8	5.3	5.5	5.5	6.1
60～80	4.5	4.7	4.8	4.8	4.9	5.1	5.3	5.8	5.9	6.4
80～100	4.7	4.8	5.1	5.2	5.3	5.5	5.8	6.3	6.4	6.7
100～120	5.0	5.1	5.2	5.3	5.4	5.6	6.0	6.5	6.5	7.0
120～140	5.1	5.3	5.5	5.6	5.7	5.9	6.3	6.7	6.7	7.2
140～160	5.3	5.5	5.6	5.8	6.0	6.3	6.6	6.8	6.9	7.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/300
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	332/264

Constants of dn/dt		
D_0	D_1	D_2
2.62E-06	2.82E-08	-5.41E-11
E_0	E_1	λ_{TK}
5.36E-07	-4.51E-11	2.24E-01

H-LaK4L	640602	n_d = 1.64000	υ_d = 60.20	$n_F - n_C$ = 0.010631
		n_e = 1.64254	υ_e = 60.00	$n_{F'} - n_{C'}$ = 0.010709

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.60415
n_{1970}	1970.09	1.61142
n_{1530}	1529.58	1.61918
n_{1129}	1128.64	1.62562
n_{1064}	1064.00	1.62670
n_t	1013.98	1.62759
n_s	852.11	1.63083
$n_{A'}$	768.19	1.63296
n_r	706.52	1.63486
n_C	656.27	1.63674
$n_{C'}$	643.85	1.63726
n_{He-Ne}	632.80	1.63775
n_D	589.29	1.63990
n_d	587.56	1.64000
n_e	546.07	1.64254
n_F	486.13	1.64737
$n_{F'}$	479.99	1.64797
n_g	435.84	1.65305
n_h	404.66	1.65776
n_i	365.01	1.66574

Constants of Dispersion Formula	
A_0	2.65004076E+00
A_1	-1.46730544E-02
A_2	1.38448882E-02
A_3	7.00625352E-04
A_4	-6.62250000E-05
A_5	3.53607313E-06

Density	
ρ (g/cm^3)	2.98

Solarization	
△λ (%)	-3.3

Relative Partial Dispersion	
$P_{d,C}$	0.3067
$P_{e,d}$	0.2389
$P_{g,F}$	0.5343
$P'_{d,c'}$	0.2559
$P'_{e,d}$	0.2372
$P'_{g,F'}$	0.4744

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0026
$\triangle P_{g,F}$	-0.0093
$\triangle P_{C,t}$	0.0289
$\triangle P_{C,s}$	0.0110

Thermal Properties	
Tg (℃)	667
Ts (℃)	688
$T_{10}^{14.5}$ (℃)	603
T_{10}^{13} (℃)	637
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	80
λ (W/(m·K))	1.03

Mechanical Properties	
HK (10^7Pa)	640
F_A	78
E (GPa)	113.3
G (GPa)	44.0
μ	0.289
σ_b (MPa)	86
B (10^{-12}/Pa)	1.84

Chemical Properties (grade)	
RC (S)	3
RA (S)	2
D_W	4
D_A	4
R_{OH} (S)	5
RP (S)	4

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	57
-40/-30	59
-30/-20	60
-20/-10	60
-10/0	61
0/10	62
10/20	62
20/30	63
30/40	63
40/50	65
50/60	65
60/70	66
70/80	66
80/90	67
90/100	67
100/110	68
110/120	69
120/130	70
130/140	71
140/150	72
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.777	0.604
2200	0.926	0.857
2000	0.985	0.970
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.997	0.993
440	0.995	0.990
420	0.993	0.987
400	0.991	0.984
390	0.989	0.977
380	0.986	0.971
370	0.979	0.956
360	0.965	0.931
350	0.941	0.883
340	0.906	0.823
330	0.858	0.736
320	0.791	0.628
310	0.706	0.505
300	0.612	0.380
290	0.514	0.271
280	0.419	0.183

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.7	2.9	2.9	2.9	2.9	3.1	3.2	3.3	3.4	3.7
-40～-20	2.8	2.9	2.9	2.9	3.0	3.1	3.2	3.3	3.4	3.9
-20～0	2.9	2.9	2.9	3.0	3.1	3.2	3.4	3.5	3.5	3.9
0～20	2.9	2.9	3.0	3.0	3.2	3.2	3.4	3.6	3.6	3.9
20～40	2.9	2.9	3.0	3.1	3.2	3.2	3.5	3.7	3.7	3.9
40～60	2.9	2.9	3.1	3.2	3.2	3.3	3.5	3.7	3.8	4.0
60～80	2.9	3.0	3.1	3.2	3.2	3.3	3.5	3.8	3.8	4.1
80～100	2.9	3.0	3.2	3.2	3.2	3.4	3.6	3.9	3.9	4.2
100～120	2.9	3.1	3.3	3.3	3.3	3.5	3.7	4.0	4.0	4.3
120～140	2.9	3.1	3.4	3.4	3.4	3.5	3.8	4.1	4.1	4.3
140～160	3.0	3.1	3.4	3.4	3.4	3.5	3.8	4.1	4.1	4.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	355/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	334/266

Constants of dn/dt		
D_0	D_1	D_2
2.19E-06	1.20E-08	-2.68E-11
E_0	E_1	λ_{TK}
3.21E-07	4.86E-10	2.20E-01

H-LaK5A	678555	n_d = 1.67790	υ_d = 55.52	$n_F - n_C$ = 0.012211
		n_e = 1.68081	υ_e = 55.26	$n_{F'} - n_{C'}$ = 0.012319

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.64174
n_{1970}	1970.09	1.64851
n_{1530}	1529.58	1.65581
n_{1129}	1128.64	1.66213
n_{1064}	1064.00	1.66325
n_t	1013.98	1.66416
n_s	852.11	1.66763
$n_{A'}$	768.19	1.66996
n_r	706.52	1.67209
n_C	656.27	1.67420
$n_{C'}$	643.85	1.67479
n_{He-Ne}	632.80	1.67533
n_D	589.29	1.67779
n_d	587.56	1.67790
n_e	546.07	1.68081
n_F	486.13	1.68641
$n_{F'}$	479.99	1.68710
n_g	435.84	1.69304
n_h	404.66	1.69854
n_i	365.01	1.70795

Constants of Dispersion Formula	
A_0	2.76662000E+00
A_1	-1.37659970E-02
A_2	1.68042016E-02
A_3	7.09094213E-04
A_4	-5.52664143E-05
A_5	3.02453719E-06

Density	
ρ (g/cm^3)	3.53

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.3030
$P_{e,d}$	0.2383
$P_{g,F}$	0.5430
$P'_{d,c'}$	0.2525
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4822

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0010
$\triangle P_{g,F}$	-0.0084
$\triangle P_{C,t}$	0.0131
$\triangle P_{C,s}$	0.0044

Thermal Properties	
Tg (℃)	658
Ts (℃)	684
$T_{10}^{14.5}$ (℃)	595
T_{10}^{13} (℃)	630
$\alpha_{-50/80℃}$ (10^{-7}/K)	70
$\alpha_{100/300℃}$ (10^{-7}/K)	81
λ (W/(m·K))	0.76

Mechanical Properties	
HK (10^7Pa)	595
F_A	117
E (GPa)	94.6
G (GPa)	37.3
μ	0.270
σ_b (MPa)	90
B (10^{-12}/Pa)	1.74

Chemical Properties (grade)	
RC (S)	3
RA (S)	3
D_W	3
D_A	3
R_{OH} (S)	2
RP (S)	3

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	62
-40/-30	65
-30/-20	67
-20/-10	68
-10/0	69
0/10	70
10/20	71
20/30	71
30/40	72
40/50	73
50/60	73
60/70	74
70/80	75
80/90	75
90/100	76
100/110	78
110/120	79
120/130	80
130/140	81
140/150	82
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.791	0.625
2200	0.925	0.855
2000	0.976	0.953
1800	0.990	0.979
1600	0.996	0.991
1400	0.996	0.991
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.997
600	0.998	0.997
550	0.998	0.997
500	0.998	0.997
480	0.998	0.996
460	0.996	0.993
440	0.996	0.992
420	0.995	0.990
400	0.993	0.987
390	0.991	0.983
380	0.987	0.974
370	0.980	0.960
360	0.966	0.933
350	0.943	0.889
340	0.909	0.826
330	0.853	0.727
320	0.777	0.603
310	0.686	0.471
300	0.580	0.336
290	0.467	0.218
280	0.355	0.126

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.9	2.1	2.2	2.2	2.2	2.3	2.5	2.7	2.7	3.1
-40～-20	1.8	2.0	2.2	2.2	2.2	2.4	2.5	2.7	2.8	3.2
-20～0	1.8	2.0	2.2	2.2	2.2	2.4	2.6	2.8	2.8	3.2
0～20	1.8	2.1	2.2	2.2	2.2	2.4	2.6	2.8	2.9	3.2
20～40	1.8	2.0	2.2	2.2	2.3	2.4	2.6	2.9	2.9	3.4
40～60	1.8	2.1	2.3	2.3	2.4	2.5	2.6	3.0	3.0	3.4
60～80	2.0	2.1	2.3	2.4	2.4	2.5	2.9	3.2	3.2	3.6
80～100	2.0	2.2	2.4	2.5	2.5	2.5	3.0	3.3	3.4	3.6
100～120	2.2	2.3	2.5	2.7	2.7	2.7	3.2	3.4	3.5	3.8
120～140	2.3	2.4	2.6	2.7	2.7	2.8	3.3	3.5	3.7	3.9
140～160	2.4	2.5	2.7	2.7	2.8	2.9	3.5	3.7	3.8	4.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	339/274

Constants of dn/dt		
D_0	D_1	D_2
1.13E-07	1.17E-08	-1.44E-11
E_0	E_1	λ_{TK}
4.21E-07	4.77E-10	2.11E-01

H-LaK6	694533	n_d = 1.69350	υ_d = 53.31	$n_F - n_C$ = 0.013008
		n_e = 1.69660	υ_e = 53.11	$n_{F'} - n_{C'}$ = 0.013115

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65451
n_{1970}	1970.09	1.66191
n_{1530}	1529.58	1.66989
n_{1129}	1128.64	1.67672
n_{1064}	1064.00	1.67791
n_t	1013.98	1.67889
n_s	852.11	1.68258
$n_{A'}$	768.19	1.68506
n_r	706.52	1.68731
n_C	656.27	1.68955
$n_{C'}$	643.85	1.69018
n_{He-Ne}	632.80	1.69076
n_D	589.29	1.69337
n_d	587.56	1.69350
n_e	546.07	1.69660
n_F	486.13	1.70256
$n_{F'}$	479.99	1.70330
n_g	435.84	1.70965
n_h	404.66	1.71556
n_i	365.01	1.72565

Constants of Dispersion Formula	
A_0	2.81648072E+00
A_1	-1.52313167E-02
A_2	1.76168363E-02
A_3	8.07769313E-04
A_4	-5.32742539E-05
A_5	2.58509025E-06

Density	
ρ (g/cm^3)	3.57

Solarization	
△λ (%)	-1.8

Relative Partial Dispersion	
$P_{d,C}$	0.3037
$P_{e,d}$	0.2383
$P_{g,F}$	0.5450
$P'_{d,c'}$	0.2531
$P'_{e,d}$	0.2364
$P'_{g,F'}$	0.4842

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0026
$\triangle P_{g,F}$	-0.0100
$\triangle P_{C,t}$	0.0211
$\triangle P_{C,s}$	0.0075

Thermal Properties	
Tg (℃)	646
Ts (℃)	674
$T_{10}^{14.5}$ (℃)	580
T_{10}^{13} (℃)	625
$\alpha_{-50/80℃}$ (10^{-7}/K)	51
$\alpha_{100/300℃}$ (10^{-7}/K)	67
λ (W/(m·K))	0.94

Mechanical Properties	
HK (10^7Pa)	665
F_A	84
E (GPa)	109.8
G (GPa)	42.0
μ	0.309
σ_b (MPa)	87
B (10^{-12}/Pa)	1.96

Chemical Properties (grade)	
RC (S)	2
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	46
-40/-30	47
-30/-20	49
-20/-10	50
-10/0	51
0/10	52
10/20	52
20/30	53
30/40	54
40/50	54
50/60	55
60/70	55
70/80	56
80/90	56
90/100	57
100/110	58
110/120	58
120/130	59
130/140	60
140/150	61
150/160	62

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.752	0.566
2200	0.915	0.837
2000	0.983	0.966
1800	0.998	0.996
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.994	0.989
400	0.990	0.985
390	0.987	0.977
380	0.981	0.966
370	0.971	0.946
360	0.955	0.910
350	0.924	0.856
340	0.879	0.771
330	0.810	0.654
320	0.707	0.499
310	0.551	0.300
300	0.301	0.089
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	5.0	5.1	5.2	5.3	5.3	5.4	5.8	6.1	6.1	6.5
-40～-20	4.8	5.1	5.3	5.3	5.4	5.5	5.7	5.9	6.0	6.4
-20～0	4.7	5.0	5.3	5.3	5.3	5.4	5.6	5.9	6.0	6.4
0～20	4.7	5.0	5.2	5.2	5.3	5.3	5.6	5.9	6.0	6.4
20～40	4.6	5.0	5.2	5.2	5.3	5.4	5.7	6.0	6.1	6.5
40～60	4.9	5.1	5.3	5.3	5.4	5.6	5.8	6.2	6.3	6.7
60～80	5.0	5.2	5.4	5.5	5.6	5.8	6.0	6.4	6.5	6.9
80～100	5.0	5.3	5.6	5.7	5.8	6.0	6.1	6.5	6.6	7.0
100～120	5.1	5.4	5.8	5.9	6.0	6.1	6.4	6.8	6.9	7.3
120～140	5.1	5.5	5.9	6.0	6.1	6.3	6.6	7.0	7.1	7.5
140～160	5.0	5.4	6.0	6.0	6.1	6.3	6.7	7.2	7.3	7.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/300
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	338/297

Constants of dn/dt		
D_0	D_1	D_2
5.25E-06	1.04E-08	-7.12E-12
E_0	E_1	λ_{TK}
6.31E-07	9.91E-10	6.71E-02

H-LaK7	713539	n_d = 1.71300	υ_d = 53.94	$n_F - n_C$ = 0.013219
		n_e = 1.71615	υ_e = 53.72	$n_{F'} - n_{C'}$ = 0.013332

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.67450
n_{1970}	1970.09	1.68160
n_{1530}	1529.58	1.68930
n_{1129}	1128.64	1.69601
n_{1064}	1064.00	1.69720
n_t	1013.98	1.69818
n_s	852.11	1.70190
$n_{A'}$	768.19	1.70441
n_r	706.52	1.70670
n_C	656.27	1.70898
$n_{C'}$	643.85	1.70962
n_{He-Ne}	632.80	1.71021
n_D	589.29	1.71287
n_d	587.56	1.71300
n_e	546.07	1.71615
n_F	486.13	1.72220
$n_{F'}$	479.99	1.72295
n_g	435.84	1.72943
n_h	404.66	1.73545
n_i	365.01	1.74574

Constants of Dispersion Formula	
A_0	2.87989018E+00
A_1	-1.46958687E-02
A_2	1.89956868E-02
A_3	6.06495285E-04
A_4	-2.91346717E-05
A_5	1.65584289E-06

Density		Solarization	
ρ (g/cm^3)	3.78	△λ (%)	-1.7

Relative Partial Dispersion	
$P_{d,C}$	0.3041
$P_{e,d}$	0.2383
$P_{g,F}$	0.5469
$P'_{d,c'}$	0.2535
$P'_{e,d}$	0.2363
$P'_{g,F'}$	0.4860

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0028
$\triangle P_{g,F}$	-0.0071
$\triangle P_{C,t}$	0.0155
$\triangle P_{C,s}$	0.0057

Thermal Properties	
Tg (℃)	640
Ts (℃)	665
$T_{10}^{14.5}$ (℃)	573
T_{10}^{13} (℃)	619
$\alpha_{-50/80℃}$ (10^{-7}/K)	61
$\alpha_{100/300℃}$ (10^{-7}/K)	77
λ (W/(m·K))	0.77

Mechanical Properties	
HK (10^7Pa)	626
F_A	76
E (GPa)	111.1
G (GPa)	43.2
μ	0.285
σ_b (MPa)	64
B (10^{-12}/Pa)	1.67

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	53
-40/-30	54
-30/-20	56
-20/-10	57
-10/0	57
0/10	58
10/20	61
20/30	62
30/40	62
40/50	63
50/60	64
60/70	64
70/80	65
80/90	65
90/100	66
100/110	67
110/120	67
120/130	68
130/140	69
140/150	70
150/160	71

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.774	0.600
2200	0.924	0.854
2000	0.986	0.972
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.993
420	0.995	0.990
400	0.993	0.984
390	0.990	0.977
380	0.987	0.964
370	0.975	0.939
360	0.950	0.899
350	0.914	0.833
340	0.860	0.738
330	0.785	0.614
320	0.687	0.473
310	0.577	0.334
300	0.464	0.217
290	0.355	0.128
280	0.248	0.063

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.6	3.8	4.0	4.1	4.1	4.2	4.3	4.7	4.7	5.1
-40～-20	3.6	3.8	4.0	4.0	4.1	4.3	4.3	4.8	4.9	5.2
-20～0	3.7	3.9	4.1	4.1	4.1	4.3	4.5	4.8	4.9	5.3
0～20	3.7	3.9	4.1	4.1	4.1	4.4	4.5	5.0	5.1	5.4
20～40	3.7	3.9	4.1	4.1	4.2	4.4	4.6	5.0	5.1	5.5
40～60	3.7	3.9	4.2	4.2	4.2	4.5	4.7	5.1	5.2	5.6
60～80	3.8	4.0	4.3	4.3	4.4	4.7	4.9	5.3	5.3	5.7
80～100	3.9	4.1	4.5	4.5	4.5	4.8	5.0	5.4	5.4	5.8
100～120	4.1	4.3	4.7	4.7	4.8	5.1	5.3	5.4	5.4	6.0
120～140	4.2	4.4	4.8	4.8	4.9	5.3	5.4	5.6	5.6	6.2
140～160	4.3	4.5	5.0	5.0	5.1	5.4	5.6	5.7	5.7	6.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	337/268

Constants of dn/dt		
D_0	D_1	D_2
3.18E-06	1.31E-08	-1.47E-11
E_0	E_1	λ_{TK}
5.57E-07	3.42E-10	1.46E-01

H-LaK8A	720503	n_d = 1.72000	υ_d = 50.34	$n_F - n_C$ = 0.014302
		n_e = 1.72341	υ_e = 50.10	$n_{F'} - n_{C'}$ = 0.014439

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68225
n_{1970}	1970.09	1.68879
n_{1530}	1529.58	1.69593
n_{1129}	1128.64	1.70232
n_{1064}	1064.00	1.70349
n_t	1013.98	1.70446
n_s	852.11	1.70823
$n_{A'}$	768.19	1.71084
n_r	706.52	1.71325
n_C	656.27	1.71568
$n_{C'}$	643.85	1.71636
n_{He-Ne}	632.80	1.71700
n_D	589.29	1.71987
n_d	587.56	1.72000
n_e	546.07	1.72341
n_F	486.13	1.72998
$n_{F'}$	479.99	1.73080
n_g	435.84	1.73785
n_h	404.66	1.74443
n_i	365.01	1.75588

Constants of Dispersion Formula	
A_0	2.89933470E+00
A_1	-1.34878716E-02
A_2	1.90766692E-02
A_3	1.36400166E-03
A_4	-1.50217455E-04
A_5	9.16048470E-06

Density	
ρ (g/cm^3)	3.87

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3021
$P_{e,d}$	0.2384
$P_{g,F}$	0.5503
$P'_{d,c'}$	0.2521
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4883

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0030
$\triangle P_{g,F}$	-0.0097
$\triangle P_{C,t}$	0.0005
$\triangle P_{C,s}$	-0.0003

Thermal Properties	
Tg (℃)	650
Ts (℃)	679
$T_{10}^{14.5}$ (℃)	588
T_{10}^{13} (℃)	616
$\alpha_{-50/80℃}$ (10^{-7}/K)	71
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	0.96

Mechanical Properties	
HK (10^7Pa)	606
F_A	108
E (GPa)	107.5
G (GPa)	40.9
μ	0.313
σ_b (MPa)	76
B (10^{-12}/Pa)	1.73

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	63
-40/-30	66
-30/-20	68
-20/-10	68
-10/0	69
0/10	70
10/20	71
20/30	71
30/40	72
40/50	72
50/60	73
60/70	73
70/80	74
80/90	74
90/100	75
100/110	75
110/120	76
120/130	77
130/140	79
140/150	80
150/160	81

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.828	0.686
2200	0.946	0.895
2000	0.991	0.982
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.994
420	0.995	0.990
400	0.992	0.983
390	0.987	0.974
380	0.979	0.959
370	0.965	0.931
360	0.945	0.880
350	0.900	0.804
340	0.812	0.689
330	0.717	0.530
320	0.581	0.330
310	0.326	0.110
300	0.088	0.008
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.0	2.2	2.4	2.5	2.5	2.6	2.9	3.3	3.3	3.6
-40～-20	1.9	2.2	2.4	2.4	2.5	2.6	2.9	3.3	3.4	3.7
-20～0	1.9	2.2	2.4	2.4	2.5	2.6	3.0	3.3	3.4	3.8
0～20	2.0	2.2	2.5	2.5	2.6	2.7	3.0	3.3	3.4	3.8
20～40	2.0	2.3	2.5	2.5	2.6	2.7	3.0	3.4	3.4	3.9
40～60	2.1	2.4	2.5	2.5	2.6	2.8	3.1	3.5	3.5	4.0
60～80	2.2	2.5	2.6	2.7	2.7	2.9	3.3	3.7	3.7	4.2
80～100	2.2	2.5	2.7	2.7	2.8	3.0	3.4	3.8	3.8	4.3
100～120	2.3	2.7	2.9	2.9	3.0	3.2	3.6	3.9	4.0	4.6
120～140	2.5	2.8	3.0	3.1	3.1	3.4	3.8	4.0	4.1	4.7
140～160	2.6	2.9	3.2	3.3	3.3	3.6	4.0	4.2	4.3	5.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/305
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	345/305

Constants of dn/dt		
D_0	D_1	D_2
1.67E-07	1.21E-08	-1.18E-11
E_0	E_1	λ_{TK}
5.40E-07	3.41E-10	2.06E-01

H-LaK8B	720503	n_d = 1.72000	υ_d = 50.34	$n_F - n_C$ = 0.014302
		n_e = 1.72341	υ_e = 50.10	$n_{F'} - n_{C'}$ = 0.014439

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.70247
n_{1064}	1064.00	1.70360
n_t	1013.98	1.70455
n_s	852.11	1.70826
$n_{A'}$	768.19	1.71086
n_r	706.52	1.71327
n_C	656.27	1.71569
$n_{C'}$	643.85	1.71638
n_{He-Ne}	632.80	1.71701
n_D	589.29	1.71987
n_d	587.56	1.72000
n_e	546.07	1.72341
n_F	486.13	1.73000
$n_{F'}$	479.99	1.73082
n_g	435.84	1.73789
n_h	404.66	1.74450
n_i	365.01	1.75588

Constants of Dispersion Formula	
A_0	2.89634931E+00
A_1	-1.17449806E-02
A_2	2.12156990E-02
A_3	6.32018297E-04
A_4	-3.39053843E-05
A_5	2.46626102E-06

Density	
ρ (g/cm^3)	3.91

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.3014
$P_{e,d}$	0.2384
$P_{g,F}$	0.5517
$P'_{d,c'}$	0.2507
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4896

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0016
$\triangle P_{g,F}$	-0.0083
$\triangle P_{C,t}$	-0.0051
$\triangle P_{C,s}$	-0.0017

Thermal Properties	
Tg (℃)	651
Ts (℃)	680
$T_{10}^{14.5}$ (℃)	589
T_{10}^{13} (℃)	617
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	0.83

Mechanical Properties	
HK (10^7Pa)	606
F_A	156
E (GPa)	103.9
G (GPa)	39.9
μ	0.301
σ_b (MPa)	90
B (10^{-12}/Pa)	1.67

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	66
-40/-30	68
-30/-20	69
-20/-10	70
-10/0	71
0/10	72
10/20	73
20/30	74
30/40	75
40/50	75
50/60	76
60/70	77
70/80	78
80/90	79
90/100	79
100/110	80
110/120	81
120/130	83
130/140	84
140/150	85
150/160	87

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.876	0.768
2200	0.965	0.932
2000	0.986	0.973
1800	0.995	0.990
1600	0.998	0.997
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.997
480	0.998	0.996
460	0.997	0.994
440	0.996	0.992
420	0.994	0.989
400	0.992	0.984
390	0.989	0.978
380	0.984	0.968
370	0.975	0.950
360	0.958	0.919
350	0.931	0.868
340	0.890	0.792
330	0.821	0.674
320	0.724	0.524
310	0.570	0.325
300	0.336	0.113
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.0	1.2	1.5	1.7	1.8	2.0	2.4	2.7	2.7	3.1
-40～-20	1.1	1.3	1.6	1.8	2.0	2.2	2.4	2.8	2.9	3.3
-20～0	1.2	1.3	1.6	1.8	2.0	2.3	2.5	2.8	2.9	3.3
0～20	1.2	1.4	1.6	1.8	2.0	2.3	2.6	2.8	2.9	3.4
20～40	1.2	1.4	1.6	1.8	2.0	2.3	2.7	2.9	3.0	3.4
40～60	1.3	1.4	1.7	2.0	2.2	2.4	2.7	2.9	3.0	3.4
60～80	1.4	1.5	1.7	2.0	2.2	2.5	2.8	3.0	3.1	3.5
80～100	1.5	1.7	1.9	2.1	2.3	2.7	2.9	3.2	3.3	3.7
100～120	1.6	1.7	2.0	2.2	2.4	2.8	3.1	3.3	3.4	3.8
120～140	1.7	1.9	2.2	2.4	2.6	2.9	3.3	3.5	3.6	3.9
140～160	1.7	2.0	2.3	2.5	2.7	3.0	3.3	3.5	3.7	4.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	365/300
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	341/295

Constants of dn/dt		
D_0	D_1	D_2
-1.62E-06	1.34E-08	-1.84E-11
E_0	E_1	λ_{TK}
8.88E-07	4.63E-11	6.23E-09

H-LaK9	699511	n_d = 1.69930	υ_d = 51.11	$n_F - n_C$ = 0.013682
		n_e = 1.70256	υ_e = 50.82	$n_{F'} - n_{C'}$ = 0.013825

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.66716
n_{1970}	1970.09	1.67189
n_{1530}	1529.58	1.67730
n_{1129}	1128.64	1.68265
n_{1064}	1064.00	1.68370
n_t	1013.98	1.68458
n_s	852.11	1.68810
$n_{A'}$	768.19	1.69058
n_r	706.52	1.69288
n_C	656.27	1.69520
$n_{C'}$	643.85	1.69585
n_{He-Ne}	632.80	1.69646
n_D	589.29	1.69918
n_d	587.56	1.69930
n_e	546.07	1.70256
n_F	486.13	1.70888
$n_{F'}$	479.99	1.70967
n_g	435.84	1.71650
n_h	404.66	1.72288
n_i	365.01	1.73368

Relative Partial Dispersion	
$P_{d,C}$	0.2997
$P_{e,d}$	0.2383
$P_{g,F}$	0.5569
$P'_{d,c'}$	0.2495
$P'_{e,d}$	0.2358
$P'_{g,F'}$	0.4940

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	2
D_A	3
R_{OH} (S)	1
RP (S)	3

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.916	0.838
2200	0.969	0.939
2000	0.987	0.974
1800	0.994	0.988
1600	0.998	0.995
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.996	0.992
480	0.994	0.988
460	0.991	0.983
440	0.989	0.978
420	0.987	0.974
400	0.982	0.964
390	0.976	0.953
380	0.966	0.934
370	0.948	0.899
360	0.918	0.842
350	0.868	0.754
340	0.792	0.627
330	0.685	0.469
320	0.540	0.292
310	0.366	0.134
300	0.200	0.040
290		
280		

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0001
$\triangle P_{g,F}$	-0.0018
$\triangle P_{C,t}$	-0.0116
$\triangle P_{C,s}$	-0.0041

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	79
-40/-30	80
-30/-20	81
-20/-10	82
-10/0	83
0/10	85
10/20	85
20/30	87
30/40	88
40/50	88
50/60	90
60/70	91
70/80	91
80/90	91
90/100	93
100/110	94
110/120	94
120/130	96
130/140	96
140/150	96
150/160	98

Thermal Properties	
Tg (℃)	654
Ts (℃)	695
$T_{10}^{14.5}$ (℃)	618
T_{10}^{13} (℃)	645
$\alpha_{-50/80℃}$ (10^{-7}/K)	85
$\alpha_{100/300℃}$ (10^{-7}/K)	95
λ (W/(m·K))	0.66

Mechanical Properties	
HK (10^7Pa)	511
F_A	253
E (GPa)	84.5
G (GPa)	32.3
μ	0.309
σ_b (MPa)	81
B (10^{-12}/Pa)	1.37

Constants of Dispersion Formula	
A_0	2.82518848E+00
A_1	-9.25237822E-03
A_2	2.31572298E-02
A_3	-5.65059188E-04
A_4	1.62553405E-04
A_5	-9.14469356E-06

Density	
ρ (g/cm^3)	4.26

Solarization	
△λ (%)	-0.4

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-2.7	-2.5	-2.3	-2.3	-2.2	-2.0	-1.7	-1.6	-1.6	-1.4
-40～-20	-2.7	-2.5	-2.2	-2.1	-2.0	-1.8	-1.7	-1.5	-1.5	-1.4
-20～0	-2.6	-2.4	-2.0	-2.0	-1.9	-1.7	-1.5	-1.4	-1.3	-1.2
0～20	-2.5	-2.3	-1.8	-1.8	-1.8	-1.5	-1.4	-1.3	-1.2	-1.0
20～40	-2.5	-2.2	-1.7	-1.7	-1.6	-1.5	-1.4	-1.3	-1.1	-0.9
40～60	-2.5	-2.2	-1.7	-1.6	-1.6	-1.4	-1.3	-1.1	-1.0	-0.8
60～80	-2.4	-2.1	-1.5	-1.5	-1.4	-1.2	-1.1	-0.9	-0.8	-0.6
80～100	-2.3	-1.8	-1.4	-1.4	-1.4	-1.0	-1.0	-0.8	-0.7	-0.4
100～120	-2.3	-1.8	-1.2	-1.2	-1.2	-1.0	-0.9	-0.6	-0.6	-0.4
120～140	-2.1	-1.7	-1.2	-1.2	-1.2	-0.8	-0.8	-0.7	-0.5	-0.1
140～160	-2.1	-1.6	-1.1	-1.1	-1.0	-0.7	-0.5	-0.3	-0.2	0.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/310
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	355/304

Constants of dn/dt		
D_0	D_1	D_2
-7.86E-06	1.43E-08	-2.55E-11
E_0	E_1	λ_{TK}
6.68E-07	5.75E-10	2.86E-16

H-LaK10	651559	n_d = 1.65113	υ_d = 55.89	$n_F - n_C$ = 0.011650
		n_e = 1.65391	υ_e = 55.62	$n_{F'} - n_{C'}$ = 0.011757

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.61921
n_{1970}	1970.09	1.62487
n_{1530}	1529.58	1.63105
n_{1129}	1128.64	1.63650
n_{1064}	1064.00	1.63749
n_t	1013.98	1.63830
n_s	852.11	1.64144
$n_{A'}$	768.19	1.64361
n_r	706.52	1.64560
n_C	656.27	1.64760
$n_{C'}$	643.85	1.64816
n_{He-Ne}	632.80	1.64869
n_D	589.29	1.65103
n_d	587.56	1.65113
n_e	546.07	1.65391
n_F	486.13	1.65925
$n_{F'}$	479.99	1.65992
n_g	435.84	1.66558
n_h	404.66	1.67083
n_i	365.01	1.67985

Constants of Dispersion Formula	
A_0	2.68014719E+00
A_1	-1.13022222E-02
A_2	1.49971961E-02
A_3	1.08435000E-03
A_4	-1.25822106E-04
A_5	7.18648482E-06

Density	
ρ (g/cm^3)	3.72

Solarization	
△λ (%)	-4.0

Relative Partial Dispersion	
$P_{d,C}$	0.3030
$P_{e,d}$	0.2386
$P_{g,F}$	0.5433
$P'_{d,c'}$	0.2526
$P'_{e,d}$	0.2365
$P'_{g,F'}$	0.4814

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0010
$\triangle P_{g,F}$	-0.0074
$\triangle P_{C,t}$	-0.0127
$\triangle P_{C,s}$	-0.0058

Thermal Properties	
Tg (℃)	656
Ts (℃)	687
$T_{10}^{14.5}$ (℃)	589
T_{10}^{13} (℃)	629
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	0.80

Mechanical Properties	
HK (10^7Pa)	552
F_A	170
E (GPa)	90.3
G (GPa)	34.4
μ	0.311
σ_b (MPa)	54
B (10^{-12}/Pa)	1.90

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	59
-40/-30	61
-30/-20	62
-20/-10	63
-10/0	63
0/10	64
10/20	65
20/30	65
30/40	66
40/50	67
50/60	68
60/70	68
70/80	69
80/90	69
90/100	70
100/110	71
110/120	72
120/130	73
130/140	74
140/150	75
150/160	76

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.891	0.794
2200	0.966	0.933
2000	0.990	0.980
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.995
420	0.996	0.992
400	0.994	0.989
390	0.991	0.985
380	0.988	0.979
370	0.982	0.968
360	0.971	0.945
350	0.952	0.910
340	0.920	0.849
330	0.867	0.756
320	0.790	0.628
310	0.684	0.469
300	0.551	0.305
290	0.401	0.163
280	0.249	0.064

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.5	2.8	2.9	3.0	3.0	3.1	3.3	3.5	3.6	4.0
-40～-20	2.5	2.7	2.8	2.9	2.9	3.1	3.3	3.5	3.6	4.0
-20～0	2.5	2.8	2.9	2.9	2.9	3.1	3.3	3.5	3.6	4.0
0～20	2.5	2.8	3.0	3.0	3.0	3.1	3.3	3.5	3.6	4.1
20～40	2.5	2.8	3.0	3.0	3.0	3.1	3.3	3.5	3.6	4.1
40～60	2.6	2.8	3.0	3.0	3.0	3.1	3.4	3.6	3.7	4.2
60～80	2.6	2.9	3.1	3.1	3.1	3.2	3.6	3.8	3.9	4.4
80～100	2.7	3.0	3.2	3.2	3.3	3.4	3.7	3.9	4.0	4.6
100～120	2.8	3.1	3.2	3.2	3.3	3.5	3.8	4.1	4.2	4.8
120～140	2.9	3.2	3.3	3.3	3.4	3.6	3.9	4.2	4.3	4.9
140～160	3.0	3.3	3.4	3.4	3.5	3.7	4.0	4.3	4.4	5.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	329/275

Constants of dn/dt		
D_0	D_1	D_2
1.69E-06	1.16E-08	-1.39E-11
E_0	E_1	λ_{TK}
3.41E-07	4.23E-10	2.78E-01

H-LaK11	651562	n_d = 1.65100	υ_d = 56.24	$n_F - n_C$ = 0.011576
		n_e = 1.65376	υ_e = 56.02	$n_{F'} - n_{C'}$ = 0.011670

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	
n_{1064}	1064.00	1.63688
n_t	1013.98	1.63776
n_s	852.11	1.64113
$n_{A'}$	768.19	1.64340
n_r	706.52	1.64543
n_C	656.27	1.64747
$n_{C'}$	643.85	1.64803
n_{He-Ne}	632.80	1.64856
n_D	589.29	1.65089
n_d	587.56	1.65100
n_e	546.07	1.65376
n_F	486.13	1.65905
$n_{F'}$	479.99	1.65970
n_g	435.84	1.66534
n_h	404.66	1.67056
n_i	365.01	1.67944

Constants of Dispersion Formula	
A_0	2.67752226E+00
A_1	-1.24341775E-02
A_2	1.81020008E-02
A_3	-1.38622158E-04
A_4	6.22866969E-05
A_5	-3.07013984E-06

Density	
ρ (g/cm^3)	3.34

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.3049
$P_{e,d}$	0.2384
$P_{g,F}$	0.5434
$P'_{d,c'}$	0.2545
$P'_{e,d}$	0.2365
$P'_{g,F'}$	0.4833

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0022
$\triangle P_{g,F}$	-0.0068
$\triangle P_{C,t}$	0.0262
$\triangle P_{C,s}$	0.0123

Thermal Properties	
Tg (℃)	689
Ts (℃)	723
$T_{10}^{14.5}$ (℃)	646
T_{10}^{13} (℃)	679
$\alpha_{-50/80℃}$ (10^{-7}/K)	40
$\alpha_{100/300℃}$ (10^{-7}/K)	56
λ (W/(m·K))	1.00

Mechanical Properties	
HK (10^7Pa)	680
F_A	75
E (GPa)	104.6
G (GPa)	40.4
μ	0.296
σ_b (MPa)	121
B (10^{-12}/Pa)	2.27

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	32
-40/-30	34
-30/-20	36
-20/-10	36
-10/0	36
0/10	37
10/20	39
20/30	40
30/40	41
40/50	41
50/60	42
60/70	42
70/80	42
80/90	43
90/100	45
100/110	46
110/120	48
120/130	49
130/140	51
140/150	52
150/160	54

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.789	0.623
2200	0.933	0.871
2000	0.980	0.961
1800	0.993	0.985
1600	0.997	0.994
1400	0.995	0.991
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.997
440	0.998	0.996
420	0.997	0.993
400	0.993	0.987
390	0.989	0.978
380	0.983	0.967
370	0.973	0.947
360	0.956	0.913
350	0.926	0.858
340	0.883	0.781
330	0.817	0.667
320	0.732	0.536
310	0.627	0.393
300	0.508	0.258
290	0.383	0.146
280	0.265	0.070

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.3	4.5	4.6	4.7	4.9	5.1	5.5	5.7	5.8	6.2
-40～-20	4.3	4.5	4.7	4.8	4.9	5.3	5.5	5.7	5.8	6.2
-20～0	4.3	4.5	4.7	4.9	4.9	5.4	5.6	5.8	5.8	6.3
0～20	4.3	4.6	4.8	4.9	5.1	5.5	5.6	5.9	5.9	6.4
20～40	4.4	4.6	4.9	5.0	5.2	5.5	5.6	6.0	6.0	6.5
40～60	4.4	4.8	4.9	5.0	5.2	5.6	5.8	6.0	6.2	6.7
60～80	4.5	4.9	5.1	5.2	5.3	5.8	5.9	6.1	6.2	6.9
80～100	4.5	5.0	5.1	5.3	5.5	5.9	5.9	6.2	6.3	7.0
100～120	4.5	5.0	5.2	5.4	5.6	6.0	6.1	6.3	6.4	7.2
120～140	4.6	5.1	5.3	5.5	5.7	6.1	6.2	6.4	6.4	7.3
140～160	4.6	5.2	5.4	5.5	5.7	6.1	6.2	6.5	6.6	7.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	342/277

Constants of dn/dt		
D_0	D_1	D_2
4.70E-06	1.30E-08	-2.38E-11
E_0	E_1	λ_{TK}
8.51E-07	6.66E-10	4.15E-14

H-LaK12	697562	n_d = 1.69680	υ_d = 56.19	$n_F - n_C$ = 0.012400
		n_e = 1.69975	υ_e = 55.98	$n_{F'} - n_{C'}$ = 0.012500

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65825
n_{1970}	1970.09	1.66578
n_{1530}	1529.58	1.67381
n_{1129}	1128.64	1.68059
n_{1064}	1064.00	1.68176
n_t	1013.98	1.68271
n_s	852.11	1.68629
$n_{A'}$	768.19	1.68869
n_r	706.52	1.69087
n_C	656.27	1.69301
$n_{C'}$	643.85	1.69361
n_{He-Ne}	632.80	1.69418
n_D	589.29	1.69668
n_d	587.56	1.69680
n_e	546.07	1.69975
n_F	486.13	1.70541
$n_{F'}$	479.99	1.70611
n_g	435.84	1.71210
n_h	404.66	1.71764
n_i	365.01	1.72713

Constants of Dispersion Formula	
A_0	2.83112539E+00
A_1	-1.55847682E-02
A_2	1.58070931E-02
A_3	1.24470183E-03
A_4	-1.41192909E-04
A_5	7.83660883E-06

Density	
ρ (g/cm^3)	3.71

Solarization	
△λ (%)	-2.0

Relative Partial Dispersion	
$P_{d,C}$	0.3056
$P_{e,d}$	0.2379
$P_{g,F}$	0.5395
$P'_{d,c'}$	0.2552
$P'_{e,d}$	0.2360
$P'_{g,F'}$	0.4792

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0027
$\triangle P_{g,F}$	-0.0108
$\triangle P_{C,t}$	0.0182
$\triangle P_{C,s}$	0.0067

Thermal Properties	
Tg (℃)	673
Ts (℃)	696
$T_{10}^{14.5}$ (℃)	611
T_{10}^{13} (℃)	638
$\alpha_{-50/80℃}$ (10^{-7}/K)	56
$\alpha_{100/300℃}$ (10^{-7}/K)	72
λ (W/(m·K))	1.07

Mechanical Properties	
HK (10^7Pa)	616
F_A	79
E (GPa)	112.9
G (GPa)	43.2
μ	0.307
σ_b (MPa)	73
B (10^{-12}/Pa)	1.59

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	53
-40/-30	55
-30/-20	57
-20/-10	58
-10/0	58
0/10	59
10/20	59
20/30	60
30/40	60
40/50	60
50/60	61
60/70	61
70/80	61
80/90	62
90/100	62
100/110	63
110/120	64
120/130	65
130/140	66
140/150	67
150/160	67

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.795	0.614
2200	0.953	0.898
2000	0.988	0.969
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.994
420	0.999	0.989
400	0.999	0.984
390	0.997	0.978
380	0.992	0.967
370	0.983	0.948
360	0.968	0.918
350	0.942	0.858
340	0.907	0.792
330	0.856	0.699
320	0.785	0.581
310	0.688	0.442
300	0.564	0.289
290	0.401	0.144
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.5	1.5	1.6	1.6	1.7	1.8	2.0	2.2	2.2	2.3
-40～-20	1.6	1.6	1.7	1.7	1.8	1.9	2.1	2.4	2.4	2.6
-20～0	1.7	1.8	2.0	2.0	2.1	2.2	2.3	2.6	2.7	3.3
0～20	1.8	2.0	2.2	2.2	2.3	2.4	2.6	2.7	2.8	3.4
20～40	2.0	2.2	2.4	2.4	2.5	2.6	2.8	3.0	3.1	3.5
40～60	2.1	2.3	2.5	2.5	2.6	2.8	2.9	3.1	3.2	3.6
60～80	2.1	2.3	2.5	2.4	2.5	2.8	3.0	3.2	3.3	3.8
80～100	2.1	2.4	2.6	2.6	2.7	2.9	3.1	3.4	3.5	3.9
100～120	2.1	2.6	2.8	2.8	2.9	3.1	3.3	3.5	3.6	4.0
120～140	2.2	2.7	2.8	2.8	2.9	3.1	3.3	3.5	3.6	4.3
140～160	2.4	2.8	3.0	3.0	3.1	3.2	3.5	3.7	3.8	4.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	334/268

Constants of dn/dt		
D_0	D_1	D_2
1.91E-07	1.65E-08	-3.83E-11
E_0	E_1	λ_{TK}
3.84E-07	4.87E-10	2.27E-01

H-LaK50A	652584	n_d = 1.65160	υ_d = 58.40	$n_F - n_C$ = 0.011157
		n_e = 1.65426	υ_e = 58.15	$n_{F'} - n_{C'}$ = 0.011251

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.61677
n_{1970}	1970.09	1.62349
n_{1530}	1529.58	1.63071
n_{1129}	1128.64	1.63688
n_{1064}	1064.00	1.63795
n_t	1013.98	1.63882
n_s	852.11	1.64210
$n_{A'}$	768.19	1.64428
n_r	706.52	1.64625
n_C	656.27	1.64820
$n_{C'}$	643.85	1.64874
n_{He-Ne}	632.80	1.64924
n_D	589.29	1.65150
n_d	587.56	1.65160
n_e	546.07	1.65426
n_F	486.13	1.65935
$n_{F'}$	479.99	1.65999
n_g	435.84	1.66541
n_h	404.66	1.67043
n_i	365.01	1.67894

Relative Partial Dispersion	
$P_{d,C}$	0.3047
$P_{e,d}$	0.2384
$P_{g,F}$	0.5432
$P'_{d,c'}$	0.2542
$P'_{e,d}$	0.2364
$P'_{g,F'}$	0.4817

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0017
$\triangle P_{g,F}$	-0.0034
$\triangle P_{C,t}$	0.0176
$\triangle P_{C,s}$	0.0062

Thermal Properties	
Tg (℃)	619
Ts (℃)	652
$T_{10}^{14.5}$ (℃)	570
T_{10}^{13} (℃)	615
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	77
λ (W/(m·K))	0.95

Mechanical Properties	
HK (10^7Pa)	594
F_A	105
E (GPa)	102.9
G (GPa)	39.5
μ	0.302
σ_b (MPa)	76
B (10^{-12}/Pa)	1.85

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	3
D_A	4
R_{OH} (S)	1
RP (S)	3

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	57
-40/-30	59
-30/-20	60
-20/-10	61
-10/0	62
0/10	63
10/20	64
20/30	64
30/40	65
40/50	65
50/60	66
60/70	66
70/80	67
80/90	68
90/100	68
100/110	69
110/120	70
120/130	71
130/140	73
140/150	74
150/160	75

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.840	0.706
2200	0.954	0.910
2000	0.991	0.982
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.996
460	0.995	0.994
440	0.993	0.992
420	0.991	0.990
400	0.989	0.988
390	0.986	0.985
380	0.982	0.979
370	0.974	0.968
360	0.969	0.949
350	0.948	0.916
340	0.920	0.863
330	0.881	0.783
320	0.816	0.672
310	0.725	0.531
300	0.607	0.377
290	0.482	0.241
280	0.357	0.136

Constants of Dispersion Formula	
A_0	2.68404972E+00
A_1	-1.34999767E-02
A_2	1.56364220E-02
A_3	3.91605064E-04
A_4	-8.87810681E-06
A_5	2.90663584E-07

Density	
ρ (g/cm^3)	3.48

Solarization	
△λ (%)	-2.6

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.7	2.9	3.1	3.2	3.2	3.3	3.4	3.6	3.6	4.0
-40～-20	2.7	2.9	3.2	3.3	3.3	3.3	3.5	3.7	3.7	4.1
-20～0	2.8	3.0	3.3	3.3	3.3	3.3	3.6	3.7	3.8	4.2
0～20	2.8	3.0	3.3	3.3	3.3	3.3	3.6	3.8	3.9	4.2
20～40	2.9	3.1	3.3	3.3	3.3	3.4	3.6	3.9	4.0	4.3
40～60	3.0	3.2	3.3	3.4	3.4	3.5	3.8	4.0	4.1	4.4
60～80	3.0	3.3	3.4	3.5	3.5	3.7	3.8	4.1	4.2	4.5
80～100	3.0	3.3	3.5	3.6	3.6	3.8	3.9	4.2	4.3	4.6
100～120	3.2	3.4	3.6	3.6	3.6	3.9	4.0	4.3	4.4	4.8
120～140	3.2	3.4	3.6	3.7	3.7	4.0	4.1	4.4	4.5	5.0
140～160	3.2	3.5	3.7	3.7	3.8	4.1	4.2	4.5	4.6	5.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	332/270

Constants of dn/dt		
D_0	D_1	D_2
2.25E-06	1.25E-08	-2.25E-11
E_0	E_1	λ_{TK}
4.23E-07	5.63E-10	1.91E-01

H-LaK51	697555	n_d = 1.69680	υ_d = 55.46	$n_F - n_C$ = 0.012564
		n_e = 1.69980	υ_e = 55.25	$n_{F'} - n_{C'}$ = 0.012667

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65840
n_{1970}	1970.09	1.66575
n_{1530}	1529.58	1.67368
n_{1129}	1128.64	1.68042
n_{1064}	1064.00	1.68159
n_t	1013.98	1.68254
n_s	852.11	1.68616
$n_{A'}$	768.19	1.68859
n_r	706.52	1.69079
n_C	656.27	1.69297
$n_{C'}$	643.85	1.69358
n_{He-Ne}	632.80	1.69415
n_D	589.29	1.69669
n_d	587.56	1.69680
n_e	546.07	1.69980
n_F	486.13	1.70553
$n_{F'}$	479.99	1.70625
n_g	435.84	1.71234
n_h	404.66	1.71800
n_i	365.01	1.72765

Constants of Dispersion Formula	
A_0	2.82930828E+00
A_1	-1.51991877E-02
A_2	1.69710302E-02
A_3	9.14047795E-04
A_4	-8.69746514E-05
A_5	4.85293775E-06

Density	
ρ (g/cm^3)	3.69

Solarization	
△λ (%)	-3.7

Relative Partial Dispersion	
$P_{d,C}$	0.3048
$P_{e,d}$	0.2388
$P_{g,F}$	0.5420
$P'_{d,c'}$	0.2542
$P'_{e,d}$	0.2368
$P'_{g,F'}$	0.4808

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0035
$\triangle P_{g,F}$	-0.0095
$\triangle P_{C,t}$	0.0213
$\triangle P_{C,s}$	0.0085

Thermal Properties	
Tg (℃)	650
Ts (℃)	676
$T_{10}^{14.5}$ (℃)	591
T_{10}^{13} (℃)	625
$\alpha_{-50/80℃}$ (10^{-7}/K)	55
$\alpha_{100/300℃}$ (10^{-7}/K)	71
λ (W/(m·K))	0.62

Mechanical Properties	
HK (10^7Pa)	680
F_A	85
E (GPa)	110.2
G (GPa)	43.9
μ	0.255
σ_b (MPa)	64
B (10^{-12}/Pa)	1.70

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	53
-30/-20	54
-20/-10	55
-10/0	56
0/10	56
10/20	57
20/30	57
30/40	58
40/50	58
50/60	58
60/70	59
70/80	59
80/90	59
90/100	60
100/110	61
110/120	61
120/130	62
130/140	63
140/150	64
150/160	65

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.757	0.575
2200	0.923	0.846
2000	0.986	0.960
1800	0.999	0.993
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.993
400	0.992	0.987
390	0.990	0.980
380	0.985	0.971
370	0.975	0.951
360	0.957	0.918
350	0.928	0.862
340	0.885	0.787
330	0.827	0.683
320	0.748	0.561
310	0.643	0.417
300	0.553	0.308
290	0.451	0.206
280	0.328	0.110

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.9	4.1	4.2	4.3	4.4	4.5	4.7	5.0	5.0	5.4
-40～-20	3.9	4.2	4.3	4.3	4.4	4.5	4.7	5.1	5.1	5.4
-20～0	3.9	4.2	4.3	4.3	4.4	4.5	4.7	5.1	5.2	5.4
0～20	3.9	4.2	4.3	4.3	4.4	4.5	4.7	5.1	5.2	5.4
20～40	3.9	4.2	4.4	4.4	4.5	4.5	4.7	5.2	5.3	5.5
40～60	4.1	4.4	4.5	4.6	4.7	4.7	4.9	5.4	5.4	5.8
60～80	4.1	4.4	4.6	4.7	4.6	4.9	5.0	5.5	5.5	5.9
80～100	4.2	4.4	4.7	4.8	4.8	5.0	5.0	5.5	5.5	6.0
100～120	4.2	4.5	4.7	4.8	4.8	5.0	5.1	5.5	5.6	6.0
120～140	4.2	4.5	4.8	4.8	4.8	5.1	5.1	5.5	5.6	6.1
140～160	4.3	4.4	4.8	4.9	4.9	5.1	5.1	5.6	5.6	6.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	342/277

Constants of dn/dt		
D_0	D_1	D_2
4.02E-06	1.29E-08	-2.62E-11
E_0	E_1	λ_{TK}
4.49E-07	2.06E-10	2.05E-01

H-LaK51A	697555	n_d = 1.69680	υ_d = 55.46	$n_F - n_C$ = 0.012564
		n_e = 1.69980	υ_e = 55.25	$n_{F'} - n_{C'}$ = 0.012667

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	
n_{1064}	1064.00	1.68155
n_t	1013.98	1.68252
n_s	852.11	1.68615
$n_{A'}$	768.19	1.68860
n_r	706.52	1.69080
n_C	656.27	1.69297
$n_{C'}$	643.85	1.69358
n_{He-Ne}	632.80	1.69417
n_D	589.29	1.69670
n_d	587.56	1.69680
n_e	546.07	1.69980
n_F	486.13	1.70553
$n_{F'}$	479.99	1.70625
n_g	435.84	1.71234
n_h	404.66	1.71799
n_i	365.01	1.72764

Constants of Dispersion Formula	
A_0	2.82835724E+00
A_1	-1.49967196E-02
A_2	1.78960905E-02
A_3	5.80447845E-04
A_4	-3.68202672E-05
A_5	2.18285424E-06

Density	
ρ (g/cm^3)	3.65

Solarization	
△λ (%)	-3.5

Relative Partial Dispersion	
$P_{d,C}$	0.3048
$P_{e,d}$	0.2388
$P_{g,F}$	0.5420
$P'_{d,c'}$	0.2542
$P'_{e,d}$	0.2368
$P'_{g,F'}$	0.4808

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0035
$\triangle P_{g,F}$	-0.0095
$\triangle P_{C,t}$	0.0229
$\triangle P_{C,s}$	0.0093

Thermal Properties	
Tg (℃)	648
Ts (℃)	675
$T_{10}^{14.5}$ (℃)	589
T_{10}^{13} (℃)	624
$\alpha_{-50/80℃}$ (10^{-7}/K)	58
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	0.92

Mechanical Properties	
HK (10^7Pa)	608
F_A	119
E (GPa)	111.4
G (GPa)	43.3
μ	0.288
σ_b (MPa)	107
B (10^{-12}/Pa)	1.75

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	51
-40/-30	52
-30/-20	53
-20/-10	55
-10/0	56
0/10	57
10/20	58
20/30	59
30/40	60
40/50	61
50/60	62
60/70	63
70/80	64
80/90	64
90/100	65
100/110	66
110/120	67
120/130	68
130/140	70
140/150	71
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.742	0.550
2200	0.904	0.817
2000	0.980	0.960
1800	0.997	0.994
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.997
460	0.997	0.995
440	0.996	0.993
420	0.995	0.990
400	0.993	0.986
390	0.990	0.981
380	0.986	0.973
370	0.979	0.959
360	0.966	0.933
350	0.946	0.895
340	0.915	0.838
330	0.872	0.760
320	0.812	0.659
310	0.735	0.540
300	0.643	0.413
290	0.537	0.288
280	0.405	0.164

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.6	2.0	2.1	2.2	2.4	2.6	3.0	3.1	3.2	3.5
-40～-20	1.6	2.0	2.2	2.3	2.4	2.7	3.0	3.1	3.2	3.6
-20～0	1.6	2.2	2.3	2.3	2.4	2.8	3.2	3.3	3.3	3.8
0～20	1.7	2.3	2.4	2.5	2.5	2.9	3.2	3.3	3.3	4.0
20～40	1.7	2.3	2.5	2.6	2.7	3.1	3.3	3.4	3.4	4.2
40～60	1.8	2.4	2.7	2.7	2.8	3.1	3.4	3.5	3.5	4.3
60～80	1.8	2.4	2.8	2.8	2.9	3.3	3.6	3.7	3.8	4.6
80～100	2.0	2.6	3.0	3.1	3.2	3.4	3.8	3.9	3.9	4.8
100～120	2.1	2.7	3.2	3.2	3.2	3.4	4.0	4.1	4.1	4.9
120～140	2.1	2.8	3.2	3.2	3.2	3.5	4.0	4.2	4.3	5.1
140～160	2.2	2.9	3.3	3.4	3.4	3.6	4.2	4.4	4.4	5.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	335/273

Constants of dn/dt		
D_0	D_1	D_2
-2.78E-07	1.33E-08	-2.35E-11
E_0	E_1	λ_{TK}
8.64E-07	8.98E-10	4.82E-15

H-LaK52	729547	n_d = 1.72916	υ_d = 54.67	$n_F - n_C$ = 0.013337
		n_e = 1.73234	υ_e = 54.44	$n_{F'} - n_{C'}$ = 0.013451

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68934
n_{1970}	1970.09	1.69681
n_{1530}	1529.58	1.70490
n_{1129}	1128.64	1.71188
n_{1064}	1064.00	1.71310
n_t	1013.98	1.71409
n_s	852.11	1.71790
$n_{A'}$	768.19	1.72047
n_r	706.52	1.72279
n_C	656.27	1.72510
$n_{C'}$	643.85	1.72575
n_{He-Ne}	632.80	1.72635
n_D	589.29	1.72904
n_d	587.56	1.72916
n_e	546.07	1.73234
n_F	486.13	1.73844
$n_{F'}$	479.99	1.73920
n_g	435.84	1.74571
n_h	404.66	1.75176
n_i	365.01	1.76205

Constants of Dispersion Formula	
A_0	2.93497096E+00
A_1	-1.56596537E-02
A_2	1.92100308E-02
A_3	6.55992008E-04
A_4	-3.57893356E-05
A_5	1.86989357E-06

Density	
ρ (g/cm^3)	3.98

Solarization	
△λ (%)	-2.6

Relative Partial Dispersion	
$P_{d,C}$	0.3044
$P_{e,d}$	0.2384
$P_{g,F}$	0.5451
$P'_{d,c'}$	0.2535
$P'_{e,d}$	0.2364
$P'_{g,F'}$	0.4840

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0026
$\triangle P_{g,F}$	-0.0077
$\triangle P_{C,t}$	0.0205
$\triangle P_{C,s}$	0.0082

Thermal Properties	
Tg (℃)	688
Ts (℃)	705
$T_{10}^{14.5}$ (℃)	620
T_{10}^{13} (℃)	645
$\alpha_{-50/80℃}$ (10^{-7}/K)	61
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	1.01

Mechanical Properties	
HK (10^7Pa)	720
F_A	63
E (GPa)	117.8
G (GPa)	45.3
μ	0.301
σ_b (MPa)	91
B (10^{-12}/Pa)	1.35

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	54
-40/-30	56
-30/-20	57
-20/-10	58
-10/0	58
0/10	59
10/20	59
20/30	59
30/40	60
40/50	61
50/60	61
60/70	62
70/80	62
80/90	63
90/100	64
100/110	65
110/120	66
120/130	67
130/140	68
140/150	69
150/160	70

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.769	0.591
2200	0.926	0.857
2000	0.978	0.956
1800	0.994	0.988
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.997	0.995
420	0.996	0.992
400	0.994	0.988
390	0.991	0.982
380	0.986	0.973
370	0.978	0.957
360	0.969	0.938
350	0.948	0.898
340	0.918	0.842
330	0.873	0.763
320	0.818	0.669
310	0.732	0.536
300	0.670	0.449
290	0.583	0.340
280	0.428	0.183

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.6	3.1	3.2	3.2	3.2	3.3	3.5	3.7	3.7	4.2
-40～-20	2.7	3.1	3.2	3.2	3.2	3.2	3.5	3.7	3.8	4.3
-20～0	2.7	3.1	3.2	3.2	3.2	3.3	3.6	3.8	3.9	4.3
0～20	2.8	3.2	3.2	3.2	3.3	3.5	3.5	4.0	4.0	4.4
20～40	2.8	3.2	3.3	3.3	3.3	3.5	3.6	4.0	4.1	4.5
40～60	2.8	3.2	3.3	3.3	3.4	3.5	3.6	4.1	4.1	4.5
60～80	2.9	3.2	3.4	3.4	3.5	3.6	3.8	4.2	4.2	4.7
80～100	2.9	3.3	3.6	3.6	3.7	3.7	3.9	4.3	4.3	4.9
100～120	2.9	3.3	3.7	3.7	3.8	3.8	4.0	4.4	4.4	5.2
120～140	2.9	3.4	3.7	3.7	3.8	4.0	4.2	4.5	4.6	5.4
140～160	3.0	3.5	3.8	3.8	3.9	4.2	4.3	4.7	4.8	5.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	335/275

Constants of dn/dt		
D_0	D_1	D_2
1.80E-06	1.11E-08	-1.88E-11
E_0	E_1	λ_{TK}
4.02E-07	6.22E-10	2.23E-01

H-LaK53A	755523	n_d = 1.75500	υ_d = 52.32	$n_F - n_C$ = 0.014430
		n_e = 1.75844	υ_e = 52.09	$n_{F'} - n_{C'}$ = 0.014561

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.71389
n_{1970}	1970.09	1.72137
n_{1530}	1529.58	1.72950
n_{1129}	1128.64	1.73661
n_{1064}	1064.00	1.73789
n_t	1013.98	1.73893
n_s	852.11	1.74293
$n_{A'}$	768.19	1.74566
n_r	706.52	1.74815
n_C	656.27	1.75063
$n_{C'}$	643.85	1.75132
n_{He-Ne}	632.80	1.75197
n_D	589.29	1.75487
n_d	587.56	1.75500
n_e	546.07	1.75844
n_F	486.13	1.76506
$n_{F'}$	479.99	1.76588
n_g	435.84	1.77295
n_h	404.66	1.77953
n_i	365.01	1.79081

Constants of Dispersion Formula	
A_0	3.01906956E+00
A_1	-1.58184620E-02
A_2	2.09047144E-02
A_3	8.46561491E-04
A_4	-6.18209745E-05
A_5	3.65072914E-06

Density	
ρ (g/cm^3)	4.24

Solarization	
△λ (%)	-3.2

Relative Partial Dispersion	
$P_{d,C}$	0.3028
$P_{e,d}$	0.2384
$P_{g,F}$	0.5468
$P'_{d,c'}$	0.2527
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4855

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0026
$\triangle P_{g,F}$	-0.0099
$\triangle P_{C,t}$	0.0172
$\triangle P_{C,s}$	0.0076

Thermal Properties	
Tg (℃)	695
Ts (℃)	712
$T_{10}^{14.5}$ (℃)	631
T_{10}^{13} (℃)	652
$\alpha_{-50/80℃}$ (10^{-7}/K)	57
$\alpha_{100/300℃}$ (10^{-7}/K)	72
λ (W/(m·K))	1.06

Mechanical Properties	
HK (10^7Pa)	718
F_A	58
E (GPa)	121.8
G (GPa)	46.4
μ	0.313
σ_b (MPa)	102
B (10^{-12}/Pa)	1.36

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	53
-40/-30	54
-30/-20	55
-20/-10	56
-10/0	57
0/10	58
10/20	59
20/30	59
30/40	59
40/50	60
50/60	60
60/70	60
70/80	61
80/90	61
90/100	62
100/110	63
110/120	63
120/130	64
130/140	65
140/150	66
150/160	67

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.778	0.605
2200	0.934	0.872
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.997	0.994
420	0.995	0.989
400	0.992	0.984
390	0.989	0.978
380	0.984	0.968
370	0.975	0.950
360	0.957	0.918
350	0.934	0.873
340	0.897	0.805
330	0.846	0.715
320	0.779	0.607
310	0.672	0.450
300	0.606	0.367
290	0.515	0.266
280	0.354	0.129

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.3	3.5	3.7	3.7	3.7	4.0	4.2	4.6	4.7	4.9
-40～-20	3.4	3.5	3.7	3.7	3.8	4.0	4.2	4.6	4.7	5.0
-20～0	3.4	3.6	3.8	3.8	3.8	4.1	4.3	4.7	4.8	5.0
0～20	3.4	3.6	3.9	3.9	3.9	4.2	4.3	4.7	4.8	5.1
20～40	3.5	3.7	3.9	3.9	3.9	4.2	4.4	4.8	4.9	5.1
40～60	3.5	3.8	4.0	4.0	4.0	4.2	4.5	5.0	5.0	5.3
60～80	3.5	3.9	4.1	4.1	4.1	4.3	4.5	5.0	5.0	5.5
80～100	3.6	3.9	4.2	4.2	4.2	4.4	4.5	5.1	5.1	5.6
100～120	3.7	4.1	4.3	4.3	4.3	4.5	4.6	5.2	5.2	5.7
120～140	3.7	4.2	4.3	4.3	4.4	4.6	4.7	5.4	5.4	5.8
140～160	3.9	4.3	4.3	4.4	4.6	4.6	4.9	5.5	5.5	5.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	340/276

Constants of dn/dt		
D_0	D_1	D_2
2.70E-06	1.23E-08	-2.14E-11
E_0	E_1	λ_{TK}
4.31E-07	2.47E-10	2.29E-01

H-LaK53B	755523	n_d = 1.75500	υ_d = 52.32	$n_F - n_C$ = 0.014430
		n_e = 1.75844	υ_e = 52.09	$n_{F'} - n_{C'}$ = 0.014561

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.73669
n_{1064}	1064.00	1.73793
n_t	1013.98	1.73896
n_s	852.11	1.74293
$n_{A'}$	768.19	1.74567
n_r	706.52	1.74815
n_C	656.27	1.75063
$n_{C'}$	643.85	1.75132
n_{He-Ne}	632.80	1.75199
n_D	589.29	1.75487
n_d	587.56	1.75500
n_e	546.07	1.75844
n_F	486.13	1.76506
$n_{F'}$	479.99	1.76588
n_g	435.84	1.77296
n_h	404.66	1.77955
n_i	365.01	1.79083

Constants of Dispersion Formula	
A_0	3.01608135E+00
A_1	-1.42847622E-02
A_2	2.30284242E-02
A_3	1.69148291E-04
A_4	3.56310545E-05
A_5	-1.43259924E-06

Density		Solarization	
ρ (g/cm^3)	4.18	△λ (%)	-3.0

Relative Partial Dispersion	
$P_{d,C}$	0.3028
$P_{e,d}$	0.2384
$P_{g,F}$	0.5475
$P'_{d,c'}$	0.2527
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4862

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0026
$\triangle P_{g,F}$	-0.0092
$\triangle P_{C,t}$	0.0151
$\triangle P_{C,s}$	0.0076

Thermal Properties	
Tg (℃)	686
Ts (℃)	708
$T_{10}^{14.5}$ (℃)	622
T_{10}^{13} (℃)	643
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	0.90

Mechanical Properties	
HK (10^7Pa)	635
F_A	65
E (GPa)	122.2
G (GPa)	46.9
μ	0.303
σ_b (MPa)	91
B (10^{-12}/Pa)	1.30

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	51
-40/-30	53
-30/-20	54
-20/-10	55
-10/0	55
0/10	57
10/20	57
20/30	58
30/40	59
40/50	59
50/60	60
60/70	60
70/80	60
80/90	60
90/100	60
100/110	62
110/120	62
120/130	64
130/140	65
140/150	65
150/160	67

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.799	0.638
2200	0.928	0.862
2000	0.975	0.950
1800	0.990	0.981
1600	0.996	0.993
1400	0.996	0.992
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.996
480	0.997	0.994
460	0.996	0.992
440	0.994	0.989
420	0.993	0.986
400	0.991	0.982
390	0.988	0.977
380	0.985	0.970
370	0.977	0.955
360	0.967	0.935
350	0.949	0.901
340	0.920	0.847
330	0.882	0.778
320	0.831	0.690
310	0.764	0.584
300	0.690	0.476
290	0.594	0.353
280	0.447	0.200

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.1	2.4	2.7	2.8	3.0	3.1	3.2	3.4	3.6	3.9
-40～-20	2.1	2.5	2.8	2.9	3.0	3.1	3.3	3.6	3.7	4.0
-20～0	2.2	2.7	2.9	3.0	3.1	3.2	3.5	3.7	3.7	4.2
0～20	2.2	2.9	3.0	3.0	3.2	3.4	3.6	3.8	3.9	4.3
20～40	2.2	3.0	3.1	3.2	3.3	3.5	3.8	4.0	4.1	4.4
40～60	2.3	3.2	3.3	3.4	3.5	3.6	3.8	4.1	4.3	4.5
60～80	2.5	3.2	3.4	3.5	3.7	3.9	4.0	4.2	4.4	4.6
80～100	2.6	3.3	3.6	3.6	3.7	4.1	4.2	4.3	4.6	4.7
100～120	2.7	3.5	3.7	3.8	4.0	4.3	4.3	4.4	4.7	4.9
120～140	2.8	3.7	3.8	3.9	4.0	4.3	4.5	4.7	4.8	5.1
140～160	2.8	3.7	3.8	3.9	4.1	4.4	4.6	4.8	4.9	5.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	333/272

Constants of dn/dt		
D_0	D_1	D_2
9.52E-07	1.46E-08	-2.48E-11
E_0	E_1	λ_{TK}
6.68E-07	3.49E-10	2.49E-09

H-LaK54	734511	n_d = 1.73400	υ_d = 51.05	$n_F - n_C$ = 0.014377
		n_e = 1.73742	υ_e = 50.82	$n_{F'} - n_{C'}$ = 0.014511

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.69388
n_{1970}	1970.09	1.70113
n_{1530}	1529.58	1.70899
n_{1129}	1128.64	1.71588
n_{1064}	1064.00	1.71711
n_t	1013.98	1.71813
n_s	852.11	1.72204
$n_{A'}$	768.19	1.72471
n_r	706.52	1.72718
n_C	656.27	1.72965
$n_{C'}$	643.85	1.73034
n_{He-Ne}	632.80	1.73099
n_D	589.29	1.73387
n_d	587.56	1.73400
n_e	546.07	1.73742
n_F	486.13	1.74403
$n_{F'}$	479.99	1.74485
n_g	435.84	1.75189
n_h	404.66	1.75842
n_i	365.01	1.76975

Constants of Dispersion Formula	
A_0	2.94765208E+00
A_1	-1.51684002E-02
A_2	1.92673146E-02
A_3	1.38888212E-03
A_4	-1.55407755E-04
A_5	9.21281201E-06

Density	
ρ (g/cm^3)	4.07

Solarization	
△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.3026
$P_{e,d}$	0.2379
$P_{g,F}$	0.5467
$P'_{d,c'}$	0.2522
$P'_{e,d}$	0.2357
$P'_{g,F'}$	0.4851

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0023
$\triangle P_{g,F}$	-0.0121
$\triangle P_{C,t}$	0.0138
$\triangle P_{C,s}$	0.0064

Thermal Properties	
Tg (℃)	636
Ts (℃)	665
$T_{10}^{14.5}$ (℃)	575
T_{10}^{13} (℃)	618
$\alpha_{-50/80℃}$ (10^{-7}/K)	51
$\alpha_{100/300℃}$ (10^{-7}/K)	67
λ (W/(m·K))	0.96

Mechanical Properties	
HK (10^7Pa)	698
F_A	80
E (GPa)	112.3
G (GPa)	43.5
μ	0.291
σ_b (MPa)	85
B (10^{-12}/Pa)	1.81

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	44
-40/-30	47
-30/-20	48
-20/-10	49
-10/0	50
0/10	51
10/20	51
20/30	52
30/40	52
40/50	53
50/60	53
60/70	54
70/80	54
80/90	55
90/100	55
100/110	56
110/120	57
120/130	58
130/140	59
140/150	60
150/160	61

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.786	0.618
2200	0.922	0.850
2000	0.987	0.974
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.994
420	0.995	0.989
400	0.992	0.984
390	0.989	0.977
380	0.983	0.966
370	0.973	0.947
360	0.954	0.912
350	0.926	0.859
340	0.885	0.782
330	0.823	0.677
320	0.735	0.540
310	0.595	0.352
300	0.385	0.148
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	6.0	6.4	6.6	6.6	6.7	6.9	7.0	7.5	7.6	7.8
-40～-20	6.1	6.4	6.6	6.6	6.7	6.9	7.0	7.5	7.6	8.0
-20～0	6.1	6.5	6.7	6.7	6.8	7.0	7.1	7.6	7.7	8.2
0～20	6.1	6.5	6.7	6.7	6.8	7.0	7.2	7.7	7.7	8.2
20～40	6.2	6.6	6.8	6.8	6.9	7.2	7.2	7.8	7.8	8.2
40～60	6.2	6.7	6.9	7.0	7.0	7.2	7.5	8.0	8.0	8.6
60～80	6.5	6.9	7.0	7.1	7.1	7.4	7.5	8.1	8.1	8.6
80～100	6.5	7.0	7.2	7.3	7.3	7.6	7.6	8.3	8.4	8.9
100～120	6.7	7.2	7.4	7.5	7.5	7.6	7.6	8.5	8.6	9.2
120～140	6.9	7.3	7.5	7.6	7.6	8.1	8.1	8.6	8.7	9.4
140～160	7.0	7.4	7.7	7.7	7.8	8.1	8.1	8.8	8.9	9.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	343/291

Constants of dn/dt		
D_0	D_1	D_2
7.73E-06	1.34E-08	-1.40E-11
E_0	E_1	λ_{TK}
4.76E-07	3.95E-10	2.32E-01

H-LaK61	741527	n_d = 1.74100	υ_d = 52.70	$n_F - n_C$ = 0.014060
		n_e = 1.74435	υ_e = 52.41	$n_{F'} - n_{C'}$ = 0.014203

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70124
n_{1970}	1970.09	1.70844
n_{1530}	1529.58	1.71627
n_{1129}	1128.64	1.72315
n_{1064}	1064.00	1.72438
n_t	1013.98	1.72540
n_s	852.11	1.72928
$n_{A'}$	768.19	1.73191
n_r	706.52	1.73432
n_C	656.27	1.73673
$n_{C'}$	643.85	1.73741
n_{He-Ne}	632.80	1.73805
n_D	589.29	1.74087
n_d	587.56	1.74100
n_e	546.07	1.74435
n_F	486.13	1.75079
$n_{F'}$	479.99	1.75161
n_g	435.84	1.75850
n_h	404.66	1.76491
n_i	365.01	1.77586

Constants of Dispersion Formula	
A_0	2.97212067E+00
A_1	-1.51048406E-02
A_2	2.02885560E-02
A_3	7.34194347E-04
A_4	-3.75051084E-05
A_5	1.82377017E-06

Density	
ρ (g/cm^3)	4.10

Solarization	
△λ (%)	-4.1

Relative Partial Dispersion	
$P_{d,C}$	0.3037
$P_{e,d}$	0.2383
$P_{g,F}$	0.5484
$P'_{d,c'}$	0.2528
$P'_{e,d}$	0.2359
$P'_{g,F'}$	0.4851

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0031
$\triangle P_{g,F}$	-0.0077
$\triangle P_{C,t}$	0.0103
$\triangle P_{C,s}$	0.0030

Thermal Properties	
Tg (℃)	668
Ts (℃)	693
$T_{10}^{14.5}$ (℃)	601
T_{10}^{13} (℃)	635
$\alpha_{-50/80℃}$ (10^{-7}/K)	56
$\alpha_{100/300℃}$ (10^{-7}/K)	71
λ (W/(m·K))	0.96

Mechanical Properties	
HK (10^7Pa)	706
F_A	67
E (GPa)	119.9
G (GPa)	45.2
μ	0.327
σ_b (MPa)	81
B (10^{-12}/Pa)	1.49

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	49
-40/-30	51
-30/-20	52
-20/-10	53
-10/0	54
0/10	55
10/20	56
20/30	57
30/40	57
40/50	58
50/60	58
60/70	59
70/80	59
80/90	60
90/100	61
100/110	61
110/120	62
120/130	63
130/140	64
140/150	65
150/160	66

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.783	0.613
2200	0.930	0.865
2000	0.986	0.972
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.997	0.993
390	0.995	0.988
380	0.990	0.979
370	0.983	0.964
360	0.969	0.935
350	0.948	0.893
340	0.914	0.831
330	0.866	0.746
320	0.804	0.641
310	0.728	0.526
300	0.644	0.411
290	0.551	0.300
280	0.444	0.193

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.6	4.7	4.9	4.9	4.9	5.1	5.3	5.6	5.7	6.2
-40～-20	4.6	4.7	4.8	4.9	5.0	5.2	5.2	5.7	5.8	6.2
-20～0	4.4	4.7	5.0	5.0	5.0	5.2	5.2	5.7	5.7	6.3
0～20	4.4	4.7	5.0	5.0	5.0	5.2	5.2	5.8	5.8	6.3
20～40	4.5	4.7	5.0	5.0	5.0	5.2	5.2	6.0	6.0	6.4
40～60	4.5	4.8	5.1	5.1	5.2	5.3	5.3	6.2	6.3	6.5
60～80	4.7	5.0	5.3	5.3	5.4	5.5	5.5	6.3	6.3	6.8
80～100	4.8	5.1	5.5	5.5	5.5	5.7	5.9	6.4	6.5	7.0
100～120	4.8	5.2	5.5	5.6	5.6	5.7	6.0	6.5	6.6	7.1
120～140	5.0	5.3	5.7	5.7	5.8	5.9	6.2	6.6	6.7	7.3
140～160	5.0	5.4	5.8	5.8	5.9	6.0	6.3	6.7	6.8	7.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	336/265

Constants of dn/dt		
D_0	D_1	D_2
4.66E-06	1.23E-08	-1.52E-11
E_0	E_1	λ_{TK}
4.36E-07	4.14E-10	2.38E-01

H-LaK68	678507	n_d = 1.67790	υ_d = 50.72	$n_F - n_C$ = 0.013365
		n_e = 1.68108	υ_e = 50.44	$n_{F'} - n_{C'}$ = 0.013502

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.64478
n_{1970}	1970.09	1.65017
n_{1530}	1529.58	1.65615
n_{1129}	1128.64	1.66167
n_{1064}	1064.00	1.66271
n_t	1013.98	1.66357
n_s	852.11	1.66699
$n_{A'}$	768.19	1.66940
n_r	706.52	1.67162
n_C	656.27	1.67388
$n_{C'}$	643.85	1.67452
n_{He-Ne}	632.80	1.67511
n_D	589.29	1.67778
n_d	587.56	1.67790
n_e	546.07	1.68108
n_F	486.13	1.68724
$n_{F'}$	479.99	1.68802
n_g	435.84	1.69467
n_h	404.66	1.70090
n_i	365.01	1.71174

Relative Partial Dispersion	
$P_{d,C}$	0.3008
$P_{e,d}$	0.2379
$P_{g,F}$	0.5559
$P'_{d,c'}$	0.2503
$P'_{e,d}$	0.2355
$P'_{g,F'}$	0.4925

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0013
$\triangle P_{g,F}$	-0.0034
$\triangle P_{C,t}$	-0.0145
$\triangle P_{C,s}$	-0.0066

Thermal Properties	
Tg (℃)	657
Ts (℃)	698
$T_{10}^{14.5}$ (℃)	594
T_{10}^{13} (℃)	628
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	0.80

Mechanical Properties	
HK (10^7Pa)	528
F_A	175
E (GPa)	90.6
G (GPa)	35.2
μ	0.287
σ_b (MPa)	74
B (10^{-12}/Pa)	1.67

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	67
-40/-30	69
-30/-20	71
-20/-10	72
-10/0	72
0/10	73
10/20	74
20/30	74
30/40	75
40/50	75
50/60	75
60/70	75
70/80	76
80/90	77
90/100	78
100/110	78
110/120	79
120/130	80
130/140	82
140/150	82
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.910	0.828
2200	0.968	0.937
2000	0.994	0.989
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.998	0.996
550	0.997	0.993
500	0.996	0.990
480	0.995	0.987
460	0.993	0.984
440	0.991	0.981
420	0.989	0.976
400	0.986	0.966
390	0.977	0.954
380	0.967	0.931
370	0.944	0.884
360	0.886	0.781
350	0.756	0.566
340	0.474	0.220
330	0.115	0.016
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.75995716E+00
A_1	-1.07353820E-02
A_2	1.82532687E-02
A_3	9.37020441E-04
A_4	-8.40203685E-05
A_5	5.44074316E-06

Density	
ρ (g/cm^3)	3.86

Solarization	
△λ (%)	-0.8

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.6	1.8	2.0	2.0	2.1	2.2	2.4	2.7	2.7	3.4
-40～-20	1.5	1.8	2.0	2.0	2.1	2.2	2.4	2.8	2.8	3.4
-20～0	1.5	1.8	1.9	2.0	2.0	2.2	2.5	2.8	2.9	3.4
0～20	1.6	1.9	2.0	2.0	2.1	2.2	2.5	2.8	2.9	3.5
20～40	1.6	1.8	2.0	2.0	2.1	2.3	2.6	2.9	2.9	3.5
40～60	1.7	1.9	2.0	2.0	2.2	2.3	2.7	3.0	3.1	3.6
60～80	1.7	2.0	2.1	2.1	2.3	2.5	2.8	3.1	3.2	3.8
80～100	1.8	2.1	2.2	2.2	2.3	2.6	2.9	3.2	3.3	3.9
100～120	1.9	2.2	2.3	2.3	2.4	2.7	3.0	3.3	3.4	4.0
120～140	2.0	2.2	2.3	2.4	2.5	2.8	3.2	3.4	3.5	4.1
140～160	2.0	2.2	2.4	2.5	2.6	2.9	3.4	3.6	3.7	4.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	375/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	361/333

Constants of dn/dt		
D_0	D_1	D_2
-3.65E-07	1.21E-08	-1.66E-11
E_0	E_1	λ_{TK}
4.42E-07	2.98E-10	2.70E-01

H-LaK77	775503	n_d = 1.77536	υ_d = 50.32	$n_F - n_C$ = 0.015410
		n_e = 1.77902	υ_e = 50.10	$n_{F'} - n_{C'}$ = 0.015550

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	1.74890
n_{1129}	1128.64	1.75598
n_{1064}	1064.00	1.75728
n_t	1013.98	1.75836
n_s	852.11	1.76253
$n_{A'}$	768.19	1.76541
n_r	706.52	1.76805
n_C	656.27	1.77069
$n_{C'}$	643.85	1.77144
n_{He-Ne}	632.80	1.77213
n_D	589.29	1.77522
n_d	587.56	1.77536
n_e	546.07	1.77902
n_F	486.13	1.78610
$n_{F'}$	479.99	1.78699
n_g	435.84	1.79459
n_h	404.66	1.80168
n_i	365.01	1.81387

Constants of Dispersion Formula	
A_0	3.08315587E+00
A_1	-1.49460142E-02
A_2	2.43300964E-02
A_3	3.65640749E-04
A_4	1.42131183E-05
A_5	-8.23160850E-08

Density		Solarization	
ρ (g/cm^3)	4.35	△λ (%)	-2.9

Relative Partial Dispersion	
$P_{d,C}$	0.3030
$P_{e,d}$	0.2375
$P_{g,F}$	0.5509
$P'_{d,c'}$	0.2521
$P'_{e,d}$	0.2354
$P'_{g,F'}$	0.4887

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0030
$\triangle P_{g,F}$	-0.0091
$\triangle P_{C,t}$	0.0162
$\triangle P_{C,s}$	0.0084

Thermal Properties	
Tg (℃)	699
Ts (℃)	714
$T_{10}^{14.5}$ (℃)	625
T_{10}^{13} (℃)	670
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	76
λ (W/(m·K))	1.02

Mechanical Properties	
HK (10^7Pa)	728
F_A	115
E (GPa)	108.0
G (GPa)	41.6
μ	0.297
σ_b (MPa)	85
B (10^{-12}/Pa)	1.20

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	54
-30/-20	56
-20/-10	57
-10/0	58
0/10	58
10/20	59
20/30	59
30/40	60
40/50	60
50/60	61
60/70	61
70/80	62
80/90	63
90/100	64
100/110	65
110/120	66
120/130	67
130/140	68
140/150	69
150/160	70

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.815	0.664
2200	0.948	0.899
2000	0.984	0.968
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.994
460	0.996	0.992
440	0.996	0.992
420	0.996	0.992
400	0.991	0.982
390	0.986	0.972
380	0.979	0.958
370	0.971	0.943
360	0.950	0.903
350	0.913	0.834
340	0.870	0.757
330	0.813	0.661
320	0.736	0.542
310	0.633	0.401
300	0.550	0.303
290	0.450	0.203
280	0.305	0.093

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.9	3.2	3.2	3.3	3.4	3.6	3.8	4.0	4.1	4.4
-40～-20	3.0	3.2	3.4	3.5	3.6	3.7	3.7	4.0	4.1	4.6
-20～0	2.9	3.2	3.5	3.6	3.7	3.9	3.9	4.1	4.2	4.6
0～20	2.9	3.2	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.8
20～40	2.9	3.3	3.6	3.7	3.8	3.9	4.2	4.2	4.2	4.9
40～60	2.9	3.4	3.8	3.8	3.9	4.0	4.2	4.3	4.3	5.0
60～80	3.1	3.6	3.8	3.8	3.9	4.0	4.2	4.4	4.4	5.1
80～100	3.1	3.7	3.9	3.9	4.0	4.1	4.3	4.5	4.5	5.3
100～120	3.1	3.7	3.9	3.9	4.0	4.1	4.4	4.6	4.6	5.4
120～140	3.2	3.7	3.9	4.0	4.0	4.2	4.5	4.6	4.7	5.5
140～160	3.2	3.8	4.0	4.0	4.1	4.2	4.7	4.8	4.9	5.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	365/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	333/276

Constants of dn/dt		
D_0	D_1	D_2
1.90E-06	1.15E-08	-2.57E-11
E_0	E_1	λ_{TK}
5.50E-07	5.84E-10	6.74E-02

H-KF6	517522	n_d = 1.51742	υ_d = 52.15	$n_F - n_C$ = 0.009922
		n_e = 1.51977	υ_e = 51.85	$n_{F'} - n_{C'}$ = 0.010024

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.49023
n_{1970}	1970.09	1.49507
n_{1530}	1529.58	1.50035
n_{1129}	1128.64	1.50503
n_{1064}	1064.00	1.50588
n_t	1013.98	1.50657
n_s	852.11	1.50925
$n_{A'}$	768.19	1.51108
n_r	706.52	1.51276
n_C	656.27	1.51444
$n_{C'}$	643.85	1.51491
n_{He-Ne}	632.80	1.51535
n_D	589.29	1.51733
n_d	587.56	1.51742
n_e	546.07	1.51977
n_F	486.13	1.52436
$n_{F'}$	479.99	1.52493
n_g	435.84	1.52994
n_h	404.66	1.53468
n_i	365.01	1.54305

Constants of Dispersion Formula	
A_0	2.26634630E+00
A_1	-8.85481035E-03
A_2	1.25163602E-02
A_3	3.69483817E-04
A_4	-8.19964870E-06
A_5	1.43231024E-06

Density	
ρ (g/cm^3)	2.52

Solarization	
△λ (%)	-4.1

Relative Partial Dispersion	
$P_{d,C}$	0.3003
$P_{e,d}$	0.2368
$P_{g,F}$	0.5624
$P'_{d,c'}$	0.2504
$P'_{e,d}$	0.2344
$P'_{g,F'}$	0.4998

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0012
$\triangle P_{g,F}$	0.0054
$\triangle P_{C,t}$	0.0004
$\triangle P_{C,s}$	-0.0025

Thermal Properties	
Tg (℃)	461
Ts (℃)	536
$T_{10}^{14.5}$ (℃)	407
T_{10}^{13} (℃)	430
$\alpha_{-50/80℃}$ (10^{-7}/K)	91
$\alpha_{100/300℃}$ (10^{-7}/K)	102
λ (W/(m·K))	1.04

Mechanical Properties	
HK (10^7Pa)	432
F_A	107
E (GPa)	56.3
G (GPa)	22.8
μ	0.233
σ_b (MPa)	48
B (10^{-12}/Pa)	3.12

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	82
-40/-30	86
-30/-20	88
-20/-10	89
-10/0	90
0/10	91
10/20	92
20/30	92
30/40	93
40/50	93
50/60	94
60/70	94
70/80	95
80/90	96
90/100	96
100/110	97
110/120	98
120/130	99
130/140	100
140/150	101
150/160	102

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.929	0.861
2200	0.956	0.910
2000	0.994	0.987
1800	0.997	0.994
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.996
420	0.997	0.993
400	0.995	0.991
390	0.993	0.989
380	0.987	0.979
370	0.976	0.957
360	0.936	0.879
350	0.783	0.618
340	0.390	0.154
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-1.2	-1.0	-0.9	-0.8	-0.8	-0.8	-0.6	-0.3	-0.2	0.2
-40～-20	-1.1	-1.0	-0.9	-0.8	-0.7	-0.6	-0.5	-0.2	-0.1	0.3
-20～0	-1.1	-1.0	-0.9	-0.8	-0.7	-0.6	-0.4	-0.1	-0.1	0.3
0～20	-1.0	-0.9	-0.8	-0.7	-0.7	-0.5	-0.2	0.0	0.0	0.4
20～40	-0.9	-0.8	-0.7	-0.5	-0.5	-0.4	-0.2	0.1	0.1	0.6
40～60	-0.8	-0.7	-0.5	-0.4	-0.4	-0.2	0.0	0.2	0.3	0.7
60～80	-0.6	-0.5	-0.4	-0.2	-0.2	-0.2	0.1	0.3	0.4	0.9
80～100	-0.5	-0.4	-0.3	-0.2	-0.2	-0.1	0.3	0.5	0.6	1.1
100～120	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.5	0.7	0.7	1.2
120～140	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.5	0.8	0.8	1.3
140～160	-0.1	0.0	0.1	0.2	0.2	0.2	0.7	0.9	0.9	1.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	356/336

Constants of dn/dt		
D_0	D_1	D_2
-5.94E-06	1.78E-08	-2.50E-11
E_0	E_1	λ_{TK}
4.20E-07	1.79E-10	2.83E-01

H-QF14	596392	n_d = 1.59551	υ_d = 39.22	$n_F - n_C$ = 0.015183
		n_e = 1.59911	υ_e = 38.95	$n_{F'} - n_{C'}$ = 0.015383

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.56078
n_{1970}	1970.09	1.56608
n_{1530}	1529.58	1.57206
n_{1129}	1128.64	1.57777
n_{1064}	1064.00	1.57886
n_t	1013.98	1.57979
n_s	852.11	1.58348
$n_{A'}$	768.19	1.58609
n_r	706.52	1.58854
n_C	656.27	1.59103
$n_{C'}$	643.85	1.59173
n_{He-Ne}	632.80	1.59239
n_D	589.29	1.59538
n_d	587.56	1.59551
n_e	546.07	1.59911
n_F	486.13	1.60621
$n_{F'}$	479.99	1.60712
n_g	435.84	1.61509
n_h	404.66	1.62284
n_i	365.01	1.63695

Constants of Dispersion Formula	
A_0	2.48576653E+00
A_1	-9.89034420E-03
A_2	2.02035248E-02
A_3	4.92709000E-04
A_4	1.83898751E-05
A_5	2.51608701E-06

Density	
ρ (g/cm^3)	2.71

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.2951
$P_{e,d}$	0.2371
$P_{g,F}$	0.5849
$P'_{d,c'}$	0.2457
$P'_{e,d}$	0.2340
$P'_{g,F'}$	0.5181

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0009
$\triangle P_{g,F}$	0.0064
$\triangle P_{C,t}$	0.0101
$\triangle P_{C,s}$	0.0027

Thermal Properties	
Tg (℃)	546
Ts (℃)	598
$T_{10}^{14.5}$ (℃)	483
T_{10}^{13} (℃)	515
$\alpha_{-50/80℃}$ (10^{-7}/K)	80
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	534
F_A	168
E (GPa)	75.3
G (GPa)	30.9
μ	0.221
σ_b (MPa)	73
B (10^{-12}/Pa)	3.08

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	73
-40/-30	75
-30/-20	76
-20/-10	76
-10/0	77
0/10	78
10/20	79
20/30	79
30/40	80
40/50	81
50/60	81
60/70	82
70/80	83
80/90	84
90/100	85
100/110	86
110/120	87
120/130	88
130/140	89
140/150	90
150/160	91

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.958	0.916
2200	0.964	0.927
2000	0.990	0.977
1800	0.994	0.987
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.997	0.994
440	0.995	0.990
420	0.993	0.986
400	0.990	0.980
390	0.981	0.961
380	0.956	0.914
370	0.882	0.776
360	0.641	0.413
350	0.185	0.038
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.2	2.5	2.7	2.7	2.8	2.9	3.1	3.7	3.8	4.4
-40～-20	2.2	2.5	2.8	2.8	2.8	3.0	3.2	3.7	3.8	4.5
-20～0	2.3	2.5	2.8	2.8	2.8	3.0	3.2	3.8	3.9	4.6
0～20	2.3	2.6	2.8	2.8	2.8	3.1	3.4	3.9	4.0	4.8
20～40	2.3	2.6	2.8	2.8	2.9	3.1	3.4	4.1	4.1	4.9
40～60	2.3	2.6	2.9	2.9	3.0	3.2	3.5	4.2	4.2	5.1
60～80	2.3	2.7	2.9	2.9	3.0	3.3	3.6	4.3	4.3	5.2
80～100	2.4	2.7	2.9	3.0	3.0	3.3	3.7	4.3	4.4	5.3
100～120	2.4	2.8	2.9	3.0	3.1	3.3	3.8	4.3	4.4	5.4
120～140	2.5	2.8	2.9	3.0	3.1	3.4	3.9	4.4	4.5	5.5
140～160	2.5	2.8	2.9	3.0	3.1	3.5	4.1	4.6	4.7	5.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	369/350

Constants of dn/dt		
D_0	D_1	D_2
1.19E-06	1.20E-08	-2.83E-11
E_0	E_1	λ_{TK}
5.30E-07	5.94E-10	3.05E-01

H-QF50	581409	n_d = 1.58144	υ_d = 40.89	$n_F - n_C$ = 0.014220
		n_e = 1.58481	υ_e = 40.61	$n_{F'} - n_{C'}$ = 0.014400

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.54848
n_{1970}	1970.09	1.55364
n_{1530}	1529.58	1.55940
n_{1129}	1128.64	1.56481
n_{1064}	1064.00	1.56584
n_t	1013.98	1.56671
n_s	852.11	1.57015
$n_{A'}$	768.19	1.57260
n_r	706.52	1.57490
n_C	656.27	1.57723
$n_{C'}$	643.85	1.57789
n_{He-Ne}	632.80	1.57852
n_D	589.29	1.58131
n_d	587.56	1.58144
n_e	546.07	1.58481
n_F	486.13	1.59145
$n_{F'}$	479.99	1.59229
n_g	435.84	1.59961
n_h	404.66	1.60669
n_i	365.01	1.61951

Constants of Dispersion Formula	
A_0	2.44672171E+00
A_1	-9.64692814E-03
A_2	1.72763622E-02
A_3	1.09967502E-03
A_4	-9.37435013E-05
A_5	8.00160916E-06

Density	
ρ (g/cm^3)	2.64

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2961
$P_{e,d}$	0.2370
$P_{g,F}$	0.5738
$P'_{d,c'}$	0.2465
$P'_{e,d}$	0.2340
$P'_{g,F'}$	0.5083

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0007
$\triangle P_{g,F}$	-0.0018
$\triangle P_{C,t}$	0.0016
$\triangle P_{C,s}$	-0.0006

Thermal Properties	
Tg (℃)	584
Ts (℃)	638
$T_{10}^{14.5}$ (℃)	515
T_{10}^{13} (℃)	559
$\alpha_{-50/80℃}$ (10^{-7}/K)	82
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	499
F_A	128
E (GPa)	70.3
G (GPa)	27.7
μ	0.269
σ_b (MPa)	62
B (10^{-12}/Pa)	3.07

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	73
-40/-30	76
-30/-20	78
-20/-10	79
-10/0	80
0/10	80
10/20	81
20/30	82
30/40	82
40/50	83
50/60	84
60/70	84
70/80	85
80/90	85
90/100	86
100/110	87
110/120	88
120/130	90
130/140	91
140/150	92
150/160	93

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.933	0.810
2200	0.946	0.859
2000	0.980	0.960
1800	0.990	0.980
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.997	0.994
440	0.996	0.992
420	0.994	0.989
400	0.992	0.981
390	0.986	0.966
380	0.966	0.926
370	0.903	0.808
360	0.701	0.488
350	0.268	0.075
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.4	1.8	2.0	2.1	2.1	2.5	2.6	2.9	3.0	3.6
-40～-20	1.6	1.9	2.2	2.3	2.3	2.5	2.7	3.1	3.1	3.8
-20～0	1.5	2.0	2.3	2.4	2.5	2.6	2.8	3.4	3.5	4.2
0～20	1.6	2.3	2.5	2.6	2.6	2.8	3.1	3.5	3.6	4.4
20～40	1.9	2.6	2.7	2.7	2.7	3.0	3.3	3.7	3.7	4.6
40～60	2.0	2.6	2.8	2.8	2.8	3.2	3.5	3.9	3.9	4.8
60～80	2.3	2.7	3.0	3.0	3.0	3.3	3.8	4.2	4.2	5.0
80～100	2.3	2.8	3.1	3.1	3.2	3.5	3.9	4.3	4.4	5.3
100～120	2.3	2.9	3.1	3.2	3.3	3.6	4.1	4.4	4.5	5.4
120～140	2.5	3.1	3.3	3.3	3.4	3.7	4.2	4.5	4.6	5.6
140～160	2.7	3.2	3.5	3.5	3.6	3.9	4.3	4.7	4.8	5.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	370/350

Constants of dn/dt		
D_0	D_1	D_2
3.81E-07	1.80E-08	-3.28E-11
E_0	E_1	λ_{TK}
7.19E-07	6.44E-10	2.45E-01

H-F1	603380	n_d = 1.60342	υ_d = 38.01	$n_F - n_C$ = 0.015875
		n_e = 1.60718	υ_e = 37.74	$n_{F'} - n_{C'}$ = 0.016088

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.56760
n_{1970}	1970.09	1.57308
n_{1530}	1529.58	1.57923
n_{1129}	1128.64	1.58506
n_{1064}	1064.00	1.58618
n_t	1013.98	1.58713
n_s	852.11	1.59091
$n_{A'}$	768.19	1.59361
n_r	706.52	1.59615
n_C	656.27	1.59874
$n_{C'}$	643.85	1.59948
n_{He-Ne}	632.80	1.60017
n_D	589.29	1.60328
n_d	587.56	1.60342
n_e	546.07	1.60718
n_F	486.13	1.61462
$n_{F'}$	479.99	1.61557
n_g	435.84	1.62386
n_h	404.66	1.63190
n_i	365.01	1.64667

Constants of Dispersion Formula	
A_0	2.50960367E+00
A_1	-1.03328069E-02
A_2	1.94468683E-02
A_3	1.23207636E-03
A_4	-9.94382918E-05
A_5	9.44281258E-06

Density	
ρ (g/cm^3)	2.63

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2948
$P_{e,d}$	0.2369
$P_{g,F}$	0.5820
$P'_{d,c'}$	0.2449
$P'_{e,d}$	0.2337
$P'_{g,F'}$	0.5153

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0006
$\triangle P_{g,F}$	0.0016
$\triangle P_{C,t}$	0.0070
$\triangle P_{C,s}$	0.0016

Thermal Properties	
Tg (℃)	587
Ts (℃)	628
$T_{10}^{14.5}$ (℃)	517
T_{10}^{13} (℃)	565
$\alpha_{-50/80℃}$ (10^{-7}/K)	81
$\alpha_{100/300℃}$ (10^{-7}/K)	101
λ (W/(m·K))	1.19

Mechanical Properties	
HK (10^7Pa)	491
F_A	141
E (GPa)	76.6
G (GPa)	31.3
μ	0.223
σ_b (MPa)	
B (10^{-12}/Pa)	2.74

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	75
-40/-30	77
-30/-20	78
-20/-10	80
-10/0	80
0/10	81
10/20	82
20/30	83
30/40	84
40/50	84
50/60	84
60/70	85
70/80	85
80/90	86
90/100	87
100/110	88
110/120	90
120/130	91
130/140	92
140/150	93
150/160	94

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.938	0.867
2200	0.950	0.892
2000	0.987	0.961
1800	0.996	0.982
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.997	0.993
440	0.995	0.990
420	0.991	0.981
400	0.985	0.965
390	0.975	0.944
380	0.940	0.867
370	0.841	0.683
360	0.540	0.279
350	0.112	0.018
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.8	2.1	2.3	2.4	2.4	2.6	2.8	3.4	3.4	4.3
-40～-20	1.8	2.1	2.3	2.4	2.4	2.6	2.9	3.5	3.5	4.3
-20～0	1.7	2.2	2.3	2.4	2.4	2.7	2.9	3.5	3.5	4.5
0～20	1.7	2.2	2.4	2.4	2.5	2.7	2.9	3.6	3.7	4.5
20～40	1.8	2.2	2.4	2.4	2.6	2.7	2.9	3.6	3.7	4.5
40～60	1.8	2.2	2.6	2.6	2.7	2.8	3.1	3.7	3.9	4.7
60～80	1.8	2.3	2.6	2.6	2.7	2.8	3.1	3.8	3.9	4.9
80～100	1.9	2.4	2.7	2.7	2.8	3.0	3.1	3.9	4.0	5.1
100～120	1.9	2.4	2.7	2.7	2.8	3.1	3.3	4.1	4.2	5.2
120～140	2.0	2.5	2.8	2.8	2.8	3.2	3.4	4.2	4.3	5.3
140～160	2.0	2.5	2.8	2.9	2.9	3.4	3.6	4.4	4.5	5.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	375/354

Constants of dn/dt		
D_0	D_1	D_2
1.43E-07	1.19E-08	-2.03E-11
E_0	E_1	λ_{TK}
5.89E-07	5.54E-10	2.98E-01

H-F4	620364	n_d = 1.62005	υ_d = 36.35	$n_F - n_C$ = 0.017060
		n_e = 1.62408	υ_e = 36.09	$n_{F'} - n_{C'}$ = 0.017291

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58141
n_{1970}	1970.09	1.58736
n_{1530}	1529.58	1.59402
n_{1129}	1128.64	1.60033
n_{1064}	1064.00	1.60154
n_t	1013.98	1.60256
n_s	852.11	1.60664
$n_{A'}$	768.19	1.60954
n_r	706.52	1.61226
n_C	656.27	1.61504
$n_{C'}$	643.85	1.61582
n_{He-Ne}	632.80	1.61656
n_D	589.29	1.61990
n_d	587.56	1.62005
n_e	546.07	1.62408
n_F	486.13	1.63210
$n_{F'}$	479.99	1.63312
n_g	435.84	1.64214
n_h	404.66	1.65099
n_i	365.01	1.66740

Constants of Dispersion Formula	
A_0	2.55786478E+00
A_1	-1.12844748E-02
A_2	2.15761024E-02
A_3	1.06818810E-03
A_4	-6.19068712E-05
A_5	8.79794163E-06

Density	
ρ (g/cm^3)	2.66

Solarization	
△λ (%)	-1.2

Relative Partial Dispersion	
$P_{d,C}$	0.2937
$P_{e,d}$	0.2362
$P_{g,F}$	0.5885
$P'_{d,c'}$	0.2446
$P'_{e,d}$	0.2331
$P'_{g,F'}$	0.5217

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	0.0053
$\triangle P_{C,t}$	0.0153
$\triangle P_{C,s}$	0.0047

Thermal Properties	
Tg (℃)	590
Ts (℃)	635
$T_{10}^{14.5}$ (℃)	524
T_{10}^{13} (℃)	563
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	90
λ (W/(m·K))	1.39

Mechanical Properties	
HK (10^7Pa)	603
F_A	118
E (GPa)	83.0
G (GPa)	33.3
μ	0.246
σ_b (MPa)	72
B (10^{-12}/Pa)	3.07

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	71
-40/-30	73
-30/-20	75
-20/-10	76
-10/0	77
0/10	77
10/20	78
20/30	79
30/40	79
40/50	79
50/60	80
60/70	80
70/80	81
80/90	81
90/100	82
100/110	83
110/120	84
120/130	86
130/140	86
140/150	87
150/160	88

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.934	0.872
2200	0.945	0.893
2000	0.994	0.989
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.997	0.994
440	0.995	0.990
420	0.992	0.981
400	0.982	0.961
390	0.963	0.925
380	0.910	0.828
370	0.749	0.568
360	0.363	0.140
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.5	2.9	3.1	3.1	3.2	3.4	3.7	4.3	4.4	4.9
-40～-20	2.5	3.0	3.2	3.2	3.2	3.4	3.8	4.3	4.4	5.1
-20～0	2.6	3.0	3.3	3.3	3.4	3.5	3.8	4.5	4.5	5.3
0～20	2.6	3.1	3.4	3.4	3.4	3.6	3.9	4.6	4.6	5.5
20～40	2.6	3.1	3.4	3.4	3.4	3.6	4.0	4.8	4.8	5.6
40～60	2.7	3.2	3.5	3.5	3.5	3.7	4.0	4.9	4.9	5.8
60～80	2.9	3.4	3.7	3.7	3.7	3.9	4.3	5.1	5.1	6.0
80～100	3.0	3.5	3.8	3.8	3.8	4.0	4.4	5.3	5.3	6.2
100～120	3.1	3.7	4.0	4.0	4.0	4.1	4.6	5.4	5.4	6.3
120～140	3.3	3.8	4.1	4.1	4.1	4.2	4.7	5.5	5.6	6.3
140～160	3.3	3.8	4.2	4.2	4.3	4.4	4.8	5.6	5.7	6.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	377/356

Constants of dn/dt		
D_0	D_1	D_2
1.85E-06	1.51E-08	-2.19E-11
E_0	E_1	λ_{TK}
6.75E-07	4.19E-10	2.71E-01

H-F13	626357	n_d = 1.62588	υ_d = 35.70	$n_F - n_C$ = 0.017532
		n_e = 1.63003	υ_e = 35.43	$n_{F'} - n_{C'}$ = 0.017780

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58752
n_{1970}	1970.09	1.59329
n_{1530}	1529.58	1.59977
n_{1129}	1128.64	1.60594
n_{1064}	1064.00	1.60713
n_t	1013.98	1.60814
n_s	852.11	1.61220
$n_{A'}$	768.19	1.61513
n_r	706.52	1.61790
n_C	656.27	1.62074
$n_{C'}$	643.85	1.62155
n_{He-Ne}	632.80	1.62231
n_D	589.29	1.62573
n_d	587.56	1.62588
n_e	546.07	1.63003
n_F	486.13	1.63828
$n_{F'}$	479.99	1.63933
n_g	435.84	1.64860
n_h	404.66	1.65768
n_i	365.01	1.67466

Constants of Dispersion Formula	
A_0	2.57590334E+00
A_1	-1.10109986E-02
A_2	2.05548046E-02
A_3	1.79594369E-03
A_4	-1.78465029E-04
A_5	1.57736814E-05

Density	
ρ (g/cm^3)	2.72

Solarization	
△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.2932
$P_{e,d}$	0.2367
$P_{g,F}$	0.5886
$P'_{d,c'}$	0.2435
$P'_{e,d}$	0.2334
$P'_{g,F'}$	0.5214

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0001
$\triangle P_{g,F}$	0.0043
$\triangle P_{C,t}$	0.0056
$\triangle P_{C,s}$	0.0010

Thermal Properties	
Tg (℃)	596
Ts (℃)	639
$T_{10}^{14.5}$ (℃)	522
T_{10}^{13} (℃)	566
$\alpha_{-50/80℃}$ (10^{-7}/K)	75
$\alpha_{100/300℃}$ (10^{-7}/K)	93
λ (W/(m·K))	1.19

Mechanical Properties	
HK (10^7Pa)	546
F_A	123
E (GPa)	80.4
G (GPa)	32.4
μ	0.240
σ_b (MPa)	71
B (10^{-12}/Pa)	3.04

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	72
-40/-30	74
-30/-20	75
-20/-10	76
-10/0	76
0/10	77
10/20	77
20/30	77
30/40	78
40/50	78
50/60	78
60/70	78
70/80	79
80/90	80
90/100	81
100/110	82
110/120	83
120/130	85
130/140	86
140/150	87
150/160	88

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.945	0.893
2200	0.948	0.899
2000	0.982	0.964
1800	0.984	0.968
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.996	0.993
480	0.994	0.989
460	0.992	0.984
440	0.989	0.978
420	0.982	0.967
400	0.967	0.936
390	0.941	0.890
380	0.877	0.772
370	0.699	0.490
360	0.308	0.098
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.8	3.1	3.4	3.4	3.5	3.6	3.9	4.7	4.8	5.4
-40～-20	2.8	3.1	3.4	3.4	3.5	3.7	4.0	4.7	4.8	5.5
-20～0	2.8	3.2	3.4	3.5	3.5	3.7	4.1	4.8	4.9	5.7
0～20	2.7	3.2	3.4	3.5	3.5	3.8	4.1	4.9	4.9	5.9
20～40	2.8	3.3	3.5	3.6	3.6	3.8	4.2	5.0	5.0	6.0
40～60	2.8	3.3	3.5	3.6	3.6	3.9	4.4	5.1	5.2	6.1
60～80	3.0	3.4	3.6	3.7	3.7	4.1	4.5	5.3	5.3	6.3
80～100	3.0	3.5	3.7	3.8	3.8	4.3	4.6	5.3	5.3	6.5
100～120	3.2	3.7	3.9	4.0	4.0	4.4	4.8	5.4	5.4	6.6
120～140	3.3	3.8	4.0	4.1	4.2	4.5	4.8	5.5	5.6	6.7
140～160	3.4	3.9	4.0	4.1	4.2	4.7	5.0	5.6	5.7	6.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	382/358

Constants of dn/dt		
D_0	D_1	D_2
2.09E-06	1.35E-08	-1.84E-11
E_0	E_1	λ_{TK}
6.50E-07	3.82E-10	2.92E-01

H-ZF1	648338	n_d = 1.64769	υ_d = 33.84	$n_F - n_C$ = 0.019140
		n_e = 1.65222	υ_e = 33.58	$n_{F'} - n_{C'}$ = 0.019421

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.60836
n_{1970}	1970.09	1.61379
n_{1530}	1529.58	1.62001
n_{1129}	1128.64	1.62623
n_{1064}	1064.00	1.62748
n_t	1013.98	1.62854
n_s	852.11	1.63287
$n_{A'}$	768.19	1.63603
n_r	706.52	1.63903
n_C	656.27	1.64210
$n_{C'}$	643.85	1.64298
n_{He-Ne}	632.80	1.64380
n_D	589.29	1.64753
n_d	587.56	1.64769
n_e	546.07	1.65222
n_F	486.13	1.66124
$n_{F'}$	479.99	1.66240
n_g	435.84	1.67254
n_h	404.66	1.68249
n_i	365.01	1.70101

Constants of Dispersion Formula	
A_0	2.63790882E+00
A_1	-1.02830084E-02
A_2	2.41578002E-02
A_3	1.47633602E-03
A_4	-1.10620627E-04
A_5	1.23442258E-05

Density	
ρ (g/cm^3)	2.73

Solarization	
△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.2921
$P_{e,d}$	0.2367
$P_{g,F}$	0.5904
$P'_{d,c'}$	0.2425
$P'_{e,d}$	0.2333
$P'_{g,F'}$	0.5221

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0003
$\triangle P_{g,F}$	0.0030
$\triangle P_{C,t}$	0.0044
$\triangle P_{C,s}$	0.0006

Thermal Properties	
Tg (℃)	534
Ts (℃)	566
$T_{10}^{14.5}$ (℃)	485
T_{10}^{13} (℃)	525
$\alpha_{-50/80℃}$ (10^{-7}/K)	97
$\alpha_{100/300℃}$ (10^{-7}/K)	122
λ (W/(m·K))	0.95

Mechanical Properties	
HK (10^7Pa)	520
F_A	145
E (GPa)	80.5
G (GPa)	32.3
μ	0.247
σ_b (MPa)	97
B (10^{-12}/Pa)	2.59

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	87
-40/-30	91
-30/-20	92
-20/-10	94
-10/0	95
0/10	96
10/20	97
20/30	98
30/40	98
40/50	99
50/60	100
60/70	101
70/80	103
80/90	104
90/100	105
100/110	107
110/120	108
120/130	109
130/140	112
140/150	115
150/160	119

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.923	0.853
2200	0.945	0.893
2000	0.981	0.962
1800	0.992	0.984
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.997	0.993
440	0.996	0.990
420	0.994	0.985
400	0.983	0.963
390	0.966	0.929
380	0.917	0.838
370	0.773	0.594
360	0.434	0.189
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.9	-0.8	-0.6	-0.6	-0.5	-0.2	0.3	1.2	1.3	1.6
-40～-20	-0.7	-0.7	-0.5	-0.5	-0.3	0.0	0.5	1.4	1.4	2.0
-20～0	-0.6	-0.5	-0.4	-0.3	0.0	0.2	0.7	1.5	1.6	2.3
0～20	-0.4	-0.3	-0.3	-0.2	0.1	0.4	0.9	1.6	1.7	2.6
20～40	-0.3	-0.2	-0.2	-0.1	0.3	0.5	1.0	1.7	1.7	2.8
40～60	-0.3	-0.2	0.1	0.1	0.4	0.6	1.3	1.9	1.9	3.1
60～80	-0.3	-0.1	0.3	0.3	0.5	0.8	1.5	2.2	2.2	3.4
80～100	-0.2	0.2	0.5	0.5	0.6	0.9	1.7	2.5	2.5	3.8
100～120	0.0	0.4	0.6	0.7	0.8	1.1	1.9	2.8	2.8	4.1
120～140	0.2	0.5	0.8	0.9	0.9	1.2	2.1	3.1	3.1	4.4
140～160	0.3	0.7	1.0	1.0	1.1	1.4	2.2	3.4	3.5	4.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	378/354

Constants of dn/dt		
D_0	D_1	D_2
-5.06E-06	1.53E-08	-1.99E-11
E_0	E_1	λ_{TK}
7.46E-07	8.91E-10	2.96E-01

H-ZF1B	648338	n_d = 1.64769	υ_d = 33.84	$n_F - n_C$ = 0.019140
		n_e = 1.65222	υ_e = 33.58	$n_{F'} - n_{C'}$ = 0.019421

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.62568
n_{1064}	1064.00	1.62715
n_t	1013.98	1.62838
n_s	852.11	1.63289
$n_{A'}$	768.19	1.63608
n_r	706.52	1.63905
n_C	656.27	1.64209
$n_{C'}$	643.85	1.64298
n_{He-Ne}	632.80	1.64382
n_D	589.29	1.64754
n_d	587.56	1.64769
n_e	546.07	1.65222
n_F	486.13	1.66124
$n_{F'}$	479.99	1.66240
n_g	435.84	1.67254
n_h	404.66	1.68252
n_i	365.01	1.70116

Constants of Dispersion Formula	
A_0	2.65337691E+00
A_1	-1.90021227E-02
A_2	1.44298518E-02
A_3	4.25529366E-03
A_4	-4.77918162E-04
A_5	3.06145958E-05

Density	
ρ (g/cm^3)	2.77

Solarization	
△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2926
$P_{e,d}$	0.2367
$P_{g,F}$	0.5904
$P'_{d,c'}$	0.2425
$P'_{e,d}$	0.2333
$P'_{g,F'}$	0.5221

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0003
$\triangle P_{g,F}$	0.0030
$\triangle P_{C,t}$	0.0122
$\triangle P_{C,s}$	-0.0009

Thermal Properties	
Tg (℃)	580
Ts (℃)	621
$T_{10}^{14.5}$ (℃)	527
T_{10}^{13} (℃)	541
$\alpha_{-50/80℃}$ (10^{-7}/K)	85
$\alpha_{100/300℃}$ (10^{-7}/K)	107
λ (W/(m·K))	1.11

Mechanical Properties	
HK (10^7Pa)	538
F_A	132
E (GPa)	82.0
G (GPa)	32.8
μ	0.252
σ_b (MPa)	81
B (10^{-12}/Pa)	2.79

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	76
-40/-30	78
-30/-20	79
-20/-10	80
-10/0	81
0/10	82
10/20	85
20/30	87
30/40	88
40/50	89
50/60	91
60/70	91
70/80	92
80/90	94
90/100	94
100/110	97
110/120	98
120/130	100
130/140	102
140/150	102
150/160	104

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.930	0.865
2200	0.944	0.891
2000	0.976	0.953
1800	0.985	0.971
1600	0.995	0.991
1400	0.996	0.993
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.998	0.997
500	0.998	0.996
480	0.997	0.995
460	0.996	0.993
440	0.995	0.990
420	0.992	0.985
400	0.980	0.961
390	0.959	0.920
380	0.898	0.807
370	0.726	0.527
360	0.367	0.135
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.2	0.4	0.8	1.0	1.1	1.5	1.7	2.0	2.2	2.8
-40～-20	0.4	0.6	0.9	1.2	1.3	1.7	1.8	2.2	2.3	3.0
-20～0	0.5	0.7	1.1	1.3	1.5	1.9	2.1	2.3	2.4	3.4
0～20	0.6	0.9	1.3	1.4	1.6	2.1	2.3	2.5	2.5	3.6
20～40	0.8	1.1	1.5	1.5	1.7	2.2	2.5	2.5	2.6	3.9
40～60	0.9	1.2	1.6	1.6	1.8	2.4	2.7	2.7	2.9	4.1
60～80	0.9	1.4	1.7	1.8	2.0	2.5	2.8	2.9	3.1	4.3
80～100	0.9	1.5	1.8	1.9	2.1	2.6	3.0	3.0	3.2	4.5
100～120	0.9	1.6	1.8	1.9	2.2	2.7	3.0	3.1	3.3	4.7
120～140	1.0	1.6	2.0	2.1	2.3	2.8	3.1	3.2	3.4	5.1
140～160	1.0	1.7	2.1	2.2	2.4	3.0	3.2	3.3	3.5	5.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	379/356

Constants of dn/dt		
D_0	D_1	D_2
-2.51E-06	1.55E-08	-3.44E-11
E_0	E_1	λ_{TK}
9.45E-07	8.73E-10	1.94E-01

H-ZF2	673322	n_d = 1.67270	υ_d = 32.17	$n_F - n_C$ = 0.020910
		n_e = 1.67764	υ_e = 31.92	$n_{F'} - n_{C'}$ = 0.021227

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.63037
n_{1970}	1970.09	1.63613
n_{1530}	1529.58	1.64275
n_{1129}	1128.64	1.64942
n_{1064}	1064.00	1.65076
n_t	1013.98	1.65190
n_s	852.11	1.65659
$n_{A'}$	768.19	1.66001
n_r	706.52	1.66327
n_C	656.27	1.66661
$n_{C'}$	643.85	1.66756
n_{He-Ne}	632.80	1.66846
n_D	589.29	1.67252
n_d	587.56	1.67270
n_e	546.07	1.67764
n_F	486.13	1.68752
$n_{F'}$	479.99	1.68879
n_g	435.84	1.70004
n_h	404.66	1.71115
n_i	365.01	1.73203

Constants of Dispersion Formula	
A_0	2.71254884E+00
A_1	-1.09981079E-02
A_2	2.69930833E-02
A_3	1.44291354E-03
A_4	-8.34857219E-05
A_5	1.26851609E-05

Density		Solarization	
ρ (g/cm^3)	2.90	△λ (%)	-0.2

Relative Partial Dispersion	
$P_{d,C}$	0.2912
$P_{e,d}$	0.2363
$P_{g,F}$	0.5988
$P'_{d,c'}$	0.2421
$P'_{e,d}$	0.2327
$P'_{g,F'}$	0.5300

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0001
$\triangle P_{g,F}$	0.0086
$\triangle P_{C,t}$	0.0075
$\triangle P_{C,s}$	0.0016

Thermal Properties	
Tg (℃)	592
Ts (℃)	627
$T_{10}^{14.5}$ (℃)	518
T_{10}^{13} (℃)	560
$\alpha_{-50/80℃}$ (10^{-7}/K)	85
$\alpha_{100/300℃}$ (10^{-7}/K)	107
λ (W/(m·K))	1.20

Mechanical Properties	
HK (10^7Pa)	569
F_A	140
E (GPa)	82.1
G (GPa)	33.2
μ	0.237
σ_b (MPa)	89
B (10^{-12}/Pa)	2.53

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	76
-40/-30	79
-30/-20	80
-20/-10	82
-10/0	84
0/10	86
10/20	87
20/30	88
30/40	89
40/50	89
50/60	90
60/70	90
70/80	91
80/90	92
90/100	93
100/110	94
110/120	95
120/130	97
130/140	98
140/150	99
150/160	100

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.930	0.865
2200	0.952	0.906
2000	0.986	0.972
1800	0.996	0.992
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.997	0.993
500	0.995	0.989
480	0.993	0.987
460	0.991	0.984
440	0.989	0.979
420	0.986	0.970
400	0.971	0.937
390	0.943	0.883
380	0.868	0.747
370	0.655	0.426
360	0.225	0.052
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.7	1.0	1.4	1.4	1.5	1.7	2.0	2.9	3.0	3.7
-40～-20	0.7	1.0	1.4	1.4	1.4	1.8	2.0	2.9	3.0	3.8
-20～0	0.7	1.1	1.4	1.5	1.5	1.8	2.1	3.0	3.1	4.0
0～20	0.7	1.1	1.5	1.5	1.6	1.8	2.2	3.1	3.2	4.2
20～40	0.7	1.1	1.5	1.5	1.6	1.8	2.3	3.3	3.3	4.5
40～60	0.7	1.3	1.6	1.6	1.7	2.1	2.5	3.5	3.6	4.5
60～80	0.9	1.4	1.7	1.8	1.8	2.3	2.5	3.7	3.8	4.8
80～100	0.9	1.5	1.8	1.9	2.0	2.4	2.7	4.0	4.0	4.9
100～120	1.0	1.6	2.0	2.1	2.1	2.6	2.8	4.1	4.1	5.1
120～140	1.2	1.8	2.2	2.3	2.3	2.8	3.1	4.2	4.3	5.2
140～160	1.2	1.8	2.3	2.4	2.4	2.9	3.3	4.3	4.4	5.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	395/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	382/360

Constants of dn/dt		
D_0	D_1	D_2
-2.44E-06	1.28E-08	-1.52E-11
E_0	E_1	λ_{TK}
8.60E-07	6.85E-10	2.66E-01

H-ZF3	717295	n_d = 1.71736	υ_d = 29.50	$n_F - n_C$ = 0.024318
		n_e = 1.72310	υ_e = 29.27	$n_{F'} - n_{C'}$ = 0.024707

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.67093
n_{1970}	1970.09	1.67676
n_{1530}	1529.58	1.68361
n_{1129}	1128.64	1.69079
n_{1064}	1064.00	1.69228
n_t	1013.98	1.69355
n_s	852.11	1.69884
$n_{A'}$	768.19	1.70274
n_r	706.52	1.70647
n_C	656.27	1.71032
$n_{C'}$	643.85	1.71142
n_{He-Ne}	632.80	1.71245
n_D	589.29	1.71715
n_d	587.56	1.71736
n_e	546.07	1.72310
n_F	486.13	1.73464
$n_{F'}$	479.99	1.73613
n_g	435.84	1.74933
n_h	404.66	1.76249
n_i	365.01	1.78745

Constants of Dispersion Formula	
A_0	2.84670798E+00
A_1	-1.12350760E-02
A_2	3.23607570E-02
A_3	1.62442342E-03
A_4	-8.05719818E-05
A_5	1.55748376E-05

Density	
ρ (g/cm^3)	3.06

Solarization	
△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2895
$P_{e,d}$	0.2360
$P_{g,F}$	0.6041
$P'_{d,c'}$	0.2404
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5343

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0095
$\triangle P_{C,t}$	0.0066
$\triangle P_{C,s}$	0.0009

Thermal Properties	
Tg (℃)	601
Ts (℃)	634
$T_{10}^{14.5}$ (℃)	538
T_{10}^{13} (℃)	572
$\alpha_{-50/80℃}$ (10^{-7}/K)	84
$\alpha_{100/300℃}$ (10^{-7}/K)	107
λ (W/(m·K))	1.14

Mechanical Properties	
HK (10^7Pa)	578
F_A	164
E (GPa)	88.0
G (GPa)	34.5
μ	0.276
σ_b (MPa)	74
B (10^{-12}/Pa)	2.66

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	75
-40/-30	78
-30/-20	80
-20/-10	82
-10/0	83
0/10	84
10/20	84
20/30	85
30/40	85
40/50	86
50/60	87
60/70	88
70/80	89
80/90	90
90/100	91
100/110	92
110/120	93
120/130	95
130/140	96
140/150	97
150/160	98

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.934	0.872
2200	0.963	0.927
2000	0.993	0.986
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.998	0.996
460	0.998	0.996
440	0.991	0.983
420	0.984	0.969
400	0.957	0.917
390	0.913	0.833
380	0.801	0.641
370	0.534	0.286
360	0.161	0.026
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.4	1.0	1.5	1.5	1.5	1.8	2.1	2.9	3.0	4.1
-40～-20	0.5	1.1	1.4	1.4	1.5	1.8	2.0	3.1	3.1	4.3
-20～0	0.6	1.2	1.4	1.5	1.5	1.9	2.2	3.2	3.3	4.5
0～20	0.6	1.2	1.4	1.5	1.5	1.9	2.2	3.3	3.4	4.7
20～40	0.6	1.3	1.5	1.6	1.6	1.9	2.4	3.5	3.6	5.0
40～60	0.6	1.4	1.6	1.7	1.7	2.0	2.6	3.8	3.8	5.2
60～80	0.8	1.4	1.7	1.7	1.8	2.3	2.6	4.0	4.0	5.5
80～100	0.9	1.6	1.8	1.9	1.9	2.3	2.8	4.1	4.1	5.6
100～120	0.9	1.7	2.0	2.1	2.1	2.4	2.9	4.1	4.2	5.8
120～140	1.1	1.8	2.1	2.2	2.3	2.7	3.1	4.2	4.3	6.0
140～160	1.2	1.9	2.3	2.3	2.4	2.8	3.3	4.3	4.4	6.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	405/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	387/362

Constants of dn/dt		
D_0	D_1	D_2
-2.26E-06	1.29E-08	-2.10E-11
E_0	E_1	λ_{TK}
7.27E-07	5.23E-10	3.08E-01

H-ZF4	728283	n_d = 1.72825	υ_d = 28.32	$n_F - n_C$ = 0.025716
		n_e = 1.73432	υ_e = 28.10	$n_{F'} - n_{C'}$ = 0.026133

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.67946
n_{1970}	1970.09	1.68559
n_{1530}	1529.58	1.69277
n_{1129}	1128.64	1.70031
n_{1064}	1064.00	1.70186
n_t	1013.98	1.70320
n_s	852.11	1.70875
$n_{A'}$	768.19	1.71285
n_r	706.52	1.71677
n_C	656.27	1.72082
$n_{C'}$	643.85	1.72198
n_{He-Ne}	632.80	1.72307
n_D	589.29	1.72803
n_d	587.56	1.72825
n_e	546.07	1.73432
n_F	486.13	1.74654
$n_{F'}$	479.99	1.74811
n_g	435.84	1.76215
n_h	404.66	1.77615
n_i	365.01	1.80264

Constants of Dispersion Formula	
A_0	2.87833860E+00
A_1	-1.18585043E-02
A_2	3.41292688E-02
A_3	1.67815401E-03
A_4	-5.56455694E-05
A_5	1.43620134E-05

Density	
ρ (g/cm^3)	3.05

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2889
$P_{e,d}$	0.2360
$P_{g,F}$	0.6070
$P'_{d,c'}$	0.2399
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5373

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0105
$\triangle P_{C,t}$	0.0078
$\triangle P_{C,s}$	0.0010

Thermal Properties	
Tg (℃)	610
Ts (℃)	641
$T_{10}^{14.5}$ (℃)	546
T_{10}^{13} (℃)	575
$\alpha_{-50/80℃}$ (10^{-7}/K)	87
$\alpha_{100/300℃}$ (10^{-7}/K)	107
λ (W/(m·K))	1.18

Mechanical Properties	
HK (10^7Pa)	548
F_A	158
E (GPa)	87.4
G (GPa)	34.8
μ	0.257
σ_b (MPa)	79
B (10^{-12}/Pa)	2.76

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	80
-40/-30	82
-30/-20	84
-20/-10	86
-10/0	88
0/10	89
10/20	90
20/30	91
30/40	91
40/50	92
50/60	92
60/70	93
70/80	95
80/90	96
90/100	97
100/110	98
110/120	99
120/130	100
130/140	101
140/150	103
150/160	104

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.942	0.887
2200	0.963	0.927
2000	0.994	0.989
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.996	0.992
550	0.994	0.989
500	0.992	0.985
480	0.990	0.980
460	0.987	0.976
440	0.981	0.966
420	0.969	0.942
400	0.930	0.867
390	0.876	0.769
380	0.748	0.563
370	0.460	0.213
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.4	0.7	1.1	1.2	1.3	1.6	2.0	3.1	3.2	3.9
-40～-20	0.4	0.7	1.2	1.2	1.3	1.5	2.0	3.2	3.3	4.2
-20～0	0.4	0.8	1.3	1.3	1.4	1.7	2.3	3.3	3.3	4.5
0～20	0.4	0.8	1.3	1.3	1.4	1.9	2.4	3.6	3.7	4.9
20～40	0.4	0.8	1.4	1.4	1.5	1.9	2.5	3.8	3.8	5.1
40～60	0.5	0.9	1.5	1.6	1.7	2.1	2.6	4.0	4.1	5.3
60～80	0.5	1.0	1.6	1.7	1.8	2.2	2.9	4.2	4.3	5.7
80～100	0.5	1.0	1.7	1.8	1.9	2.3	3.0	4.4	4.5	5.9
100～120	0.6	1.1	1.9	1.9	2.0	2.3	3.1	4.6	4.6	6.1
120～140	0.7	1.2	2.0	2.0	2.1	2.6	3.3	4.7	4.7	6.0
140～160	0.7	1.3	2.1	2.1	2.2	2.6	3.5	4.8	4.9	6.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	392/364

Constants of dn/dt		
D_0	D_1	D_2
-3.28E-06	1.15E-08	-2.60E-11
E_0	E_1	λ_{TK}
1.09E-06	1.15E-09	2.56E-01

H-ZF4GT	728283	n_d = 1.72825	υ_d = 28.32	$n_F - n_C$ = 0.025716
		n_e = 1.73432	υ_e = 28.10	$n_{F'} - n_{C'}$ = 0.026133

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.67946
n_{1970}	1970.09	1.68559
n_{1530}	1529.58	1.69277
n_{1129}	1128.64	1.70031
n_{1064}	1064.00	1.70186
n_t	1013.98	1.70320
n_s	852.11	1.70875
$n_{A'}$	768.19	1.71285
n_r	706.52	1.71677
n_C	656.27	1.72082
$n_{C'}$	643.85	1.72198
n_{He-Ne}	632.80	1.72307
n_D	589.29	1.72803
n_d	587.56	1.72825
n_e	546.07	1.73432
n_F	486.13	1.74654
$n_{F'}$	479.99	1.74811
n_g	435.84	1.76215
n_h	404.66	1.77615
n_i	365.01	1.80264

Constants of Dispersion Formula	
A_0	2.87833860E+00
A_1	-1.18585043E-02
A_2	3.41292688E-02
A_3	1.67815401E-03
A_4	-5.56455694E-05
A_5	1.43620134E-05

Density	
ρ (g/cm^3)	3.05

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2889
$P_{e,d}$	0.2360
$P_{g,F}$	0.6070
$P'_{d,c'}$	0.2399
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5373

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0105
$\triangle P_{C,t}$	0.0078
$\triangle P_{C,s}$	0.0010

Thermal Properties	
Tg (℃)	610
Ts (℃)	641
$T_{10}^{14.5}$ (℃)	546
T_{10}^{13} (℃)	575
$\alpha_{-50/80℃}$ (10^{-7}/K)	87
$\alpha_{100/300℃}$ (10^{-7}/K)	107
λ (W/(m·K))	1.18

Mechanical Properties	
HK (10^7Pa)	548
F_A	158
E (GPa)	87.4
G (GPa)	34.8
μ	0.257
σ_b (MPa)	79
B (10^{-12}/Pa)	2.76

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	80
-40/-30	82
-30/-20	84
-20/-10	86
-10/0	88
0/10	89
10/20	90
20/30	91
30/40	91
40/50	92
50/60	92
60/70	93
70/80	95
80/90	96
90/100	97
100/110	98
110/120	99
120/130	100
130/140	101
140/150	103
150/160	104

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.942	0.887
2200	0.963	0.927
2000	0.994	0.989
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.996	0.993
480	0.995	0.990
460	0.992	0.985
440	0.989	0.978
420	0.979	0.959
400	0.946	0.895
390	0.897	0.804
380	0.773	0.597
370	0.492	0.242
360	0.134	0.018
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.4	0.7	1.1	1.2	1.3	1.6	2.0	3.1	3.2	3.9
-40～-20	0.4	0.7	1.2	1.2	1.3	1.5	2.0	3.2	3.3	4.2
-20～0	0.4	0.8	1.3	1.3	1.4	1.7	2.3	3.3	3.3	4.5
0～20	0.4	0.8	1.3	1.3	1.4	1.9	2.4	3.6	3.7	4.9
20～40	0.4	0.8	1.4	1.4	1.5	1.9	2.5	3.8	3.8	5.1
40～60	0.5	0.9	1.5	1.6	1.7	2.1	2.6	4.0	4.1	5.3
60～80	0.5	1.0	1.6	1.7	1.8	2.2	2.9	4.2	4.3	5.7
80～100	0.5	1.0	1.7	1.8	1.9	2.3	3.0	4.4	4.5	5.9
100～120	0.6	1.1	1.9	1.9	2.0	2.3	3.1	4.6	4.6	6.1
120～140	0.7	1.2	2.0	2.0	2.1	2.6	3.3	4.7	4.7	6.0
140～160	0.7	1.3	2.1	2.1	2.2	2.6	3.5	4.8	4.9	6.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	390/364

Constants of dn/dt		
D_0	D_1	D_2
-3.28E-06	1.15E-08	-2.60E-11
E_0	E_1	λ_{TK}
1.09E-06	1.15E-09	2.56E-01

H-ZF4A	728283	n_d = 1.72825	υ_d = 28.32	$n_F - n_C$ = 0.025716
		n_e = 1.73432	υ_e = 28.10	$n_{F'} - n_{C'}$ = 0.026133

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.70032
n_{1064}	1064.00	1.70187
n_t	1013.98	1.70320
n_s	852.11	1.70873
$n_{A'}$	768.19	1.71283
n_r	706.52	1.71676
n_C	656.27	1.72082
$n_{C'}$	643.85	1.72198
n_{He-Ne}	632.80	1.72306
n_D	589.29	1.72802
n_d	587.56	1.72825
n_e	546.07	1.73432
n_F	486.13	1.74654
$n_{F'}$	479.99	1.74811
n_g	435.84	1.76215
n_h	404.66	1.77622
n_i	365.01	1.80305

Constants of Dispersion Formula	
A_0	2.87790099E+00
A_1	-1.14975391E-02
A_2	3.40752512E-02
A_3	1.83854310E-03
A_4	-1.04547399E-04
A_5	1.87465641E-05

Density		Solarization	
ρ (g/cm^3)	3.05	△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2889
$P_{e,d}$	0.2360
$P_{g,F}$	0.6070
$P'_{d,c'}$	0.2399
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5373

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0105
$\triangle P_{C,t}$	0.0078
$\triangle P_{C,s}$	0.0018

Thermal Properties	
Tg (℃)	594
Ts (℃)	621
$T_{10}^{14.5}$ (℃)	530
T_{10}^{13} (℃)	559
$\alpha_{-50/80℃}$ (10^{-7}/K)	86
$\alpha_{100/300℃}$ (10^{-7}/K)	105
λ (W/(m·K))	1.12

Mechanical Properties	
HK (10^7Pa)	551
F_A	210
E (GPa)	90.7
G (GPa)	36.0
μ	0.262
σ_b (MPa)	73
B (10^{-12}/Pa)	2.65

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	79
-40/-30	82
-30/-20	84
-20/-10	84
-10/0	85
0/10	86
10/20	87
20/30	90
30/40	91
40/50	93
50/60	94
60/70	94
70/80	95
80/90	95
90/100	97
100/110	97
110/120	99
120/130	100
130/140	100
140/150	101
150/160	103

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.922	0.851
2200	0.951	0.904
2000	0.982	0.965
1800	0.990	0.980
1600	0.996	0.992
1400	0.997	0.994
1200	0.999	0.997
1060	0.999	0.997
1000	0.999	0.997
950	0.999	0.997
900	0.999	0.997
850	0.999	0.997
800	0.999	0.997
750	0.999	0.997
700	0.998	0.997
650	0.998	0.996
600	0.997	0.994
550	0.996	0.992
500	0.994	0.987
480	0.992	0.983
460	0.989	0.979
440	0.984	0.970
420	0.974	0.950
400	0.940	0.884
390	0.887	0.788
380	0.762	0.582
370	0.477	0.228
360	0.068	0.010
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	-1.2	-1.0	-0.7	-0.6	-0.5	-0.3	0.4	1.3	1.4	1.9
-40 ~ -20	-1.2	-0.9	-0.5	-0.4	-0.4	-0.1	0.6	1.5	1.7	2.4
-20 ~ 0	-1.1	-0.7	-0.3	-0.2	-0.1	0.3	0.9	1.6	1.8	2.7
0 ~ 20	-1.1	-0.5	-0.2	-0.1	0.1	0.4	1.2	1.7	1.9	2.9
20 ~ 40	-1.0	-0.3	0.0	0.1	0.2	0.6	1.4	1.8	2.0	3.1
40 ~ 60	-1.0	-0.3	0.2	0.3	0.4	0.8	1.6	1.9	2.2	3.4
60 ~ 80	-0.9	-0.1	0.3	0.4	0.5	1.0	1.8	2.3	2.5	3.5
80 ~ 100	-0.9	-0.1	0.5	0.5	0.6	1.2	2.0	2.6	2.8	4.0
100 ~ 120	-0.8	0.1	0.7	0.7	0.8	1.3	2.1	2.9	3.1	4.2
120 ~ 140	-0.7	0.3	0.8	0.9	0.9	1.7	2.5	3.2	3.4	4.4
140 ~ 160	-0.7	0.4	0.9	1.0	1.1	1.8	2.6	3.5	3.6	4.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	391/364

Constants of dn/dt		
D_0	D_1	D_2
-6.13E-06	1.41E-08	-2.55E-11
E_0	E_1	λ_{TK}
1.37E-06	1.29E-09	1.57E-01

H-ZF4AGT	728283	$n_d = 1.72825$	$\upsilon_d = 28.32$	$n_F - n_C = 0.025716$
		$n_e = 1.73432$	$\upsilon_e = 28.10$	$n_{F'} - n_{C'} = 0.026133$

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.70032
n_{1064}	1064.00	1.70187
n_t	1013.98	1.70320
n_s	852.11	1.70873
$n_{A'}$	768.19	1.71283
n_r	706.52	1.71676
n_C	656.27	1.72082
$n_{C'}$	643.85	1.72198
n_{He-Ne}	632.80	1.72306
n_D	589.29	1.72802
n_d	587.56	1.72825
n_e	546.07	1.73432
n_F	486.13	1.74654
$n_{F'}$	479.99	1.74811
n_g	435.84	1.76215
n_h	404.66	1.77622
n_i	365.01	1.80305

Constants of Dispersion Formula	
A_0	2.87790099E+00
A_1	-1.14975391E-02
A_2	3.40752512E-02
A_3	1.83854310E-03
A_4	-1.04547399E-04
A_5	1.87465641E-05

Density	
ρ (g/cm^3)	3.05

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2889
$P_{e,d}$	0.2360
$P_{g,F}$	0.6070
$P'_{d,c'}$	0.2399
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5373

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0105
$\triangle P_{C,t}$	0.0078
$\triangle P_{C,s}$	0.0018

Thermal Properties	
Tg (℃)	594
Ts (℃)	621
$T_{10}^{14.5}$ (℃)	530
T_{10}^{13} (℃)	559
$\alpha_{-50/80℃}$ (10^{-7}/K)	86
$\alpha_{100/300℃}$ (10^{-7}/K)	105
λ (W/(m·K))	1.12

Mechanical Properties	
HK (10^7Pa)	551
F_A	210
E (GPa)	90.7
G (GPa)	36.0
μ	0.262
σ_b (MPa)	73
B (10^{-12}/Pa)	

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	79
-40/-30	82
-30/-20	84
-20/-10	84
-10/0	85
0/10	86
10/20	87
20/30	90
30/40	91
40/50	93
50/60	94
60/70	94
70/80	95
80/90	95
90/100	97
100/110	97
110/120	99
120/130	100
130/140	100
140/150	101
150/160	103

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.902	0.814
2200	0.938	0.880
2000	0.970	0.940
1800	0.982	0.964
1600	0.994	0.987
1400	0.996	0.992
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.998	0.997
650	0.998	0.996
600	0.998	0.996
550	0.997	0.994
500	0.995	0.989
480	0.993	0.986
460	0.991	0.981
440	0.987	0.974
420	0.978	0.957
400	0.949	0.900
390	0.898	0.806
380	0.775	0.601
370	0.493	0.243
360	0.136	0.019
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	-1.2	-1.0	-0.7	-0.6	-0.5	-0.3	0.4	1.3	1.4	1.9
-40 ~ -20	-1.2	-0.9	-0.5	-0.4	-0.4	-0.1	0.6	1.5	1.7	2.4
-20 ~ 0	-1.1	-0.7	-0.3	-0.2	-0.1	0.3	0.9	1.6	1.8	2.7
0 ~ 20	-1.1	-0.5	-0.2	-0.1	0.1	0.4	1.2	1.7	1.9	2.9
20 ~ 40	-1.0	-0.3	0.0	0.1	0.2	0.6	1.4	1.8	2.0	3.1
40 ~ 60	-1.0	-0.3	0.2	0.3	0.4	0.8	1.6	1.9	2.2	3.4
60 ~ 80	-0.9	-0.1	0.3	0.4	0.5	1.0	1.8	2.3	2.5	3.5
80 ~ 100	-0.9	-0.1	0.5	0.5	0.6	1.2	2.0	2.6	2.8	4.0
100 ~ 120	-0.8	0.1	0.7	0.7	0.8	1.3	2.1	2.9	3.1	4.2
120 ~ 140	-0.7	0.3	0.8	0.9	0.9	1.7	2.5	3.2	3.4	4.4
140 ~ 160	-0.7	0.4	0.9	1.0	1.1	1.8	2.6	3.5	3.6	4.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	390/364

Constants of dn/dt		
D_0	D_1	D_2
-6.13E-06	1.41E-08	-2.55E-11
E_0	E_1	λ_{TK}
1.37E-06	1.29E-09	1.57E-01

H-ZF5	740283	n_d = 1.74000	υ_d = 28.30	$n_F - n_C$ = 0.026152
		n_e = 1.74617	υ_e = 28.07	$n_{F'} - n_{C'}$ = 0.026584

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.69091
n_{1970}	1970.09	1.69701
n_{1530}	1529.58	1.70416
n_{1129}	1128.64	1.71169
n_{1064}	1064.00	1.71325
n_t	1013.98	1.71459
n_s	852.11	1.72020
$n_{A'}$	768.19	1.72435
n_r	706.52	1.72833
n_C	656.27	1.73245
$n_{C'}$	643.85	1.73363
n_{He-Ne}	632.80	1.73474
n_D	589.29	1.73977
n_d	587.56	1.74000
n_e	546.07	1.74617
n_F	486.13	1.75861
$n_{F'}$	479.99	1.76021
n_g	435.84	1.77450
n_h	404.66	1.78876
n_i	365.01	1.81588

Constants of Dispersion Formula	
A_0	2.91687382E+00
A_1	-1.18527790E-02
A_2	3.42689145E-02
A_3	2.02963652E-03
A_4	-1.14580838E-04
A_5	1.85928308E-05

Density	
ρ (g/cm^3)	3.09

Solarization	
△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.2887
$P_{e,d}$	0.2359
$P_{g,F}$	0.6076
$P'_{d,c'}$	0.2396
$P'_{e,d}$	0.2321
$P'_{g,F'}$	0.5375

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0011
$\triangle P_{g,F}$	0.0110
$\triangle P_{C,t}$	0.0057
$\triangle P_{C,s}$	0.0001

Thermal Properties	
Tg (℃)	610
Ts (℃)	640
$T_{10}^{14.5}$ (℃)	543
T_{10}^{13} (℃)	574
$\alpha_{-50/80℃}$ (10^{-7}/K)	86
$\alpha_{100/300℃}$ (10^{-7}/K)	107
λ (W/(m·K))	1.15

Mechanical Properties	
HK (10^7Pa)	580
F_A	162
E (GPa)	91.2
G (GPa)	35.6
μ	0.283
σ_b (MPa)	62
B (10^{-12}/Pa)	2.58

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	76
-40/-30	78
-30/-20	80
-20/-10	82
-10/0	83
0/10	84
10/20	84
20/30	85
30/40	86
40/50	86
50/60	87
60/70	87
70/80	88
80/90	89
90/100	90
100/110	91
110/120	93
120/130	94
130/140	95
140/150	97
150/160	98

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.937	0.878
2200	0.962	0.925
2000	0.991	0.982
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.997	0.994
550	0.995	0.992
500	0.992	0.987
480	0.990	0.985
460	0.984	0.973
440	0.980	0.966
420	0.971	0.949
400	0.935	0.875
390	0.892	0.800
380	0.776	0.603
370	0.491	0.236
360	0.109	0.013
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.8	-0.5	-0.3	-0.3	-0.2	0.1	1.0	1.7	1.8	3.2
-40～-20	-0.6	-0.3	-0.2	-0.2	-0.1	0.2	1.2	1.8	2.0	3.4
-20～0	-0.2	0.0	0.1	0.1	0.1	0.6	1.4	2.2	2.3	3.7
0～20	0.0	0.2	0.3	0.3	0.3	0.8	1.9	2.5	2.6	3.9
20～40	0.0	0.3	0.6	0.7	0.8	1.1	1.9	2.6	2.7	4.4
40～60	0.2	0.5	0.9	1.0	1.1	1.4	2.1	2.9	3.0	4.7
60～80	0.3	0.8	1.3	1.4	1.5	1.8	2.5	3.3	3.4	5.2
80～100	0.4	1.0	1.6	1.7	1.9	2.1	2.8	3.8	3.9	5.7
100～120	0.5	1.2	1.9	2.1	2.2	2.2	3.1	4.2	4.3	6.1
120～140	0.8	1.4	2.2	2.4	2.5	2.6	3.3	4.4	4.5	6.4
140～160	1.0	1.5	2.3	2.5	2.6	2.8	3.5	4.7	4.8	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/362

Constants of dn/dt		
D_0	D_1	D_2
-4.00E-06	1.95E-08	-2.24E-11
E_0	E_1	λ_{TK}
7.71E-07	5.88E-10	3.10E-01

H-ZF5GT	740283	n_d = 1.74000	υ_d = 28.30	$n_F - n_C$ = 0.026152
		n_e = 1.74617	υ_e = 28.07	$n_{F'} - n_{C'}$ = 0.026584

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.69091
n_{1970}	1970.09	1.69701
n_{1530}	1529.58	1.70416
n_{1129}	1128.64	1.71169
n_{1064}	1064.00	1.71325
n_t	1013.98	1.71459
n_s	852.11	1.72020
$n_{A'}$	768.19	1.72435
n_r	706.52	1.72833
n_C	656.27	1.73245
$n_{C'}$	643.85	1.73363
n_{He-Ne}	632.80	1.73474
n_D	589.29	1.73977
n_d	587.56	1.74000
n_e	546.07	1.74617
n_F	486.13	1.75861
$n_{F'}$	479.99	1.76021
n_g	435.84	1.77450
n_h	404.66	1.78876
n_i	365.01	1.81588

Constants of Dispersion Formula	
A_0	2.91687382E+00
A_1	-1.18527790E-02
A_2	3.42689145E-02
A_3	2.02963652E-03
A_4	-1.14580838E-04
A_5	1.85928308E-05

Density	
ρ (g/cm^3)	3.09

Solarization	
△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.2887
$P_{e,d}$	0.2359
$P_{g,F}$	0.6076
$P'_{d,c'}$	0.2396
$P'_{e,d}$	0.2321
$P'_{g,F'}$	0.5375

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0011
$\triangle P_{g,F}$	0.0110
$\triangle P_{C,t}$	0.0057
$\triangle P_{C,s}$	0.0001

Thermal Properties	
Tg (℃)	610
Ts (℃)	640
$T_{10}^{14.5}$ (℃)	543
T_{10}^{13} (℃)	574
$\alpha_{-50/80℃}$ (10^{-7}/K)	86
$\alpha_{100/300℃}$ (10^{-7}/K)	107
λ (W/(m·K))	1.15

Mechanical Properties	
HK (10^7Pa)	580
F_A	162
E (GPa)	91.2
G (GPa)	35.6
μ	0.283
σ_b (MPa)	62
B (10^{-12}/Pa)	2.58

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	76
-40/-30	78
-30/-20	80
-20/-10	82
-10/0	83
0/10	84
10/20	84
20/30	85
30/40	86
40/50	86
50/60	87
60/70	87
70/80	88
80/90	89
90/100	90
100/110	91
110/120	93
120/130	94
130/140	95
140/150	97
150/160	98

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.937	0.878
2200	0.962	0.925
2000	0.991	0.982
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.997	0.994
550	0.995	0.992
500	0.992	0.988
480	0.990	0.985
460	0.988	0.981
440	0.985	0.973
420	0.978	0.957
400	0.952	0.907
390	0.912	0.834
380	0.807	0.657
370	0.535	0.292
360	0.113	0.016
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.8	-0.5	-0.3	-0.3	-0.2	0.1	1.0	1.7	1.8	3.2
-40～-20	-0.6	-0.3	-0.2	-0.2	-0.1	0.2	1.2	1.8	2.0	3.4
-20～0	-0.2	0.0	0.1	0.1	0.1	0.6	1.4	2.2	2.3	3.7
0～20	0.0	0.2	0.3	0.3	0.3	0.8	1.9	2.5	2.6	3.9
20～40	0.0	0.3	0.6	0.7	0.8	1.1	1.9	2.6	2.7	4.4
40～60	0.2	0.5	0.9	1.0	1.1	1.4	2.1	2.9	3.0	4.7
60～80	0.3	0.8	1.3	1.4	1.5	1.8	2.5	3.3	3.4	5.2
80～100	0.4	1.0	1.6	1.7	1.9	2.1	2.8	3.8	3.9	5.7
100～120	0.5	1.2	1.9	2.1	2.2	2.2	3.1	4.2	4.3	6.1
120～140	0.8	1.4	2.2	2.4	2.5	2.6	3.3	4.4	4.5	6.4
140～160	1.0	1.5	2.3	2.5	2.6	2.8	3.5	4.7	4.8	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	388/362

Constants of dn/dt		
D_0	D_1	D_2
-4.00E-06	1.95E-08	-2.24E-11
E_0	E_1	λ_{TK}
7.71E-07	5.88E-10	3.10E-01

H-ZF6	755275	n_d = 1.75520	υ_d = 27.53	$n_F - n_C$ = 0.027432
		n_e = 1.76167	υ_e = 27.31	$n_{F'} - n_{C'}$ = 0.027888

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70459
n_{1970}	1970.09	1.71072
n_{1530}	1529.58	1.71794
n_{1129}	1128.64	1.72566
n_{1064}	1064.00	1.72728
n_t	1013.98	1.72867
n_s	852.11	1.73450
$n_{A'}$	768.19	1.73882
n_r	706.52	1.74299
n_C	656.27	1.74729
$n_{C'}$	643.85	1.74852
n_{He-Ne}	632.80	1.74968
n_D	589.29	1.75496
n_d	587.56	1.75520
n_e	546.07	1.76167
n_F	486.13	1.77472
$n_{F'}$	479.99	1.77641
n_g	435.84	1.79141
n_h	404.66	1.80646
n_i	365.01	1.83529

Constants of Dispersion Formula	
A_0	2.96351629E+00
A_1	-1.19513676E-02
A_2	3.59998931E-02
A_3	2.29903731E-03
A_4	-1.58881885E-04
A_5	2.32603789E-05

Density	
ρ (g/cm^3)	3.15

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2883
$P_{e,d}$	0.2359
$P_{g,F}$	0.6084
$P'_{d,c'}$	0.2395
$P'_{e,d}$	0.2320
$P'_{g,F'}$	0.5379

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0007
$\triangle P_{g,F}$	0.0105
$\triangle P_{C,t}$	0.0053
$\triangle P_{C,s}$	-0.0002

Thermal Properties	
Tg (℃)	604
Ts (℃)	635
$T_{10}^{14.5}$ (℃)	536
T_{10}^{13} (℃)	575
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	109
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	525
F_A	170
E (GPa)	92.0
G (GPa)	35.6
μ	0.290
σ_b (MPa)	81
B (10^{-12}/Pa)	2.54

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	81
-40/-30	84
-30/-20	86
-20/-10	88
-10/0	90
0/10	91
10/20	92
20/30	93
30/40	94
40/50	95
50/60	96
60/70	97
70/80	98
80/90	98
90/100	99
100/110	100
110/120	100
120/130	101
130/140	102
140/150	104
150/160	104

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.935	0.876
2200	0.968	0.937
2000	0.992	0.984
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.995	0.991
550	0.996	0.992
500	0.994	0.988
480	0.990	0.984
460	0.988	0.978
440	0.983	0.966
420	0.975	0.950
400	0.941	0.884
390	0.897	0.802
380	0.774	0.603
370	0.463	0.213
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.1	0.6	0.9	0.9	1.0	1.4	1.9	2.8	2.9	4.3
-40～-20	0.0	0.6	0.9	0.9	1.0	1.4	1.9	2.9	2.9	4.4
-20～0	0.0	0.7	1.0	1.0	1.0	1.6	2.0	3.1	3.2	4.7
0～20	0.0	0.7	1.1	1.1	1.1	1.7	2.2	3.3	3.3	4.8
20～40	0.2	0.8	1.2	1.2	1.2	1.8	2.2	3.4	3.5	5.1
40～60	0.2	0.9	1.3	1.3	1.4	1.8	2.4	3.6	3.7	5.3
60～80	0.3	1.1	1.5	1.5	1.6	2.0	2.6	3.9	4.0	5.7
80～100	0.3	1.1	1.6	1.7	1.8	2.2	3.0	4.3	4.3	5.9
100～120	0.5	1.3	1.7	1.9	2.0	2.4	3.1	4.5	4.6	6.3
120～140	0.7	1.5	2.0	2.1	2.1	2.7	3.3	4.7	4.8	6.5
140～160	0.9	1.7	2.1	2.2	2.2	2.8	3.5	4.9	5.0	6.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/363

Constants of dn/dt		
D_0	D_1	D_2
-3.39E-06	1.26E-08	-1.40E-11
E_0	E_1	λ_{TK}
8.90E-07	8.03E-10	2.96E-01

H-ZF6GT	755275	n_d = 1.75520	υ_d = 27.53	$n_F - n_C$ = 0.027432
		n_e = 1.76167	υ_e = 27.31	$n_{F'} - n_{C'}$ = 0.027888

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70459
n_{1970}	1970.09	1.71072
n_{1530}	1529.58	1.71794
n_{1129}	1128.64	1.72566
n_{1064}	1064.00	1.72728
n_t	1013.98	1.72867
n_s	852.11	1.73450
$n_{A'}$	768.19	1.73882
n_r	706.52	1.74299
n_C	656.27	1.74729
$n_{C'}$	643.85	1.74852
n_{He-Ne}	632.80	1.74968
n_D	589.29	1.75496
n_d	587.56	1.75520
n_e	546.07	1.76167
n_F	486.13	1.77472
$n_{F'}$	479.99	1.77641
n_g	435.84	1.79141
n_h	404.66	1.80646
n_i	365.01	1.83529

Constants of Dispersion Formula	
A_0	2.96351629E+00
A_1	-1.19513676E-02
A_2	3.59998931E-02
A_3	2.29903731E-03
A_4	-1.58881885E-04
A_5	2.32603789E-05

Density	
ρ (g/cm^3)	3.15

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2883
$P_{e,d}$	0.2359
$P_{g,F}$	0.6084
$P'_{d,c'}$	0.2395
$P'_{e,d}$	0.2320
$P'_{g,F'}$	0.5379

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0007
$\triangle P_{g,F}$	0.0105
$\triangle P_{C,t}$	0.0053
$\triangle P_{C,s}$	-0.0002

Thermal Properties	
Tg (℃)	604
Ts (℃)	635
$T_{10}^{14.5}$ (℃)	536
T_{10}^{13} (℃)	575
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	109
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	525
F_A	170
E (GPa)	92.0
G (GPa)	35.6
μ	0.290
σ_b (MPa)	81
B (10^{-12}/Pa)	2.54

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	81
-40/-30	84
-30/-20	86
-20/-10	88
-10/0	90
0/10	91
10/20	92
20/30	93
30/40	94
40/50	95
50/60	96
60/70	97
70/80	98
80/90	98
90/100	99
100/110	100
110/120	100
120/130	101
130/140	102
140/150	104
150/160	104

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.937	0.880
2200	0.969	0.939
2000	0.992	0.984
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.997	0.994
550	0.996	0.993
500	0.994	0.988
480	0.992	0.986
460	0.989	0.980
440	0.985	0.975
420	0.977	0.958
400	0.950	0.909
390	0.911	0.835
380	0.799	0.646
370	0.512	0.263
360	0.094	0.014
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.1	0.6	0.9	0.9	1.0	1.4	1.9	2.8	2.9	4.3
-40～-20	0.0	0.6	0.9	0.9	1.0	1.4	1.9	2.9	2.9	4.4
-20～0	0.0	0.7	1.0	1.0	1.0	1.6	2.0	3.1	3.2	4.7
0～20	0.0	0.7	1.1	1.1	1.1	1.7	2.2	3.3	3.3	4.8
20～40	0.2	0.8	1.2	1.2	1.2	1.8	2.2	3.4	3.5	5.1
40～60	0.2	0.9	1.3	1.3	1.4	1.8	2.4	3.6	3.7	5.3
60～80	0.3	1.1	1.5	1.5	1.6	2.0	2.6	3.9	4.0	5.7
80～100	0.3	1.1	1.6	1.7	1.8	2.2	3.0	4.3	4.3	5.9
100～120	0.5	1.3	1.7	1.9	2.0	2.4	3.1	4.5	4.6	6.3
120～140	0.7	1.5	2.0	2.1	2.1	2.7	3.3	4.7	4.8	6.5
140～160	0.9	1.7	2.1	2.2	2.2	2.8	3.5	4.9	5.0	6.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	387/363

Constants of dn/dt		
D_0	D_1	D_2
-3.39E-06	1.26E-08	-1.40E-11
E_0	E_1	λ_{TK}
8.90E-07	8.03E-10	2.96E-01

H-ZF7L	805255	n_d = 1.80518	υ_d = 25.46	$n_F - n_C$ = 0.031630
		n_e = 1.81263	υ_e = 25.25	$n_{F'} - n_{C'}$ = 0.032180

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.74928
n_{1970}	1970.09	1.75560
n_{1530}	1529.58	1.76321
n_{1129}	1128.64	1.77158
n_{1064}	1064.00	1.77339
n_t	1013.98	1.77494
n_s	852.11	1.78150
$n_{A'}$	768.19	1.78642
n_r	706.52	1.79118
n_C	656.27	1.79611
$n_{C'}$	643.85	1.79752
n_{He-Ne}	632.80	1.79883
n_D	589.29	1.80491
n_d	587.56	1.80518
n_e	546.07	1.81263
n_F	486.13	1.82774
$n_{F'}$	479.99	1.82970
n_g	435.84	1.84721
n_h	404.66	1.86480
n_i	365.01	1.89846

Constants of Dispersion Formula	
A_0	3.11898504E+00
A_1	-1.24052596E-02
A_2	4.32862244E-02
A_3	2.26049835E-03
A_4	-7.69462999E-05
A_5	2.11453139E-05

Density	
ρ (g/cm^3)	3.38

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2868
$P_{e,d}$	0.2355
$P_{g,F}$	0.6156
$P'_{d,c'}$	0.2380
$P'_{e,d}$	0.2315
$P'_{g,F'}$	0.5441

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0016
$\triangle P_{g,F}$	0.0142
$\triangle P_{C,t}$	0.0058
$\triangle P_{C,s}$	0.0004

Thermal Properties	
Tg (℃)	606
Ts (℃)	636
$T_{10}^{14.5}$ (℃)	565
T_{10}^{13} (℃)	581
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	109
λ (W/(m·K))	0.99

Mechanical Properties	
HK (10^7Pa)	523
F_A	186
E (GPa)	93.6
G (GPa)	36.1
μ	0.296
σ_b (MPa)	77
B (10^{-12}/Pa)	2.67

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	80
-40/-30	82
-30/-20	85
-20/-10	87
-10/0	89
0/10	90
10/20	91
20/30	92
30/40	92
40/50	93
50/60	93
60/70	94
70/80	95
80/90	95
90/100	97
100/110	98
110/120	99
120/130	100
130/140	102
140/150	102
150/160	103

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.927	0.863
2200	0.960	0.920
2000	0.979	0.956
1800	0.987	0.976
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.997
750	0.998	0.997
700	0.998	0.997
650	0.998	0.996
600	0.998	0.997
550	0.997	0.995
500	0.994	0.988
480	0.992	0.984
460	0.989	0.979
440	0.984	0.969
420	0.974	0.948
400	0.946	0.894
390	0.906	0.821
380	0.799	0.638
370	0.527	0.278
360	0.148	0.022
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.8	-0.2	0.2	0.3	0.4	0.6	1.2	2.4	2.5	3.7
-40～-20	-0.8	-0.1	0.3	0.4	0.4	0.7	1.3	2.5	2.6	4.0
-20～0	-0.8	-0.1	0.3	0.4	0.5	0.8	1.4	2.6	2.7	4.3
0～20	-0.8	-0.1	0.3	0.4	0.5	0.9	1.5	2.9	3.0	4.7
20～40	-0.8	-0.1	0.4	0.5	0.6	1.0	1.6	3.0	3.1	5.0
40～60	-0.7	0.1	0.5	0.6	0.7	1.1	1.8	3.3	3.4	5.3
60～80	-0.7	0.1	0.7	0.8	0.9	1.3	2.0	3.6	3.7	5.7
80～100	-0.6	0.2	0.9	1.0	1.1	1.5	2.1	3.8	3.9	5.9
100～120	-0.4	0.3	1.0	1.1	1.2	1.7	2.3	4.0	4.1	6.1
120～140	-0.3	0.4	1.1	1.2	1.3	1.8	2.4	4.2	4.3	6.4
140～160	-0.2	0.5	1.2	1.3	1.4	2.0	2.6	4.5	4.6	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	425/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	388/361

Constants of dn/dt		
D_0	D_1	D_2
-4.83E-06	1.06E-08	-1.80E-11
E_0	E_1	λ_{TK}
9.79E-07	1.08E-09	2.95E-01

H-ZF7LGT	805255	n_d = 1.80518	υ_d = 25.46	$n_F - n_C$ = 0.031630
		n_e = 1.81263	υ_e = 25.25	$n_{F'} - n_{C'}$ = 0.032180

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.74928
n_{1970}	1970.09	1.75560
n_{1530}	1529.58	1.76321
n_{1129}	1128.64	1.77158
n_{1064}	1064.00	1.77339
n_t	1013.98	1.77494
n_s	852.11	1.78150
$n_{A'}$	768.19	1.78642
n_r	706.52	1.79118
n_C	656.27	1.79611
$n_{C'}$	643.85	1.79752
n_{He-Ne}	632.80	1.79883
n_D	589.29	1.80491
n_d	587.56	1.80518
n_e	546.07	1.81263
n_F	486.13	1.82774
$n_{F'}$	479.99	1.82970
n_g	435.84	1.84721
n_h	404.66	1.86480
n_i	365.01	1.89846

Constants of Dispersion Formula	
A_0	3.11898504E+00
A_1	-1.24052596E-02
A_2	4.32862244E-02
A_3	2.26049835E-03
A_4	-7.69462999E-05
A_5	2.11453139E-05

Density	
ρ (g/cm^3)	3.38

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2868
$P_{e,d}$	0.2355
$P_{g,F}$	0.6156
$P'_{d,c'}$	0.2380
$P'_{e,d}$	0.2315
$P'_{g,F'}$	0.5441

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0016
$\triangle P_{g,F}$	0.0142
$\triangle P_{C,t}$	0.0058
$\triangle P_{C,s}$	0.0004

Thermal Properties	
Tg (℃)	606
Ts (℃)	636
$T_{10}^{14.5}$ (℃)	565
T_{10}^{13} (℃)	581
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	109
λ (W/(m·K))	0.99

Mechanical Properties	
HK (10^7Pa)	523
F_A	186
E (GPa)	93.6
G (GPa)	36.1
μ	0.296
σ_b (MPa)	77
B (10^{-12}/Pa)	2.67

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	80
-40/-30	82
-30/-20	85
-20/-10	87
-10/0	89
0/10	90
10/20	91
20/30	92
30/40	92
40/50	93
50/60	93
60/70	94
70/80	95
80/90	95
90/100	97
100/110	98
110/120	99
120/130	100
130/140	102
140/150	102
150/160	103

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.951	0.905
2200	0.974	0.949
2000	0.990	0.980
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.996	0.993
500	0.994	0.988
480	0.992	0.983
460	0.990	0.980
440	0.987	0.971
420	0.977	0.953
400	0.952	0.904
390	0.913	0.830
380	0.815	0.669
370	0.548	0.301
360	0.157	0.025
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.8	-0.2	0.2	0.3	0.4	0.6	1.2	2.4	2.5	3.7
-40～-20	-0.8	-0.1	0.3	0.4	0.4	0.7	1.3	2.5	2.6	4.0
-20～0	-0.8	-0.1	0.3	0.4	0.5	0.8	1.4	2.6	2.7	4.3
0～20	-0.8	-0.1	0.3	0.4	0.5	0.9	1.5	2.9	3.0	4.7
20～40	-0.8	-0.1	0.4	0.5	0.6	1.0	1.6	3.0	3.1	5.0
40～60	-0.7	0.1	0.5	0.6	0.7	1.1	1.8	3.3	3.4	5.3
60～80	-0.7	0.1	0.7	0.8	0.9	1.3	2.0	3.6	3.7	5.7
80～100	-0.6	0.2	0.9	1.0	1.1	1.5	2.1	3.8	3.9	5.9
100～120	-0.4	0.3	1.0	1.1	1.2	1.7	2.3	4.0	4.1	6.1
120～140	-0.3	0.4	1.1	1.2	1.3	1.8	2.4	4.2	4.3	6.4
140～160	-0.2	0.5	1.2	1.3	1.4	2.0	2.6	4.5	4.6	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	420/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	387/361

Constants of dn/dt		
D_0	D_1	D_2
-4.83E-06	1.06E-08	-1.80E-11
E_0	E_1	λ_{TK}
9.79E-07	1.08E-09	2.95E-01

H-ZF10	689312	n_d = 1.68893	υ_d = 31.16	$n_F - n_C$ = 0.022109
		n_e = 1.69416	υ_e = 30.92	$n_{F'} - n_{C'}$ = 0.022450

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.64510
n_{1970}	1970.09	1.65089
n_{1530}	1529.58	1.65759
n_{1129}	1128.64	1.66444
n_{1064}	1064.00	1.66585
n_t	1013.98	1.66704
n_s	852.11	1.67195
$n_{A'}$	768.19	1.67555
n_r	706.52	1.67898
n_C	656.27	1.68251
$n_{C'}$	643.85	1.68351
n_{He-Ne}	632.80	1.68445
n_D	589.29	1.68874
n_d	587.56	1.68893
n_e	546.07	1.69416
n_F	486.13	1.70462
$n_{F'}$	479.99	1.70596
n_g	435.84	1.71786
n_h	404.66	1.72964
n_i	365.01	1.75182

Constants of Dispersion Formula	
A_0	2.76089226E+00
A_1	-1.10845008E-02
A_2	2.89559966E-02
A_3	1.51547191E-03
A_4	-8.76539698E-05
A_5	1.38043475E-05

Density	
ρ (g/cm^3)	2.93

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2904
$P_{e,d}$	0.2366
$P_{g,F}$	0.5989
$P'_{d,c'}$	0.2414
$P'_{e,d}$	0.2330
$P'_{g,F'}$	0.5301

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0001
$\triangle P_{g,F}$	0.0070
$\triangle P_{C,t}$	0.0086
$\triangle P_{C,s}$	0.0024

Thermal Properties	
Tg (℃)	597
Ts (℃)	631
$T_{10}^{14.5}$ (℃)	523
T_{10}^{13} (℃)	561
$\alpha_{-50/80℃}$ (10^{-7}/K)	89
$\alpha_{100/300℃}$ (10^{-7}/K)	109
λ (W/(m·K))	1.11

Mechanical Properties	
HK (10^7Pa)	545
F_A	139
E (GPa)	85.4
G (GPa)	34.7
μ	0.232
σ_b (MPa)	82
B (10^{-12}/Pa)	2.71

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	79
-40/-30	82
-30/-20	84
-20/-10	87
-10/0	89
0/10	90
10/20	91
20/30	92
30/40	93
40/50	94
50/60	94
60/70	95
70/80	95
80/90	96
90/100	97
100/110	98
110/120	99
120/130	100
130/140	102
140/150	103
150/160	104

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.944	0.890
2200	0.966	0.933
2000	0.993	0.986
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.996	0.992
480	0.994	0.988
460	0.992	0.984
440	0.990	0.980
420	0.985	0.970
400	0.971	0.931
390	0.941	0.879
380	0.861	0.741
370	0.652	0.427
360	0.256	0.075
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.7	1.2	1.6	1.6	1.7	1.9	2.2	3.1	3.1	4.1
-40～-20	0.7	1.2	1.6	1.6	1.7	2.0	2.4	3.2	3.2	4.3
-20～0	0.8	1.2	1.6	1.6	1.7	2.1	2.4	3.3	3.3	4.4
0～20	0.7	1.3	1.7	1.7	1.7	2.1	2.4	3.3	3.4	4.5
20～40	0.7	1.2	1.7	1.8	1.8	2.1	2.5	3.4	3.5	4.7
40～60	0.7	1.3	1.8	1.8	1.8	2.3	2.5	3.6	3.7	4.9
60～80	0.8	1.4	1.8	1.9	1.9	2.4	2.7	3.9	3.9	5.2
80～100	0.8	1.5	1.9	2.0	2.1	2.6	2.9	4.1	4.1	5.4
100～120	0.9	1.6	2.0	2.1	2.2	2.8	3.0	4.3	4.3	5.5
120～140	1.0	1.7	2.1	2.2	2.3	2.8	3.2	4.3	4.4	5.6
140～160	1.2	1.8	2.2	2.3	2.4	3.0	3.5	4.5	4.6	5.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	383/359

Constants of dn/dt		
D_0	D_1	D_2
-2.36E-06	1.13E-08	-1.69E-11
E_0	E_1	λ_{TK}
9.20E-07	8.47E-10	2.63E-01

H-ZF11	699301	n_d = 1.69894	υ_d = 30.05	$n_F - n_C$ = 0.023259
		n_e = 1.70444	υ_e = 29.81	$n_{F'} - n_{C'}$ = 0.023628

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65368
n_{1970}	1970.09	1.65957
n_{1530}	1529.58	1.66640
n_{1129}	1128.64	1.67343
n_{1064}	1064.00	1.67487
n_t	1013.98	1.67610
n_s	852.11	1.68119
$n_{A'}$	768.19	1.68494
n_r	706.52	1.68852
n_C	656.27	1.69221
$n_{C'}$	643.85	1.69326
n_{He-Ne}	632.80	1.69425
n_D	589.29	1.69875
n_d	587.56	1.69894
n_e	546.07	1.70444
n_F	486.13	1.71547
$n_{F'}$	479.99	1.71689
n_g	435.84	1.72948
n_h	404.66	1.74204
n_i	365.01	1.76590

Constants of Dispersion Formula	
A_0	2.79026920E+00
A_1	-1.13154551E-02
A_2	2.98537059E-02
A_3	1.85548133E-03
A_4	-1.33930426E-04
A_5	1.81714166E-05

Density	
ρ (g/cm^3)	2.96

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.2894
$P_{e,d}$	0.2365
$P_{g,F}$	0.6023
$P'_{d,c'}$	0.2404
$P'_{e,d}$	0.2328
$P'_{g,F'}$	0.5328

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0087
$\triangle P_{C,t}$	0.0069
$\triangle P_{C,s}$	0.0013

Thermal Properties	
Tg (℃)	592
Ts (℃)	625
$T_{10}^{14.5}$ (℃)	528
T_{10}^{13} (℃)	558
$\alpha_{-50/80℃}$ (10^{-7}/K)	86
$\alpha_{100/300℃}$ (10^{-7}/K)	108
λ (W/(m·K))	1.17

Mechanical Properties	
HK (10^7Pa)	524
F_A	139
E (GPa)	88.1
G (GPa)	33.6
μ	0.312
σ_b (MPa)	74
B (10^{-12}/Pa)	2.56

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	79
-40/-30	82
-30/-20	84
-20/-10	86
-10/0	89
0/10	89
10/20	91
20/30	92
30/40	93
40/50	93
50/60	94
60/70	95
70/80	96
80/90	96
90/100	97
100/110	98
110/120	99
120/130	100
130/140	102
140/150	103
150/160	104

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.930	0.857
2200	0.956	0.905
2000	0.980	0.961
1800	0.993	0.985
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.997	0.995
480	0.996	0.993
460	0.995	0.990
440	0.993	0.986
420	0.986	0.973
400	0.962	0.926
390	0.922	0.850
380	0.812	0.659
370	0.540	0.292
360	0.159	0.025
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.4	0.8	1.1	1.1	1.2	1.5	1.9	3.0	3.0	4.0
-40～-20	0.3	0.8	1.1	1.2	1.3	1.6	2.0	3.0	3.1	4.0
-20～0	0.4	0.8	1.2	1.3	1.3	1.7	2.0	3.1	3.1	4.2
0～20	0.4	0.9	1.3	1.3	1.4	1.7	2.2	3.2	3.2	4.3
20～40	0.4	1.0	1.4	1.4	1.5	1.8	2.3	3.3	3.3	4.5
40～60	0.6	1.1	1.5	1.5	1.6	2.0	2.4	3.5	3.6	4.8
60～80	0.6	1.2	1.6	1.6	1.7	2.1	2.5	3.8	3.8	5.2
80～100	0.6	1.3	1.7	1.8	1.8	2.3	2.6	4.0	4.1	5.3
100～120	0.7	1.4	1.8	1.9	1.9	2.5	2.7	4.1	4.2	5.5
120～140	0.8	1.5	1.9	1.9	2.0	2.6	2.9	4.2	4.3	5.6
140～160	0.9	1.5	2.0	2.0	2.1	2.7	3.0	4.3	4.4	5.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	405/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	387/363

Constants of dn/dt		
D_0	D_1	D_2
-2.91E-06	1.29E-08	-2.24E-11
E_0	E_1	λ_{TK}
8.96E-07	6.62E-10	2.79E-01

H-ZF12	762266	n_d = 1.76182	υ_d = 26.61	$n_F - n_C$ = 0.028631
		n_e = 1.76857	υ_e = 26.39	$n_{F'} - n_{C'}$ = 0.029118

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70927
n_{1970}	1970.09	1.71556
n_{1530}	1529.58	1.72304
n_{1129}	1128.64	1.73106
n_{1064}	1064.00	1.73276
n_t	1013.98	1.73422
n_s	852.11	1.74028
$n_{A'}$	768.19	1.74478
n_r	706.52	1.74912
n_C	656.27	1.75359
$n_{C'}$	643.85	1.75487
n_{He-Ne}	632.80	1.75608
n_D	589.29	1.76157
n_d	587.56	1.76182
n_e	546.07	1.76857
n_F	486.13	1.78222
$n_{F'}$	479.99	1.78399
n_g	435.84	1.79975
n_h	404.66	1.81558
n_i	365.01	1.84562

Relative Partial Dispersion	
$P_{d,C}$	0.2875
$P_{e,d}$	0.2358
$P_{g,F}$	0.6123
$P'_{d,c'}$	0.2387
$P'_{e,d}$	0.2318
$P'_{g,F'}$	0.5412

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0012
$\triangle P_{g,F}$	0.0129
$\triangle P_{C,t}$	0.0075
$\triangle P_{C,s}$	0.0006

Thermal Properties	
Tg (℃)	618
Ts (℃)	651
$T_{10}^{14.5}$ (℃)	544
T_{10}^{13} (℃)	590
$\alpha_{-50/80℃}$ (10^{-7}/K)	85
$\alpha_{100/300℃}$ (10^{-7}/K)	106
λ (W/(m·K))	1.10

Mechanical Properties	
HK (10^7Pa)	545
F_A	158
E (GPa)	92.3
G (GPa)	36.0
μ	0.283
σ_b (MPa)	77
B (10^{-12}/Pa)	2.85

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	76
-40/-30	78
-30/-20	81
-20/-10	82
-10/0	83
0/10	84
10/20	84
20/30	85
30/40	86
40/50	86
50/60	87
60/70	88
70/80	89
80/90	90
90/100	91
100/110	92
110/120	93
120/130	95
130/140	96
140/150	98
150/160	99

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.935	0.874
2200	0.956	0.914
2000	0.979	0.958
1800	0.986	0.972
1600	0.995	0.990
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.995	0.990
480	0.991	0.982
460	0.987	0.974
440	0.983	0.966
420	0.969	0.939
400	0.923	0.849
390	0.849	0.718
380	0.711	0.508
370	0.355	0.129
360		
350		
340		
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.98048977E+00
A_1	-1.22396125E-02
A_2	3.91094110E-02
A_3	1.60680583E-03
A_4	1.39107243E-06
A_5	1.34851004E-05

Density	
ρ (g/cm^3)	3.16

Solarization	
△λ (%)	-0.3

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.3	0.9	1.3	1.3	1.4	1.7	2.1	3.2	3.2	4.5
-40～-20	0.3	0.9	1.4	1.4	1.5	1.7	2.2	3.3	3.3	4.7
-20～0	0.3	1.0	1.4	1.4	1.5	1.9	2.2	3.5	3.5	4.9
0～20	0.3	1.0	1.5	1.5	1.6	1.9	2.4	3.8	3.8	5.2
20～40	0.3	1.0	1.5	1.5	1.6	1.9	2.5	3.8	3.8	5.5
40～60	0.4	1.1	1.6	1.6	1.6	2.2	2.6	4.1	4.1	5.8
60～80	0.4	1.3	1.8	1.8	1.8	2.3	2.8	4.3	4.3	6.1
80～100	0.4	1.3	1.9	1.9	1.9	2.4	3.0	4.5	4.5	6.3
100～120	0.6	1.4	2.0	2.0	2.0	2.6	3.2	4.8	4.8	6.5
120～140	0.8	1.6	2.2	2.2	2.3	2.8	3.4	5.0	5.0	6.7
140～160	1.0	1.8	2.3	2.4	2.5	3.1	3.6	5.3	5.3	7.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	391/365

Constants of dn/dt		
D_0	D_1	D_2
-2.98E-06	1.11E-08	-1.51E-11
E_0	E_1	λ_{TK}
9.37E-07	9.52E-10	2.89E-01

H-ZF12GT	762266	n_d = 1.76182	υ_d = 26.61	$n_F - n_C$ = 0.028631
		n_e = 1.76857	υ_e = 26.39	$n_{F'} - n_{C'}$ = 0.029118

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70927
n_{1970}	1970.09	1.71556
n_{1530}	1529.58	1.72304
n_{1129}	1128.64	1.73106
n_{1064}	1064.00	1.73276
n_t	1013.98	1.73422
n_s	852.11	1.74028
$n_{A'}$	768.19	1.74478
n_r	706.52	1.74912
n_C	656.27	1.75359
$n_{C'}$	643.85	1.75487
n_{He-Ne}	632.80	1.75608
n_D	589.29	1.76157
n_d	587.56	1.76182
n_e	546.07	1.76857
n_F	486.13	1.78222
$n_{F'}$	479.99	1.78399
n_g	435.84	1.79975
n_h	404.66	1.81558
n_i	365.01	1.84562

Relative Partial Dispersion	
$P_{d,C}$	0.2875
$P_{e,d}$	0.2358
$P_{g,F}$	0.6123
$P'_{d,c'}$	0.2387
$P'_{e,d}$	0.2318
$P'_{g,F'}$	0.5412

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0012
$\triangle P_{g,F}$	0.0129
$\triangle P_{C,t}$	0.0075
$\triangle P_{C,s}$	0.0006

Thermal Properties	
Tg (℃)	618
Ts (℃)	651
$T_{10}^{14.5}$ (℃)	544
T_{10}^{13} (℃)	590
$\alpha_{-50/80℃}$ (10^{-7}/K)	85
$\alpha_{100/300℃}$ (10^{-7}/K)	106
λ (W/(m·K))	1.10

Mechanical Properties	
HK (10^7Pa)	545
F_A	158
E (GPa)	92.3
G (GPa)	36.0
μ	0.283
σ_b (MPa)	77
B (10^{-12}/Pa)	2.85

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	76
-40/-30	78
-30/-20	81
-20/-10	82
-10/0	83
0/10	84
10/20	84
20/30	85
30/40	86
40/50	86
50/60	87
60/70	88
70/80	89
80/90	90
90/100	91
100/110	92
110/120	93
120/130	95
130/140	96
140/150	98
150/160	99

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.962	0.926
2200	0.980	0.960
2000	0.992	0.984
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.996
600	0.998	0.996
550	0.997	0.994
500	0.993	0.987
480	0.991	0.983
460	0.988	0.977
440	0.984	0.969
420	0.975	0.951
400	0.946	0.895
390	0.901	0.812
380	0.767	0.588
370	0.458	0.210
360	0.105	0.011
350		
340		
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.98048977E+00
A_1	-1.22396125E-02
A_2	3.91094110E-02
A_3	1.60680583E-03
A_4	1.39107243E-06
A_5	1.34851004E-05

Density	
ρ (g/cm^3)	3.16

Solarization	
△λ (%)	-0.3

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.3	0.9	1.3	1.3	1.4	1.7	2.1	3.2	3.2	4.5
-40～-20	0.3	0.9	1.4	1.4	1.5	1.7	2.2	3.3	3.3	4.7
-20～0	0.3	1.0	1.4	1.4	1.5	1.9	2.2	3.5	3.5	4.9
0～20	0.3	1.0	1.5	1.5	1.6	1.9	2.4	3.8	3.8	5.2
20～40	0.3	1.0	1.5	1.5	1.6	1.9	2.5	3.8	3.8	5.5
40～60	0.4	1.1	1.6	1.6	1.6	2.2	2.6	4.1	4.1	5.8
60～80	0.4	1.3	1.8	1.8	1.8	2.3	2.8	4.3	4.3	6.1
80～100	0.4	1.3	1.9	1.9	1.9	2.4	3.0	4.5	4.5	6.3
100～120	0.6	1.4	2.0	2.0	2.0	2.6	3.2	4.8	4.8	6.5
120～140	0.8	1.6	2.2	2.2	2.3	2.8	3.4	5.0	5.0	6.7
140～160	1.0	1.8	2.3	2.4	2.5	3.1	3.6	5.3	5.3	7.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/362

Constants of dn/dt		
D_0	D_1	D_2
-2.98E-06	1.11E-08	-1.51E-11
E_0	E_1	λ_{TK}
9.37E-07	9.52E-10	2.89E-01

H-ZF13	785257	n_d = 1.78472	υ_d = 25.72	$n_F - n_C$ = 0.030510
		n_e = 1.79191	υ_e = 25.51	$n_{F'} - n_{C'}$ = 0.031042

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.73037
n_{1970}	1970.09	1.73662
n_{1530}	1529.58	1.74411
n_{1129}	1128.64	1.75231
n_{1064}	1064.00	1.75406
n_t	1013.98	1.75557
n_s	852.11	1.76192
$n_{A'}$	768.19	1.76666
n_r	706.52	1.77124
n_C	656.27	1.77597
$n_{C'}$	643.85	1.77733
n_{He-Ne}	632.80	1.77861
n_D	589.29	1.78446
n_d	587.56	1.78472
n_e	546.07	1.79191
n_F	486.13	1.80648
$n_{F'}$	479.99	1.80837
n_g	435.84	1.82522
n_h	404.66	1.84210
n_i	365.01	1.87399

Constants of Dispersion Formula	
A_0	3.05227481E+00
A_1	-1.21808741E-02
A_2	4.16791281E-02
A_3	1.79932930E-03
A_4	1.91659600E-05
A_5	1.22563456E-05

Density		Solarization	
ρ (g/cm^3)	3.22	△λ (%)	-0.9

Relative Partial Dispersion	
$P_{d,C}$	0.2868
$P_{e,d}$	0.2357
$P_{g,F}$	0.6142
$P'_{d,c'}$	0.2381
$P'_{e,d}$	0.2316
$P'_{g,F'}$	0.5428

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0015
$\triangle P_{g,F}$	0.0133
$\triangle P_{C,t}$	0.0039
$\triangle P_{C,s}$	-0.0016

Thermal Properties	
Tg (℃)	601
Ts (℃)	627
$T_{10}^{14.5}$ (℃)	535
T_{10}^{13} (℃)	573
$\alpha_{-50/80℃}$ (10^{-7}/K)	91
$\alpha_{100/300℃}$ (10^{-7}/K)	111
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	528
F_A	181
E (GPa)	91.5
G (GPa)	35.7
μ	0.281
σ_b (MPa)	70
B (10^{-12}/Pa)	2.73

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	81
-40/-30	84
-30/-20	86
-20/-10	88
-10/0	90
0/10	91
10/20	92
20/30	93
30/40	94
40/50	95
50/60	95
60/70	96
70/80	97
80/90	98
90/100	98
100/110	100
110/120	101
120/130	102
130/140	103
140/150	105
150/160	106

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.950	0.900
2200	0.976	0.950
2000	0.987	0.972
1800	0.993	0.984
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.996	0.992
500	0.994	0.988
480	0.990	0.980
460	0.984	0.968
440	0.976	0.953
420	0.962	0.925
400	0.907	0.819
390	0.812	0.658
380	0.640	0.407
370	0.308	0.095
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.8	-0.1	0.4	0.4	0.5	0.8	1.3	2.4	2.5	3.7
-40～-20	-0.7	0.0	0.4	0.4	0.6	0.8	1.3	2.5	2.6	3.9
-20～0	-0.7	0.0	0.5	0.5	0.6	1.0	1.4	2.7	2.8	4.3
0～20	-0.6	0.1	0.6	0.6	0.7	1.1	1.6	3.0	3.1	4.8
20～40	-0.6	0.2	0.7	0.7	0.8	1.2	1.9	3.2	3.2	5.1
40～60	-0.5	0.3	0.8	0.8	0.9	1.3	2.0	3.4	3.4	5.3
60～80	-0.5	0.4	0.9	0.9	1.0	1.5	2.2	3.6	3.7	5.7
80～100	-0.3	0.5	1.0	1.0	1.1	1.7	2.3	3.9	4.0	6.0
100～120	-0.2	0.6	1.1	1.2	1.2	2.0	2.4	4.2	4.3	6.3
120～140	0.0	0.7	1.2	1.3	1.3	2.1	2.7	4.4	4.5	6.5
140～160	0.0	0.8	1.3	1.4	1.5	2.2	2.9	4.6	4.7	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	425/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	393/365

Constants of dn/dt		
D_0	D_1	D_2
-4.52E-06	1.15E-08	-2.19E-11
E_0	E_1	λ_{TK}
9.64E-07	1.10E-09	2.96E-01

H-ZF13GT	785257	n_d = 1.78472	υ_d = 25.72	$n_F - n_C$ = 0.030510
		n_e = 1.79191	υ_e = 25.51	$n_{F'} - n_{C'}$ = 0.031042

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.73037
n_{1970}	1970.09	1.73662
n_{1530}	1529.58	1.74411
n_{1129}	1128.64	1.75231
n_{1064}	1064.00	1.75406
n_t	1013.98	1.75557
n_s	852.11	1.76192
$n_{A'}$	768.19	1.76666
n_r	706.52	1.77124
n_C	656.27	1.77597
$n_{C'}$	643.85	1.77733
n_{He-Ne}	632.80	1.77861
n_D	589.29	1.78446
n_d	587.56	1.78472
n_e	546.07	1.79191
n_F	486.13	1.80648
$n_{F'}$	479.99	1.80837
n_g	435.84	1.82522
n_h	404.66	1.84210
n_i	365.01	1.87399

Constants of Dispersion Formula	
A_0	3.05227481E+00
A_1	-1.21808741E-02
A_2	4.16791281E-02
A_3	1.79932930E-03
A_4	1.91659600E-05
A_5	1.22563456E-05

Density		Solarization	
ρ (g/cm^3)	3.22	△λ (%)	-0.9

Relative Partial Dispersion	
$P_{d,C}$	0.2868
$P_{e,d}$	0.2357
$P_{g,F}$	0.6142
$P'_{d,c'}$	0.2381
$P'_{e,d}$	0.2316
$P'_{g,F'}$	0.5428

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0015
$\triangle P_{g,F}$	0.0133
$\triangle P_{C,t}$	0.0039
$\triangle P_{C,s}$	-0.0016

Thermal Properties	
Tg (℃)	601
Ts (℃)	627
$T_{10}^{14.5}$ (℃)	535
T_{10}^{13} (℃)	573
$\alpha_{-50/80℃}$ (10^{-7}/K)	91
$\alpha_{100/300℃}$ (10^{-7}/K)	111
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	528
F_A	181
E (GPa)	91.5
G (GPa)	35.7
μ	0.281
σ_b (MPa)	70
B (10^{-12}/Pa)	2.73

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	81
-40/-30	84
-30/-20	86
-20/-10	88
-10/0	90
0/10	91
10/20	92
20/30	93
30/40	94
40/50	95
50/60	95
60/70	96
70/80	97
80/90	98
90/100	98
100/110	100
110/120	101
120/130	102
130/140	103
140/150	105
150/160	106

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.950	0.900
2200	0.976	0.950
2000	0.987	0.972
1800	0.993	0.984
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.996	0.992
460	0.993	0.985
440	0.986	0.975
420	0.970	0.950
400	0.938	0.889
390	0.891	0.801
380	0.760	0.590
370	0.458	0.210
360	0.068	0.005
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.8	-0.1	0.4	0.4	0.5	0.8	1.3	2.4	2.5	3.7
-40～-20	-0.7	0.0	0.4	0.4	0.6	0.8	1.3	2.5	2.6	3.9
-20～0	-0.7	0.0	0.5	0.5	0.6	1.0	1.4	2.7	2.8	4.3
0～20	-0.6	0.1	0.6	0.6	0.7	1.1	1.6	3.0	3.1	4.8
20～40	-0.6	0.2	0.7	0.7	0.8	1.2	1.9	3.2	3.2	5.1
40～60	-0.5	0.3	0.8	0.8	0.9	1.3	2.0	3.4	3.4	5.3
60～80	-0.5	0.4	0.9	0.9	1.0	1.5	2.2	3.6	3.7	5.7
80～100	-0.3	0.5	1.0	1.0	1.1	1.7	2.3	3.9	4.0	6.0
100～120	-0.2	0.6	1.1	1.2	1.2	2.0	2.4	4.2	4.3	6.3
120～140	0.0	0.7	1.2	1.3	1.3	2.1	2.7	4.4	4.5	6.5
140～160	0.0	0.8	1.3	1.4	1.5	2.2	2.9	4.6	4.7	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	420/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	391/365

Constants of dn/dt		
D_0	D_1	D_2
-4.52E-06	1.15E-08	-2.19E-11
E_0	E_1	λ_{TK}
9.64E-07	1.10E-09	2.96E-01

H-ZF50	741278	n_d = 1.74077	υ_d = 27.76	$n_F - n_C$ = 0.026685
		n_e = 1.74707	υ_e = 27.54	$n_{F'} - n_{C'}$ = 0.027125

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.69064
n_{1970}	1970.09	1.69692
n_{1530}	1529.58	1.70426
n_{1129}	1128.64	1.71195
n_{1064}	1064.00	1.71354
n_t	1013.98	1.71491
n_s	852.11	1.72060
$n_{A'}$	768.19	1.72483
n_r	706.52	1.72888
n_C	656.27	1.73307
$n_{C'}$	643.85	1.73427
n_{He-Ne}	632.80	1.73540
n_D	589.29	1.74054
n_d	587.56	1.74077
n_e	546.07	1.74707
n_F	486.13	1.75976
$n_{F'}$	479.99	1.76139
n_g	435.84	1.77598
n_h	404.66	1.79059
n_i	365.01	1.81850

Constants of Dispersion Formula	
A_0	2.91816811E+00
A_1	-1.22621813E-02
A_2	3.41878382E-02
A_3	2.36117574E-03
A_4	-1.68240994E-04
A_5	2.26673138E-05

Density	
ρ (g/cm^3)	3.05

Solarization	
△λ (%)	0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2886
$P_{e,d}$	0.2361
$P_{g,F}$	0.6078
$P'_{d,c'}$	0.2396
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5379

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0007
$\triangle P_{g,F}$	0.0103
$\triangle P_{C,t}$	0.0059
$\triangle P_{C,s}$	0.0003

Thermal Properties	
Tg (℃)	616
Ts (℃)	650
$T_{10}^{14.5}$ (℃)	540
T_{10}^{13} (℃)	591
$\alpha_{-50/80℃}$ (10^{-7}/K)	81
$\alpha_{100/300℃}$ (10^{-7}/K)	101
λ (W/(m·K))	1.16

Mechanical Properties	
HK (10^7Pa)	555
F_A	143
E (GPa)	90.4
G (GPa)	36.2
μ	0.248
σ_b (MPa)	58
B (10^{-12}/Pa)	2.62

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	72
-40/-30	75
-30/-20	77
-20/-10	78
-10/0	80
0/10	81
10/20	82
20/30	83
30/40	84
40/50	85
50/60	85
60/70	86
70/80	87
80/90	87
90/100	88
100/110	89
110/120	90
120/130	91
130/140	93
140/150	94
150/160	95

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.954	0.908
2200	0.968	0.941
2000	0.990	0.980
1800	0.993	0.986
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.996	0.990
480	0.993	0.984
460	0.990	0.979
440	0.986	0.972
420	0.980	0.955
400	0.940	0.884
390	0.885	0.785
380	0.745	0.554
370	0.431	0.185
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.8	1.4	1.8	1.8	1.8	2.1	2.6	3.6	3.6	4.7
-40～-20	0.8	1.4	1.8	1.8	1.9	2.1	2.7	3.7	3.7	5.0
-20～0	0.9	1.5	1.9	1.9	1.9	2.3	2.7	3.8	3.8	5.2
0～20	0.9	1.5	1.9	1.9	1.9	2.4	2.8	4.0	4.0	5.4
20～40	0.8	1.6	1.9	2.0	2.1	2.6	3.1	4.3	4.3	5.8
40～60	1.0	1.7	2.0	2.1	2.2	2.6	3.1	4.6	4.6	6.0
60～80	1.2	1.9	2.3	2.3	2.4	2.9	3.2	4.8	4.8	6.3
80～100	1.4	2.0	2.4	2.5	2.7	3.0	3.4	4.9	4.9	6.6
100～120	1.4	2.1	2.6	2.7	2.7	3.1	3.6	5.1	5.1	6.8
120～140	1.5	2.2	2.9	3.0	3.1	3.5	3.8	5.4	5.4	7.1
140～160	1.7	2.4	3.0	3.0	3.1	3.6	4.0	5.6	5.6	7.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/364

Constants of dn/dt		
D_0	D_1	D_2
-1.87E-06	1.30E-08	-1.69E-11
E_0	E_1	λ_{TK}
8.65E-07	7.76E-10	2.93E-01

H-ZF50GT	741278	n_d = 1.74077	υ_d = 27.76	$n_F - n_C$ = 0.026685
		n_e = 1.74707	υ_e = 27.54	$n_{F'} - n_{C'}$ = 0.027125

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.69064
n_{1970}	1970.09	1.69692
n_{1530}	1529.58	1.70426
n_{1129}	1128.64	1.71195
n_{1064}	1064.00	1.71354
n_t	1013.98	1.71491
n_s	852.11	1.72060
$n_{A'}$	768.19	1.72483
n_r	706.52	1.72888
n_C	656.27	1.73307
$n_{C'}$	643.85	1.73427
n_{He-Ne}	632.80	1.73540
n_D	589.29	1.74054
n_d	587.56	1.74077
n_e	546.07	1.74707
n_F	486.13	1.75976
$n_{F'}$	479.99	1.76139
n_g	435.84	1.77598
n_h	404.66	1.79059
n_i	365.01	1.81850

Constants of Dispersion Formula	
A_0	2.91816811E+00
A_1	-1.22621813E-02
A_2	3.41878382E-02
A_3	2.36117574E-03
A_4	-1.68240994E-04
A_5	2.26673138E-05

Density	
ρ (g/cm^3)	3.05

Solarization	
△λ (%)	0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2886
$P_{e,d}$	0.2361
$P_{g,F}$	0.6078
$P'_{d,c'}$	0.2396
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5379

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0007
$\triangle P_{g,F}$	0.0103
$\triangle P_{C,t}$	0.0059
$\triangle P_{C,s}$	0.0003

Thermal Properties	
Tg (℃)	616
Ts (℃)	650
$T_{10}^{14.5}$ (℃)	540
T_{10}^{13} (℃)	591
$\alpha_{-50/80℃}$ (10^{-7}/K)	81
$\alpha_{100/300℃}$ (10^{-7}/K)	101
λ (W/(m·K))	1.16

Mechanical Properties	
HK (10^7Pa)	555
F_A	143
E (GPa)	90.4
G (GPa)	36.2
μ	0.248
σ_b (MPa)	58
B (10^{-12}/Pa)	2.62

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	72
-40/-30	75
-30/-20	77
-20/-10	78
-10/0	80
0/10	81
10/20	82
20/30	83
30/40	84
40/50	85
50/60	85
60/70	86
70/80	87
80/90	87
90/100	88
100/110	89
110/120	90
120/130	91
130/140	93
140/150	94
150/160	95

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.956	0.910
2200	0.969	0.944
2000	0.990	0.980
1800	0.993	0.986
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.996	0.994
480	0.993	0.991
460	0.990	0.988
440	0.987	0.981
420	0.982	0.965
400	0.955	0.914
390	0.914	0.834
380	0.790	0.623
370	0.467	0.219
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.8	1.4	1.8	1.8	1.8	2.1	2.6	3.6	3.6	4.7
-40～-20	0.8	1.4	1.8	1.8	1.9	2.1	2.7	3.7	3.7	5.0
-20～0	0.9	1.5	1.9	1.9	1.9	2.3	2.7	3.8	3.8	5.2
0～20	0.9	1.5	1.9	1.9	1.9	2.4	2.8	4.0	4.0	5.4
20～40	0.8	1.6	1.9	2.0	2.1	2.6	3.1	4.3	4.3	5.8
40～60	1.0	1.7	2.0	2.1	2.2	2.6	3.1	4.6	4.6	6.0
60～80	1.2	1.9	2.3	2.3	2.4	2.9	3.2	4.8	4.8	6.3
80～100	1.4	2.0	2.4	2.5	2.7	3.0	3.4	4.9	4.9	6.6
100～120	1.4	2.1	2.6	2.7	2.7	3.1	3.6	5.1	5.1	6.8
120～140	1.5	2.2	2.9	3.0	3.1	3.5	3.8	5.4	5.4	7.1
140～160	1.7	2.4	3.0	3.0	3.1	3.6	4.0	5.6	5.6	7.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/364

Constants of dn/dt		
D_0	D_1	D_2
-1.87E-06	1.30E-08	-1.69E-11
E_0	E_1	λ_{TK}
8.65E-07	7.76E-10	2.93E-01

H-ZF52N	847238	n_d = 1.84666	υ_d = 23.78	$n_F - n_C$ = 0.035608
		n_e = 1.85504	υ_e = 23.59	$n_{F'} - n_{C'}$ = 0.036247

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.78524
n_{1970}	1970.09	1.79201
n_{1530}	1529.58	1.80020
n_{1129}	1128.64	1.80936
n_{1064}	1064.00	1.81133
n_t	1013.98	1.81304
n_s	852.11	1.82028
$n_{A'}$	768.19	1.82573
n_r	706.52	1.83101
n_C	656.27	1.83649
$n_{C'}$	643.85	1.83807
n_{He-Ne}	632.80	1.83956
n_D	589.29	1.84635
n_d	587.56	1.84666
n_e	546.07	1.85504
n_F	486.13	1.87210
$n_{F'}$	479.99	1.87431
n_g	435.84	1.89416
n_h	404.66	1.91418
n_i	365.01	1.95237

Constants of Dispersion Formula	
A_0	3.25093122E+00
A_1	-1.35032313E-02
A_2	4.90304607E-02
A_3	2.49344608E-03
A_4	-1.81762799E-05
A_5	1.94686410E-05

Density	
ρ (g/cm^3)	3.54

Solarization	
△λ (%)	-1.2

Relative Partial Dispersion	
$P_{d,C}$	0.2856
$P_{e,d}$	0.2353
$P_{g,F}$	0.6195
$P'_{d,c'}$	0.2370
$P'_{e,d}$	0.2312
$P'_{g,F'}$	0.5476

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0020
$\triangle P_{g,F}$	0.0154
$\triangle P_{C,t}$	0.0032
$\triangle P_{C,s}$	-0.0022

Thermal Properties	
Tg (℃)	632
Ts (℃)	662
$T_{10}^{14.5}$ (℃)	582
T_{10}^{13} (℃)	608
$\alpha_{-50/80℃}$ (10^{-7}/K)	83
$\alpha_{100/300℃}$ (10^{-7}/K)	101
λ (W/(m·K))	1.04

Mechanical Properties	
HK (10^7Pa)	531
F_A	176
E (GPa)	96.1
G (GPa)	38.1
μ	0.262
σ_b (MPa)	56
B (10^{-12}/Pa)	2.54

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	75
-40/-30	78
-30/-20	79
-20/-10	81
-10/0	82
0/10	83
10/20	84
20/30	85
30/40	85
40/50	86
50/60	86
60/70	87
70/80	87
80/90	88
90/100	89
100/110	90
110/120	92
120/130	93
130/140	94
140/150	96
150/160	97

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.962	0.925
2200	0.980	0.961
2000	0.992	0.985
1800	0.997	0.994
1600	0.999	0.999
1400	0.999	0.999
1200	0.999	0.999
1060	0.999	0.999
1000	0.999	0.999
950	0.999	0.999
900	0.999	0.999
850	0.999	0.999
800	0.999	0.999
750	0.999	0.999
700	0.999	0.999
650	0.999	0.999
600	0.999	0.999
550	0.997	0.995
500	0.993	0.986
480	0.990	0.980
460	0.985	0.971
440	0.977	0.954
420	0.958	0.918
400	0.911	0.830
390	0.843	0.710
380	0.671	0.450
370	0.332	0.110
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-1.0	-0.9	0.0	0.5	0.5	0.7	1.0	1.6	1.7	3.0
-40～-20	-0.9	-0.9	0.0	0.5	0.6	0.8	1.1	1.9	2.0	3.6
-20～0	-0.7	-0.8	0.1	0.5	0.6	0.9	1.3	2.4	2.5	4.0
0～20	-0.7	-0.7	0.2	0.6	0.7	0.9	1.4	2.7	3.1	4.4
20～40	-0.7	-0.6	0.4	0.7	0.7	1.0	1.6	3.1	3.7	4.8
40～60	-0.7	-0.6	0.4	0.7	0.7	1.0	1.9	3.5	4.0	5.3
60～80	-0.7	-0.6	0.4	0.7	0.8	1.2	2.1	3.8	4.3	5.7
80～100	-0.6	-0.6	0.5	0.7	0.8	1.3	2.1	4.1	4.6	6.1
100～120	-0.6	-0.5	0.5	0.8	0.9	1.3	2.2	4.4	4.8	6.5
120～140	-0.6	-0.4	0.7	0.8	1.0	1.5	2.3	4.7	5.0	6.9
140～160	-0.7	-0.4	0.8	0.9	1.1	1.9	2.5	5.1	5.4	7.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(404)/368
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	398/368

Constants of dn/dt		
D_0	D_1	D_2
-5.25E-06	7.18E-09	-2.89E-11
E_0	E_1	λ_{TK}
1.16E-06	2.39E-09	2.61E-01

H-ZF52NGT	847238	n_d = 1.84666	υ_d = 23.78	$n_F - n_C$ = 0.035608
		n_e = 1.85504	υ_e = 23.59	$n_{F'} - n_{C'}$ = 0.036247

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.78524
n_{1970}	1970.09	1.79201
n_{1530}	1529.58	1.80020
n_{1129}	1128.64	1.80936
n_{1064}	1064.00	1.81133
n_t	1013.98	1.81304
n_s	852.11	1.82028
$n_{A'}$	768.19	1.82573
n_r	706.52	1.83101
n_C	656.27	1.83649
$n_{C'}$	643.85	1.83807
n_{He-Ne}	632.80	1.83956
n_D	589.29	1.84635
n_d	587.56	1.84666
n_e	546.07	1.85504
n_F	486.13	1.87210
$n_{F'}$	479.99	1.87431
n_g	435.84	1.89416
n_h	404.66	1.91418
n_i	365.01	1.95237

Constants of Dispersion Formula	
A_0	3.25093122E+00
A_1	-1.35032313E-02
A_2	4.90304607E-02
A_3	2.49344608E-03
A_4	-1.81762799E-05
A_5	1.94686410E-05

Density	
ρ (g/cm^3)	3.54

Solarization	
△λ (%)	-1.1

Relative Partial Dispersion	
$P_{d,C}$	0.2856
$P_{e,d}$	0.2353
$P_{g,F}$	0.6195
$P'_{d,c'}$	0.2370
$P'_{e,d}$	0.2312
$P'_{g,F'}$	0.5476

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0020
$\triangle P_{g,F}$	0.0154
$\triangle P_{C,t}$	0.0032
$\triangle P_{C,s}$	-0.0022

Thermal Properties	
Tg (℃)	632
Ts (℃)	662
$T_{10}^{14.5}$ (℃)	582
T_{10}^{13} (℃)	608
$\alpha_{-50/80℃}$ (10^{-7}/K)	83
$\alpha_{100/300℃}$ (10^{-7}/K)	101
λ (W/(m·K))	1.04

Mechanical Properties	
HK (10^7Pa)	531
F_A	176
E (GPa)	96.1
G (GPa)	38.1
μ	0.262
σ_b (MPa)	56
B (10^{-12}/Pa)	2.54

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	75
-40/-30	78
-30/-20	79
-20/-10	81
-10/0	82
0/10	83
10/20	84
20/30	85
30/40	85
40/50	86
50/60	86
60/70	87
70/80	87
80/90	88
90/100	89
100/110	90
110/120	92
120/130	93
130/140	94
140/150	96
150/160	97

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.893	0.928
2200	0.954	0.953
2000	0.994	0.977
1800	0.999	0.985
1600	0.999	0.994
1400	0.999	0.995
1200	0.999	0.996
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.998	0.997
650	0.998	0.996
600	0.997	0.994
550	0.996	0.992
500	0.991	0.983
480	0.988	0.977
460	0.985	0.970
440	0.978	0.957
420	0.964	0.930
400	0.925	0.855
390	0.863	0.745
380	0.695	0.483
370	0.346	0.120
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-1.0	-0.9	0.0	0.5	0.5	0.7	1.0	1.6	1.7	3.0
-40～-20	-0.9	-0.9	0.0	0.5	0.6	0.8	1.1	1.9	2.0	3.6
-20～0	-0.7	-0.8	0.1	0.5	0.6	0.9	1.3	2.4	2.5	4.0
0～20	-0.7	-0.7	0.2	0.6	0.7	0.9	1.4	2.7	3.1	4.4
20～40	-0.7	-0.6	0.4	0.7	0.7	1.0	1.6	3.1	3.7	4.8
40～60	-0.7	-0.6	0.4	0.7	0.7	1.0	1.9	3.5	4.0	5.3
60～80	-0.7	-0.6	0.4	0.7	0.8	1.2	2.1	3.8	4.3	5.7
80～100	-0.6	-0.6	0.5	0.7	0.8	1.3	2.1	4.1	4.6	6.1
100～120	-0.6	-0.5	0.5	0.8	0.9	1.3	2.2	4.4	4.8	6.5
120～140	-0.6	-0.4	0.7	0.8	1.0	1.5	2.3	4.7	5.0	6.9
140～160	-0.7	-0.4	0.8	0.9	1.1	1.9	2.5	5.1	5.4	7.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(399)/369
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	395/368

Constants of dn/dt		
D_0	D_1	D_2
-5.25E-06	7.18E-09	-2.89E-11
E_0	E_1	λ_{TK}
1.16E-06	2.39E-09	2.61E-01

H-ZF56	855248	n_d = 1.85478	υ_d = 24.80	$n_F - n_C$ = 0.034469
		n_e = 1.86290	υ_e = 24.61	$n_{F'} - n_{C'}$ = 0.035057

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.79256
n_{1970}	1970.09	1.79984
n_{1530}	1529.58	1.80851
n_{1129}	1128.64	1.81792
n_{1064}	1064.00	1.81992
n_t	1013.98	1.82165
n_s	852.11	1.82888
$n_{A'}$	768.19	1.83428
n_r	706.52	1.83948
n_C	656.27	1.84488
$n_{C'}$	643.85	1.84642
n_{He-Ne}	632.80	1.84787
n_D	589.29	1.85448
n_d	587.56	1.85478
n_e	546.07	1.86290
n_F	486.13	1.87935
$n_{F'}$	479.99	1.88147
n_g	435.84	1.90044
n_h	404.66	1.91945
n_i	365.01	1.95583

Constants of Dispersion Formula	
A_0	3.28426529E+00
A_1	-1.47934043E-02
A_2	4.81498133E-02
A_3	2.74086829E-03
A_4	-1.33744832E-04
A_5	2.63779943E-05

Density	
ρ (g/cm^3)	3.49

Solarization	
△λ (%)	-3.3

Relative Partial Dispersion	
$P_{d,C}$	0.2872
$P_{e,d}$	0.2356
$P_{g,F}$	0.6119
$P'_{d,c'}$	0.2385
$P'_{e,d}$	0.2316
$P'_{g,F'}$	0.5411

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0007
$\triangle P_{g,F}$	0.0094
$\triangle P_{C,t}$	0.0137
$\triangle P_{C,s}$	0.0043

Thermal Properties	
Tg (℃)	585
Ts (℃)	623
$T_{10}^{14.5}$ (℃)	530
T_{10}^{13} (℃)	563
$\alpha_{-50/80℃}$ (10^{-7}/K)	76
$\alpha_{100/300℃}$ (10^{-7}/K)	97
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	572
F_A	201
E (GPa)	106.5
G (GPa)	42.3
μ	0.257
σ_b (MPa)	85
B (10^{-12}/Pa)	3.06

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	64
-40/-30	67
-30/-20	73
-20/-10	73
-10/0	74
0/10	74
10/20	77
20/30	80
30/40	80
40/50	80
50/60	83
60/70	85
70/80	85
80/90	86
90/100	88
100/110	88
110/120	89
120/130	89
130/140	93
140/150	93
150/160	95

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.978	0.956
2200	0.985	0.970
2000	0.995	0.989
1800	0.996	0.992
1600	0.998	0.996
1400	0.998	0.997
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.997
650	0.998	0.996
600	0.998	0.995
550	0.995	0.991
500	0.988	0.977
480	0.984	0.969
460	0.978	0.957
440	0.967	0.935
420	0.943	0.890
400	0.893	0.797
390	0.845	0.714
380	0.763	0.582
370	0.592	0.351
360	0.283	0.080
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.3	0.7	1.3	1.4	1.5	1.7	2.1	2.6	2.8	4.7
-40～-20	0.6	1.0	1.6	1.6	1.8	2.1	2.6	3.1	3.2	5.3
-20～0	0.8	1.2	1.8	1.8	1.9	2.3	2.9	3.3	3.4	5.7
0～20	1.0	1.3	2.0	2.1	2.2	2.6	3.1	3.5	3.7	6.0
20～40	1.1	1.5	2.3	2.4	2.5	2.9	3.4	3.8	4.0	6.5
40～60	1.2	1.8	2.6	2.6	2.7	3.2	3.6	4.2	4.3	6.9
60～80	1.4	2.1	2.8	2.9	3.1	3.5	4.0	4.6	4.7	7.3
80～100	1.5	2.4	3.0	3.1	3.3	3.7	4.3	4.9	5.1	7.6
100～120	1.7	2.6	3.2	3.3	3.5	3.9	4.6	5.2	5.3	8.0
120～140	1.8	2.7	3.5	3.6	3.7	4.1	4.8	5.4	5.6	8.2
140～160	1.9	2.8	3.8	3.8	3.9	4.3	5.1	5.6	5.7	8.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(405)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	400/359

Constants of dn/dt		
D_0	D_1	D_2
-1.60E-06	1.75E-08	-2.60E-11
E_0	E_1	λ_{TK}
6.93E-07	5.83E-10	3.15E-01

H-ZF62	923209	n_d = 1.92286	υ_d = 20.88	$n_F - n_C$ = 0.044198
		n_e = 1.93323	υ_e = 20.71	$n_{F'} - n_{C'}$ = 0.045071

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.84761
n_{1970}	1970.09	1.85605
n_{1530}	1529.58	1.86617
n_{1129}	1128.64	1.87734
n_{1064}	1064.00	1.87974
n_t	1013.98	1.88181
n_s	852.11	1.89061
$n_{A'}$	768.19	1.89723
n_r	706.52	1.90366
n_C	656.27	1.91038
$n_{C'}$	643.85	1.91231
n_{He-Ne}	632.80	1.91413
n_D	589.29	1.92248
n_d	587.56	1.92286
n_e	546.07	1.93323
n_F	486.13	1.95457
$n_{F'}$	479.99	1.95738
n_g	435.84	1.98274
n_h	404.66	2.00892
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.49733468E+00
A_1	-1.75493772E-02
A_2	5.99594355E-02
A_3	3.90005481E-03
A_4	-1.39531497E-04
A_5	4.41807948E-05

Density	
ρ (g/cm^3)	3.93

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2824
$P_{e,d}$	0.2346
$P_{g,F}$	0.6374
$P'_{d,c'}$	0.2341
$P'_{e,d}$	0.2301
$P'_{g,F'}$	0.5627

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0042
$\triangle P_{g,F}$	0.0284
$\triangle P_{C,t}$	0.0051
$\triangle P_{C,s}$	-0.0032

Thermal Properties	
Tg (℃)	690
Ts (℃)	725
$T_{10}^{14.5}$ (℃)	625
T_{10}^{13} (℃)	664
$\alpha_{-50/80℃}$ (10^{-7}/K)	61
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	0.99

Mechanical Properties	
HK (10^7Pa)	485
F_A	228
E (GPa)	98.0
G (GPa)	39.0
μ	0.257
σ_b (MPa)	71
B (10^{-12}/Pa)	2.85

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	54
-40/-30	56
-30/-20	58
-20/-10	60
-10/0	61
0/10	62
10/20	62
20/30	63
30/40	63
40/50	64
50/60	64
60/70	65
70/80	65
80/90	65
90/100	67
100/110	67
110/120	68
120/130	70
130/140	70
140/150	72
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.957	0.916
2200	0.978	0.956
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.997
600	0.997	0.995
550	0.993	0.986
500	0.983	0.965
480	0.976	0.952
460	0.966	0.934
440	0.950	0.902
420	0.917	0.840
400	0.791	0.625
390	0.586	0.343
380	0.210	0.044
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.4	0.1	0.7	0.7	0.8	1.0	1.6	3.3	3.5	6.2
-40～-20	0.1	0.5	1.0	1.1	1.2	1.5	2.2	3.9	4.1	6.7
-20～0	0.4	0.7	1.0	1.2	1.3	1.7	2.6	4.4	4.6	7.1
0～20	0.5	1.0	1.2	1.3	1.5	1.8	2.8	4.8	4.9	7.6
20～40	0.5	1.2	1.5	1.6	1.7	1.9	3.1	5.2	5.3	8.2
40～60	0.6	1.3	1.6	1.7	1.8	2.2	3.4	5.7	5.9	8.8
60～80	0.8	1.5	1.9	2.0	2.2	2.6	3.7	6.2	6.3	9.3
80～100	1.0	1.7	2.2	2.3	2.5	3.0	4.0	6.5	6.7	9.7
100～120	1.3	1.9	2.3	2.3	2.5	3.2	4.3	6.7	6.9	10.1
120～140	1.5	2.0	2.4	2.5	2.6	3.4	4.5	6.9	7.1	10.5
140～160	1.7	2.1	2.6	2.8	2.9	3.7	4.7	7.1	7.2	10.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(435)/385
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	415/382

Constants of dn/dt		
D_0	D_1	D_2
-2.92E-06	1.58E-08	-3.18E-11
E_0	E_1	λ_{TK}
8.11E-07	8.16E-10	3.44E-01

H-ZF62GT	923209	n_d = 1.92286	υ_d = 20.88	$n_F - n_C$ = 0.044198
		n_e = 1.93323	υ_e = 20.71	$n_{F'} - n_{C'}$ = 0.045071

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.84761
n_{1970}	1970.09	1.85605
n_{1530}	1529.58	1.86617
n_{1129}	1128.64	1.87734
n_{1064}	1064.00	1.87974
n_t	1013.98	1.88181
n_s	852.11	1.89061
$n_{A'}$	768.19	1.89723
n_r	706.52	1.90366
n_C	656.27	1.91038
$n_{C'}$	643.85	1.91231
n_{He-Ne}	632.80	1.91413
n_D	589.29	1.92248
n_d	587.56	1.92286
n_e	546.07	1.93323
n_F	486.13	1.95457
$n_{F'}$	479.99	1.95738
n_g	435.84	1.98274
n_h	404.66	2.00892
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.49733468E+00
A_1	-1.75493772E-02
A_2	5.99594355E-02
A_3	3.90005481E-03
A_4	-1.39531497E-04
A_5	4.41807948E-05

Density	
ρ (g/cm^3)	3.93

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2824
$P_{e,d}$	0.2346
$P_{g,F}$	0.6374
$P'_{d,c'}$	0.2341
$P'_{e,d}$	0.2301
$P'_{g,F'}$	0.5627

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0042
$\triangle P_{g,F}$	0.0284
$\triangle P_{C,t}$	0.0051
$\triangle P_{C,s}$	-0.0032

Thermal Properties	
Tg (℃)	690
Ts (℃)	725
$T_{10}^{14.5}$ (℃)	625
T_{10}^{13} (℃)	664
$\alpha_{-50/80℃}$ (10^{-7}/K)	61
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	0.99

Mechanical Properties	
HK (10^7Pa)	485
F_A	228
E (GPa)	98.0
G (GPa)	39.0
μ	0.257
σ_b (MPa)	71
B (10^{-12}/Pa)	2.85

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	54
-40/-30	56
-30/-20	58
-20/-10	60
-10/0	61
0/10	62
10/20	62
20/30	63
30/40	63
40/50	64
50/60	64
60/70	65
70/80	65
80/90	65
90/100	67
100/110	67
110/120	68
120/130	70
130/140	70
140/150	72
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.961	0.924
2200	0.984	0.969
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.997
600	0.997	0.995
550	0.997	0.994
500	0.991	0.983
480	0.988	0.975
460	0.983	0.965
440	0.974	0.949
420	0.945	0.894
400	0.836	0.700
390	0.615	0.378
380	0.245	0.060
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.4	0.1	0.7	0.7	0.8	1.0	1.6	3.3	3.5	6.2
-40～-20	0.1	0.5	1.0	1.1	1.2	1.5	2.2	3.9	4.1	6.7
-20～0	0.4	0.7	1.0	1.2	1.3	1.7	2.6	4.4	4.6	7.1
0～20	0.5	1.0	1.2	1.3	1.5	1.8	2.8	4.8	4.9	7.6
20～40	0.5	1.2	1.5	1.6	1.7	1.9	3.1	5.2	5.3	8.2
40～60	0.6	1.3	1.6	1.7	1.8	2.2	3.4	5.7	5.9	8.8
60～80	0.8	1.5	1.9	2.0	2.2	2.6	3.7	6.2	6.3	9.3
80～100	1.0	1.7	2.2	2.3	2.5	3.0	4.0	6.5	6.7	9.7
100～120	1.3	1.9	2.3	2.3	2.5	3.2	4.3	6.7	6.9	10.1
120～140	1.5	2.0	2.4	2.5	2.6	3.4	4.5	6.9	7.1	10.5
140～160	1.7	2.1	2.6	2.8	2.9	3.7	4.7	7.1	7.2	10.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(415)/382
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	408/380

Constants of dn/dt		
D_0	D_1	D_2
-2.92E-06	1.58E-08	-3.18E-11
E_0	E_1	λ_{TK}
8.11E-07	8.16E-10	3.44E-01

H-ZF72B	923189	n_d = 1.92286	υ_d = 18.90	$n_F - n_C$ = 0.048837
		n_e = 1.93429	υ_e = 18.74	$n_{F'} - n_{C'}$ = 0.049853

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.84193
n_{1970}	1970.09	1.85076
n_{1530}	1529.58	1.86140
n_{1129}	1128.64	1.87330
n_{1064}	1064.00	1.87587
n_t	1013.98	1.87811
n_s	852.11	1.88761
$n_{A'}$	768.19	1.89481
n_r	706.52	1.90181
n_C	656.27	1.90916
$n_{C'}$	643.85	1.91127
n_{He-Ne}	632.80	1.91327
n_D	589.29	1.92245
n_d	587.56	1.92286
n_e	546.07	1.93429
n_F	486.13	1.95800
$n_{F'}$	479.99	1.96112
n_g	435.84	1.98974
n_h	404.66	2.01970
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.47907547E+00
A_1	-1.82056514E-02
A_2	6.44069814E-02
A_3	4.67488595E-03
A_4	-2.34014347E-04
A_5	6.37833754E-05

Density	
ρ (g/cm^3)	3.57

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2805
$P_{e,d}$	0.2340
$P_{g,F}$	0.6499
$P'_{d,c'}$	0.2325
$P'_{e,d}$	0.2293
$P'_{g,F'}$	0.5741

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0057
$\triangle P_{g,F}$	0.0377
$\triangle P_{C,t}$	0.0041
$\triangle P_{C,s}$	-0.0045

Thermal Properties	
Tg (℃)	656
Ts (℃)	684
$T_{10}^{14.5}$ (℃)	585
T_{10}^{13} (℃)	634
$\alpha_{-50/80℃}$ (10^{-7}/K)	66
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	488
F_A	206
E (GPa)	100.3
G (GPa)	40.3
μ	0.243
σ_b (MPa)	56
B (10^{-12}/Pa)	3.24

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	57
-40/-30	60
-30/-20	62
-20/-10	64
-10/0	66
0/10	67
10/20	68
20/30	69
30/40	70
40/50	71
50/60	71
60/70	72
70/80	72
80/90	73
90/100	73
100/110	74
110/120	74
120/130	75
130/140	76
140/150	77
150/160	78

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.983	0.966
2200	0.995	0.990
2000	0.997	0.994
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.997	0.994
550	0.990	0.981
500	0.973	0.954
480	0.966	0.938
460	0.954	0.915
440	0.933	0.875
420	0.890	0.788
400	0.642	0.410
390	0.253	0.066
380		
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.5	0.3	0.8	0.9	1.0	1.4	2.2	4.3	4.4	6.7
-40～-20	-0.3	0.3	0.9	1.0	1.1	1.6	2.5	4.5	4.6	7.0
-20～0	-0.1	0.4	1.1	1.2	1.3	1.9	2.9	4.9	5.0	8.0
0～20	-0.1	0.5	1.2	1.3	1.6	2.1	3.1	5.3	5.5	8.6
20～40	0.0	0.6	1.6	1.7	1.8	2.4	3.3	5.7	6.0	9.4
40～60	0.2	0.8	1.8	1.8	2.0	2.6	3.6	6.3	6.5	9.9
60～80	0.3	1.0	1.9	2.0	2.2	2.9	4.0	6.8	7.0	10.7
80～100	0.5	1.2	2.1	2.3	2.4	3.1	4.3	7.3	7.5	11.1
100～120	0.6	1.4	2.3	2.4	2.5	3.3	4.6	7.8	8.0	11.9
120～140	0.6	1.5	2.5	2.6	2.8	3.6	4.8	8.2	8.3	12.4
140～160	0.7	1.7	2.7	2.9	3.0	3.8	5.1	8.6	8.7	12.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(440)/385
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	422/389

Constants of dn/dt		
D_0	D_1	D_2
-3.91E-06	1.21E-08	-2.37E-11
E_0	E_1	λ_{TK}
1.14E-06	1.61E-09	3.25E-01

H-ZF72GT	923189	n_d = 1.92286	υ_d = 18.90	$n_F - n_C$ = 0.048837
		n_e = 1.93429	υ_e = 18.74	$n_{F'} - n_{C'}$ = 0.049853

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.84193
n_{1970}	1970.09	1.85076
n_{1530}	1529.58	1.86140
n_{1129}	1128.64	1.87330
n_{1064}	1064.00	1.87587
n_t	1013.98	1.87811
n_s	852.11	1.88761
$n_{A'}$	768.19	1.89481
n_r	706.52	1.90181
n_C	656.27	1.90916
$n_{C'}$	643.85	1.91127
n_{He-Ne}	632.80	1.91327
n_D	589.29	1.92245
n_d	587.56	1.92286
n_e	546.07	1.93429
n_F	486.13	1.95800
$n_{F'}$	479.99	1.96112
n_g	435.84	1.98974
n_h	404.66	2.01970
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.47907547E+00
A_1	-1.82056514E-02
A_2	6.44069814E-02
A_3	4.67488595E-03
A_4	-2.34014347E-04
A_5	6.37833754E-05

Density	
ρ (g/cm^3)	3.57

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2805
$P_{e,d}$	0.2340
$P_{g,F}$	0.6499
$P'_{d,c'}$	0.2325
$P'_{e,d}$	0.2293
$P'_{g,F'}$	0.5741

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0057
$\triangle P_{g,F}$	0.0377
$\triangle P_{C,t}$	0.0041
$\triangle P_{C,s}$	-0.0045

Thermal Properties	
Tg (℃)	656
Ts (℃)	684
$T_{10}^{14.5}$ (℃)	585
T_{10}^{13} (℃)	634
$\alpha_{-50/80℃}$ (10^{-7}/K)	65
$\alpha_{100/300℃}$ (10^{-7}/K)	81
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	488
F_A	206
E (GPa)	100.3
G (GPa)	40.3
μ	0.243
σ_b (MPa)	56
B (10^{-12}/Pa)	3.24

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	57
-40/-30	60
-30/-20	62
-20/-10	65
-10/0	66
0/10	67
10/20	69
20/30	69
30/40	70
40/50	70
50/60	70
60/70	71
70/80	71
80/90	72
90/100	72
100/110	73
110/120	74
120/130	74
130/140	75
140/150	76
150/160	77

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.983	0.966
2200	0.995	0.990
2000	0.997	0.994
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.997
600	0.998	0.997
550	0.996	0.991
500	0.988	0.977
480	0.983	0.965
460	0.974	0.949
440	0.959	0.919
420	0.921	0.848
400	0.671	0.450
390	0.305	0.093
380		
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.5	0.3	0.8	0.9	1.0	1.4	2.2	4.3	4.4	6.7
-40～-20	-0.3	0.3	0.9	1.0	1.1	1.6	2.5	4.5	4.6	7.0
-20～0	-0.1	0.4	1.1	1.2	1.3	1.9	2.9	4.9	5.0	8.0
0～20	-0.1	0.5	1.2	1.3	1.6	2.1	3.1	5.3	5.5	8.6
20～40	0.0	0.6	1.6	1.7	1.8	2.4	3.3	5.7	6.0	9.4
40～60	0.2	0.8	1.8	1.8	2.0	2.6	3.6	6.3	6.5	9.9
60～80	0.3	1.0	1.9	2.0	2.2	2.9	4.0	6.8	7.0	10.7
80～100	0.5	1.2	2.1	2.3	2.4	3.1	4.3	7.3	7.5	11.1
100～120	0.6	1.4	2.3	2.4	2.5	3.3	4.6	7.8	8.0	11.9
120～140	0.6	1.5	2.5	2.6	2.8	3.6	4.8	8.2	8.3	12.4
140～160	0.7	1.7	2.7	2.9	3.0	3.8	5.1	8.6	8.7	12.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(420)/385
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	417/387

Constants of dn/dt		
D_0	D_1	D_2
-3.91E-06	1.21E-08	-2.37E-11
E_0	E_1	λ_{TK}
1.14E-06	1.61E-09	3.25E-01

H-ZF75A	946180	n_d = 1.94595	υ_d = 17.98	$n_F - n_C$ = 0.052600
		n_e = 1.95825	υ_e = 17.84	$n_{F'} - n_{C'}$ = 0.053718

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.85978
n_{1970}	1970.09	1.86908
n_{1530}	1529.58	1.88034
n_{1129}	1128.64	1.89291
n_{1064}	1064.00	1.89565
n_t	1013.98	1.89802
n_s	852.11	1.90816
$n_{A'}$	768.19	1.91585
n_r	706.52	1.92337
n_C	656.27	1.93123
$n_{C'}$	643.85	1.93350
n_{He-Ne}	632.80	1.93564
n_D	589.29	1.94550
n_d	587.56	1.94595
n_e	546.07	1.95825
n_F	486.13	1.98383
$n_{F'}$	479.99	1.98722
n_g	435.84	2.01828
n_h	404.66	2.05110
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.55084508E+00
A_1	-1.93992631E-02
A_2	6.82201738E-02
A_3	5.85319322E-03
A_4	-4.21740063E-04
A_5	8.66214086E-05

Density	
ρ (g/cm^3)	3.53

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.2798
$P_{e,d}$	0.2338
$P_{g,F}$	0.6549
$P'_{d,c'}$	0.2318
$P'_{e,d}$	0.2290
$P'_{g,F'}$	0.5782

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0060
$\triangle P_{g,F}$	0.0412
$\triangle P_{C,t}$	0.0041
$\triangle P_{C,s}$	-0.0050

Thermal Properties	
Tg (℃)	682
Ts (℃)	709
$T_{10}^{14.5}$ (℃)	609
T_{10}^{13} (℃)	660
$\alpha_{-50/80℃}$ (10^{-7}/K)	55
$\alpha_{100/300℃}$ (10^{-7}/K)	70
λ (W/(m·K))	1.11

Mechanical Properties	
HK (10^7Pa)	510
F_A	199
E (GPa)	104.6
G (GPa)	41.1
μ	0.272
σ_b (MPa)	66
B (10^{-12}/Pa)	3.38

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	47
-40/-30	50
-30/-20	51
-20/-10	53
-10/0	54
0/10	55
10/20	56
20/30	57
30/40	57
40/50	58
50/60	60
60/70	60
70/80	61
80/90	61
90/100	62
100/110	63
110/120	64
120/130	65
130/140	66
140/150	66
150/160	67

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.972	0.945
2200	0.982	0.964
2000	0.997	0.994
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.995	0.990
550	0.993	0.986
500	0.970	0.941
480	0.960	0.921
460	0.946	0.894
440	0.923	0.853
420	0.870	0.756
400	0.546	0.298
390	0.181	0.033
380		
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.5	1.2	1.6	1.7	1.8	2.2	2.9	4.8	5.0	7.8
-40～-20	0.5	1.3	1.8	1.9	2.0	2.5	3.4	5.4	5.6	8.7
-20～0	0.7	1.5	2.1	2.2	2.3	3.0	3.8	6.1	6.3	9.6
0～20	0.8	1.6	2.3	2.4	2.5	3.2	4.2	6.7	6.9	10.3
20～40	1.1	1.9	2.8	2.7	2.8	3.5	4.6	7.1	7.3	11.0
40～60	1.2	2.2	3.1	3.2	3.3	4.0	5.1	7.7	7.9	12.2
60～80	1.6	2.6	3.6	3.7	3.8	4.4	5.6	8.6	8.8	12.9
80～100	2.0	2.9	4.0	4.1	4.2	5.0	6.1	9.5	9.8	13.7
100～120	2.4	3.3	4.3	4.5	4.6	5.6	6.6	10.1	10.3	14.4
120～140	2.7	3.8	4.9	5.0	5.2	6.1	7.1	10.9	11.1	15.2
140～160	3.1	4.2	5.4	5.5	5.6	6.5	7.8	11.6	11.8	16.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(450)/390
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	424/391

Constants of dn/dt		
D_0	D_1	D_2
-2.30E-06	1.66E-08	-7.59E-12
E_0	E_1	λ_{TK}
1.12E-06	1.62E-09	3.30E-01

H-ZF75GT	946180	n_d = 1.94595	υ_d = 17.98	$n_F - n_C$ = 0.052600
		n_e = 1.95825	υ_e = 17.84	$n_{F'} - n_{C'}$ = 0.053718

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.85978
n_{1970}	1970.09	1.86908
n_{1530}	1529.58	1.88034
n_{1129}	1128.64	1.89291
n_{1064}	1064.00	1.89565
n_t	1013.98	1.89802
n_s	852.11	1.90816
$n_{A'}$	768.19	1.91585
n_r	706.52	1.92337
n_C	656.27	1.93123
$n_{C'}$	643.85	1.93350
n_{He-Ne}	632.80	1.93564
n_D	589.29	1.94550
n_d	587.56	1.94595
n_e	546.07	1.95825
n_F	486.13	1.98383
$n_{F'}$	479.99	1.98722
n_g	435.84	2.01828
n_h	404.66	2.05110
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.55084508E+00
A_1	-1.93992631E-02
A_2	6.82201738E-02
A_3	5.85319322E-03
A_4	-4.21740063E-04
A_5	8.66214086E-05

Density		Solarization	
ρ (g/cm^3)	3.53	△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.2798
$P_{e,d}$	0.2338
$P_{g,F}$	0.6549
$P'_{d,c'}$	0.2318
$P'_{e,d}$	0.2290
$P'_{g,F'}$	0.5782

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0060
$\triangle P_{g,F}$	0.0412
$\triangle P_{C,t}$	0.0041
$\triangle P_{C,s}$	-0.0050

Thermal Properties	
Tg (℃)	682
Ts (℃)	709
$T_{10}^{14.5}$ (℃)	609
T_{10}^{13} (℃)	660
$\alpha_{-50/80℃}$ (10^{-7}/K)	54
$\alpha_{100/300℃}$ (10^{-7}/K)	68
λ (W/(m·K))	1.11

Mechanical Properties	
HK (10^7Pa)	510
F_A	199
E (GPa)	104.6
G (GPa)	41.1
μ	0.272
σ_b (MPa)	78
B (10^{-12}/Pa)	3.38

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	48
-40/-30	51
-30/-20	53
-20/-10	55
-10/0	56
0/10	57
10/20	57
20/30	58
30/40	59
40/50	59
50/60	60
60/70	61
70/80	61
80/90	62
90/100	62
100/110	63
110/120	64
120/130	64
130/140	66
140/150	67
150/160	68

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.975	0.951
2200	0.986	0.973
2000	0.997	0.995
1800	0.997	0.995
1600	0.997	0.995
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.995	0.991
500	0.988	0.975
480	0.982	0.963
460	0.973	0.946
440	0.957	0.916
420	0.915	0.838
400	0.604	0.365
390	0.243	0.059
380		
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.5	1.2	1.6	1.7	1.8	2.2	2.9	4.8	5.0	7.8
-40～-20	0.5	1.3	1.8	1.9	2.0	2.5	3.4	5.4	5.6	8.7
-20～0	0.7	1.5	2.1	2.2	2.3	3.0	3.8	6.1	6.3	9.6
0～20	0.8	1.6	2.3	2.4	2.5	3.2	4.2	6.7	6.9	10.3
20～40	1.1	1.9	2.8	2.7	2.8	3.5	4.6	7.1	7.3	11.0
40～60	1.2	2.2	3.1	3.2	3.3	4.0	5.1	7.7	7.9	12.2
60～80	1.6	2.6	3.6	3.7	3.8	4.4	5.6	8.6	8.8	12.9
80～100	2.0	2.9	4.0	4.1	4.2	5.0	6.1	9.5	9.8	13.7
100～120	2.4	3.3	4.3	4.5	4.6	5.6	6.6	10.1	10.3	14.4
120～140	2.7	3.8	4.9	5.0	5.2	6.1	7.1	10.9	11.1	15.2
140～160	3.1	4.2	5.4	5.5	5.6	6.5	7.8	11.6	11.8	16.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(430)/392
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	417/389

Constants of dn/dt		
D_0	D_1	D_2
-2.30E-06	1.66E-08	-7.59E-12
E_0	E_1	λ_{TK}
1.12E-06	1.62E-09	3.30E-01

H-ZF76	959175	n_d = 1.95906	υ_d = 17.47	$n_F - n_C$ = 0.054890
		n_e = 1.97189	υ_e = 17.33	$n_{F'} - n_{C'}$ = 0.056091

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.90422
n_{1064}	1064.00	1.90710
n_t	1013.98	1.90958
n_s	852.11	1.92000
$n_{A'}$	768.19	1.92789
n_r	706.52	1.93562
n_C	656.27	1.94375
$n_{C'}$	643.85	1.94611
n_{He-Ne}	632.80	1.94834
n_D	589.29	1.95860
n_d	587.56	1.95906
n_e	546.07	1.97189
n_F	486.13	1.99865
$n_{F'}$	479.99	2.00220
n_g	435.84	2.03469
n_h	404.66	2.06909
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.61187240E+00
A_1	-2.77611102E-02
A_2	5.45160847E-02
A_3	1.18687253E-02
A_4	-1.30897352E-03
A_5	1.41185183E-04

Density	
ρ (g/cm^3)	3.56

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2789
$P_{e,d}$	0.2337
$P_{g,F}$	0.6566
$P'_{d,c'}$	0.2309
$P'_{e,d}$	0.2287
$P'_{g,F'}$	0.5792

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0070
$\triangle P_{g,F}$	0.0420
$\triangle P_{C,t}$	-0.0022
$\triangle P_{C,s}$	-0.0096

Thermal Properties	
Tg (℃)	683
Ts (℃)	712
$T_{10}^{14.5}$ (℃)	605
T_{10}^{13} (℃)	655
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	73
λ (W/(m·K))	

Mechanical Properties	
HK (10^7Pa)	494
F_A	178
E (GPa)	102.9
G (GPa)	41.2
μ	0.249
σ_b (MPa)	79
B (10^{-12}/Pa)	3.58

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	53
-40/-30	55
-30/-20	56
-20/-10	57
-10/0	58
0/10	58
10/20	59
20/30	60
30/40	62
40/50	62
50/60	62
60/70	62
70/80	65
80/90	65
90/100	65
100/110	67
110/120	67
120/130	68
130/140	70
140/150	70
150/160	70

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.976	0.953
2200	0.990	0.980
2000	0.992	0.984
1800	0.996	0.991
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.998	0.996
650	0.997	0.994
600	0.996	0.992
550	0.988	0.977
500	0.972	0.944
480	0.957	0.917
460	0.936	0.876
440	0.897	0.804
420	0.805	0.648
400	0.370	0.137
390		
380		
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.5	-0.2	0.4	0.5	0.6	1.1	2.0	3.9	4.1	6.8
-40～-20	-0.4	-0.2	0.5	0.6	0.7	1.2	2.4	4.2	4.4	7.1
-20～0	-0.2	-0.1	0.7	0.9	1.0	1.4	2.7	4.6	4.7	7.7
0～20	0.1	0.0	0.9	1.1	1.2	1.8	3.1	4.9	5.0	8.2
20～40	0.1	0.2	1.1	1.3	1.4	2.0	3.3	5.2	5.3	8.5
40～60	0.2	0.4	1.2	1.4	1.5	2.4	3.4	5.4	5.6	9.1
60～80	0.6	0.8	1.4	1.6	1.8	2.7	3.8	5.7	5.9	9.6
80～100	0.8	1.3	1.6	1.9	2.1	3.0	4.2	6.0	6.3	10.0
100～120	0.9	1.5	1.9	2.1	2.5	3.1	4.3	6.5	6.8	10.5
120～140	1.0	1.7	2.0	2.3	2.6	3.4	4.5	6.8	7.2	10.9
140～160	1.1	1.7	2.2	2.5	2.7	3.6	4.7	7.1	7.5	11.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(460)/395
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	438/397

Constants of dn/dt		
D_0	D_1	D_2
-3.83E-06	1.49E-08	-2.21E-11
E_0	E_1	λ_{TK}
9.49E-07	6.87E-10	3.36E-01

H-TF3L	613441	n_d = 1.61340	υ_d = 44.11	$n_F - n_C$ = 0.013907
		n_e = 1.61669	υ_e = 43.91	$n_{F'} - n_{C'}$ = 0.014044

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.57673
n_{1970}	1970.09	1.58314
n_{1530}	1529.58	1.59013
n_{1129}	1128.64	1.59636
n_{1064}	1064.00	1.59749
n_t	1013.98	1.59843
n_s	852.11	1.60207
$n_{A'}$	768.19	1.60458
n_r	706.52	1.60690
n_C	656.27	1.60924
$n_{C'}$	643.85	1.60990
n_{He-Ne}	632.80	1.61051
n_D	589.29	1.61327
n_d	587.56	1.61340
n_e	546.07	1.61669
n_F	486.13	1.62315
$n_{F'}$	479.99	1.62394
n_g	435.84	1.63097
n_h	404.66	1.63765
n_i	365.01	1.64956

Constants of Dispersion Formula	
A_0	2.54989010E+00
A_1	-1.24016345E-02
A_2	1.74291594E-02
A_3	1.02656330E-03
A_4	-8.81502201E-05
A_5	6.75446845E-06

Density		Solarization	
ρ (g/cm^3)	2.84	△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2991
$P_{e,d}$	0.2366
$P_{g,F}$	0.5623
$P'_{d,c'}$	0.2492
$P'_{e,d}$	0.2343
$P'_{g,F'}$	0.5006

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0013
$\triangle P_{g,F}$	-0.0080
$\triangle P_{C,t}$	0.0234
$\triangle P_{C,s}$	0.0093

Thermal Properties	
Tg (℃)	579
Ts (℃)	623
$T_{10}^{14.5}$ (℃)	504
T_{10}^{13} (℃)	547
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	78
λ (W/(m·K))	0.97

Mechanical Properties	
HK (10^7Pa)	575
F_A	111
E (GPa)	86.9
G (GPa)	35.1
μ	0.238
σ_b (MPa)	63
B (10^{-12}/Pa)	3.28

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	55
-40/-30	56
-30/-20	57
-20/-10	60
-10/0	63
0/10	62
10/20	61
20/30	64
30/40	63
40/50	66
50/60	65
60/70	66
70/80	68
80/90	66
90/100	73
100/110	69
110/120	68
120/130	72
130/140	71
140/150	76
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.885	0.782
2200	0.953	0.907
2000	0.994	0.988
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.996
480	0.997	0.994
460	0.996	0.992
440	0.995	0.990
420	0.993	0.987
400	0.990	0.980
390	0.989	0.978
380	0.982	0.964
370	0.970	0.941
360	0.948	0.899
350	0.903	0.815
340	0.828	0.685
330	0.647	0.418
320	0.239	0.057
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.3	4.5	4.6	4.7	4.8	5.0	5.2	5.5	5.6	6.3
-40～-20	4.3	4.6	4.7	4.8	4.9	5.0	5.2	5.6	5.7	6.4
-20～0	4.3	4.5	4.7	4.8	4.9	5.0	5.3	5.7	5.8	6.5
0～20	4.4	4.6	4.8	4.9	5.0	5.1	5.4	5.7	5.8	6.6
20～40	4.4	4.6	4.8	4.9	5.0	5.1	5.4	5.8	5.9	6.7
40～60	4.4	4.7	4.9	5.0	5.1	5.2	5.5	6.0	6.1	6.8
60～80	4.5	4.8	5.0	5.1	5.2	5.3	5.6	6.0	6.1	6.9
80～100	4.5	4.9	5.1	5.2	5.3	5.4	5.7	6.1	6.2	7.1
100～120	4.5	4.9	5.2	5.2	5.3	5.5	5.8	6.2	6.3	7.2
120～140	4.5	5.0	5.3	5.3	5.4	5.7	6.0	6.3	6.4	7.3
140～160	4.6	5.1	5.4	5.4	5.5	5.8	6.1	6.5	6.6	7.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	349/321

Constants of dn/dt		
D_0	D_1	D_2
5.46E-06	1.31E-08	-2.19E-11
E_0	E_1	λ_{TK}
4.56E-07	3.98E-10	2.95E-01

H-ZBaF3	657511	n_d = 1.65691	υ_d = 51.12	$n_F - n_C$ = 0.012850
		n_e = 1.65996	υ_e = 50.88	$n_{F'} - n_{C'}$ = 0.012970

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.62663
n_{1970}	1970.09	1.63127
n_{1530}	1529.58	1.63649
n_{1129}	1128.64	1.64148
n_{1064}	1064.00	1.64245
n_t	1013.98	1.64326
n_s	852.11	1.64648
$n_{A'}$	768.19	1.64877
n_r	706.52	1.65091
n_C	656.27	1.65306
$n_{C'}$	643.85	1.65368
n_{He-Ne}	632.80	1.65424
n_D	589.29	1.65680
n_d	587.56	1.65691
n_e	546.07	1.65996
n_F	486.13	1.66591
$n_{F'}$	479.99	1.66665
n_g	435.84	1.67306
n_h	404.66	1.67907
n_i	365.01	1.68947

Constants of Dispersion Formula	
A_0	2.69121166E+00
A_1	-9.00413519E-03
A_2	1.83609733E-02
A_3	5.31180896E-04
A_4	-2.10926709E-05
A_5	1.72686254E-06

Density	
ρ (g/cm^3)	3.89

Solarization	
△λ (%)	-0.2

Relative Partial Dispersion	
$P_{d,C}$	0.2996
$P_{e,d}$	0.2374
$P_{g,F}$	0.5564
$P'_{d,c'}$	0.2490
$P'_{e,d}$	0.2352
$P'_{g,F'}$	0.4942

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0011
$\triangle P_{g,F}$	-0.0023
$\triangle P_{C,t}$	-0.0252
$\triangle P_{C,s}$	-0.0110

Thermal Properties	
Tg (℃)	657
Ts (℃)	696
$T_{10}^{14.5}$ (℃)	590
T_{10}^{13} (℃)	631
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	0.82

Mechanical Properties	
HK (10^7Pa)	520
F_A	139
E (GPa)	80.4
G (GPa)	31.1
μ	0.292
σ_b (MPa)	77
B (10^{-12}/Pa)	1.83

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	67
-40/-30	70
-30/-20	71
-20/-10	72
-10/0	74
0/10	75
10/20	76
20/30	76
30/40	77
40/50	78
50/60	78
60/70	79
70/80	80
80/90	81
90/100	82
100/110	83
110/120	83
120/130	84
130/140	85
140/150	86
150/160	87

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.938	0.880
2200	0.973	0.947
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.997	0.994
420	0.994	0.988
400	0.991	0.981
390	0.987	0.968
380	0.976	0.945
370	0.952	0.899
360	0.894	0.798
350	0.782	0.611
340	0.555	0.308
330	0.217	0.050
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.2	2.5	2.8	2.8	2.8	3.0	3.2	3.6	3.6	4.2
-40～-20	2.2	2.5	2.8	2.8	2.8	2.9	3.2	3.6	3.6	4.2
-20～0	2.3	2.6	2.8	2.8	2.9	3.1	3.2	3.7	3.7	4.3
0～20	2.3	2.6	2.8	2.8	2.9	3.1	3.3	3.7	3.7	4.4
20～40	2.3	2.6	2.9	2.9	2.9	3.1	3.3	3.7	3.7	4.4
40～60	2.4	2.7	2.9	2.9	3.0	3.2	3.5	3.9	3.9	4.5
60～80	2.4	2.7	2.9	3.0	3.1	3.3	3.5	4.1	4.1	4.7
80～100	2.6	2.8	3.0	3.1	3.2	3.4	3.6	4.2	4.2	4.8
100～120	2.7	2.9	3.1	3.2	3.3	3.4	3.6	4.4	4.4	5.1
120～140	2.7	2.9	3.2	3.3	3.4	3.6	3.7	4.5	4.5	5.2
140～160	2.9	3.0	3.3	3.4	3.5	3.8	3.9	4.8	4.9	5.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	375/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	360/330

Constants of dn/dt		
D_0	D_1	D_2
1.08E-06	1.18E-08	-1.50E-11
E_0	E_1	λ_{TK}
4.84E-07	5.39E-10	2.70E-01

H-ZBaF5	671473	n_d = 1.67103	υ_d = 47.29	$n_F - n_C$ = 0.014190
		n_e = 1.67440	υ_e = 46.99	$n_{F'} - n_{C'}$ = 0.014353

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.63768
n_{1970}	1970.09	1.64279
n_{1530}	1529.58	1.64857
n_{1129}	1128.64	1.65410
n_{1064}	1064.00	1.65517
n_t	1013.98	1.65606
n_s	852.11	1.65961
$n_{A'}$	768.19	1.66211
n_r	706.52	1.66444
n_C	656.27	1.66680
$n_{C'}$	643.85	1.66746
n_{He-Ne}	632.80	1.66809
n_D	589.29	1.67091
n_d	587.56	1.67103
n_e	546.07	1.67440
n_F	486.13	1.68099
$n_{F'}$	479.99	1.68182
n_g	435.84	1.68902
n_h	404.66	1.69578
n_i	365.01	1.70732

Relative Partial Dispersion	
$P_{d,C}$	0.2981
$P_{e,d}$	0.2375
$P_{g,F}$	0.5659
$P'_{d,c'}$	0.2487
$P'_{e,d}$	0.2348
$P'_{g,F'}$	0.5016

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0003
$\triangle P_{g,F}$	0.0008
$\triangle P_{C,t}$	-0.0124
$\triangle P_{C,s}$	-0.0072

Thermal Properties	
Tg (℃)	583
Ts (℃)	652
$T_{10}^{14.5}$ (℃)	540
T_{10}^{13} (℃)	580
$\alpha_{-50/80℃}$ (10^{-7}/K)	78
$\alpha_{100/300℃}$ (10^{-7}/K)	94
λ (W/(m·K))	0.70

Mechanical Properties	
HK (10^7Pa)	626
F_A	140
E (GPa)	97.0
G (GPa)	38.1
μ	0.273
σ_b (MPa)	
B (10^{-12}/Pa)	1.74

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	2
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	69
-40/-30	71
-30/-20	74
-20/-10	75
-10/0	77
0/10	78
10/20	79
20/30	80
30/40	81
40/50	82
50/60	82
60/70	83
70/80	85
80/90	86
90/100	87
100/110	88
110/120	89
120/130	90
130/140	91
140/150	92
150/160	93

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.943	0.889
2200	0.971	0.942
2000	0.986	0.972
1800	0.992	0.984
1600	0.998	0.997
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.998	0.997
850	0.998	0.996
800	0.995	0.991
750	0.995	0.991
700	0.995	0.990
650	0.995	0.990
600	0.994	0.989
550	0.994	0.989
500	0.992	0.985
480	0.991	0.983
460	0.990	0.980
440	0.988	0.976
420	0.985	0.971
400	0.976	0.953
390	0.964	0.930
380	0.941	0.886
370	0.890	0.800
360	0.790	0.630
350	0.580	0.340
340	0.230	0.060
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.73214288E+00
A_1	-9.99573110E-03
A_2	2.10627506E-02
A_3	9.14104150E-05
A_4	9.31355399E-05
A_5	-5.82600014E-06

Density	
ρ (g/cm^3)	3.58

Solarization	
△λ (%)	-0.4

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.4	2.8	3.0	3.1	3.2	3.4	3.9	4.5	4.6	5.0
-40～-20	2.5	2.9	3.2	3.3	3.4	3.5	4.0	4.6	4.8	5.2
-20～0	2.7	3.1	3.4	3.5	3.6	3.7	4.1	4.7	4.8	5.3
0～20	2.7	3.2	3.7	3.8	3.9	4.0	4.2	4.8	4.9	5.4
20～40	2.8	3.3	3.9	4.0	4.1	4.2	4.3	4.9	5.0	5.5
40～60	3.0	3.4	4.1	4.2	4.3	4.4	4.5	5.0	5.1	5.6
60～80	3.1	3.6	4.3	4.4	4.4	4.5	4.6	5.1	5.2	5.8
80～100	3.2	3.7	4.4	4.5	4.5	4.6	4.7	5.2	5.3	5.9
100～120	3.3	3.9	4.6	4.7	4.7	4.8	4.9	5.3	5.4	6.1
120～140	3.3	4.0	4.7	4.8	4.8	4.9	5.0	5.4	5.5	6.2
140～160	3.4	4.0	4.8	4.9	4.9	5.0	5.2	5.6	5.6	6.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	370/340

Constants of dn/dt		
D_0	D_1	D_2
1.66E-06	1.91E-08	-3.14E-11
E_0	E_1	λ_{TK}
1.03E-06	-3.69E-10	7.88E-09

H-ZBaF10	618498	n_d = 1.61773	υ_d = 49.83	$n_F - n_C$ = 0.012397
		n_e = 1.62068	υ_e = 49.54	$n_{F'} - n_{C'}$ = 0.012529

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58640
n_{1970}	1970.09	1.59159
n_{1530}	1529.58	1.59734
n_{1129}	1128.64	1.60261
n_{1064}	1064.00	1.60359
n_t	1013.98	1.60441
n_s	852.11	1.60761
$n_{A'}$	768.19	1.60985
n_r	706.52	1.61192
n_C	656.27	1.61401
$n_{C'}$	643.85	1.61460
n_{He-Ne}	632.80	1.61515
n_D	589.29	1.61762
n_d	587.56	1.61773
n_e	546.07	1.62068
n_F	486.13	1.62641
$n_{F'}$	479.99	1.62713
n_g	435.84	1.63335
n_h	404.66	1.63923
n_i	365.01	1.64953

Relative Partial Dispersion	
$P_{d,C}$	0.3001
$P_{e,d}$	0.2380
$P_{g,F}$	0.5598
$P'_{d,c'}$	0.2498
$P'_{e,d}$	0.2355
$P'_{g,F'}$	0.4964

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0005
$\triangle P_{g,F}$	-0.0010
$\triangle P_{C,t}$	-0.0072
$\triangle P_{C,s}$	-0.0037

Thermal Properties	
Tg (℃)	627
Ts (℃)	672
$T_{10}^{14.5}$ (℃)	548
T_{10}^{13} (℃)	590
$\alpha_{-50/80℃}$ (10^{-7}/K)	72
$\alpha_{100/300℃}$ (10^{-7}/K)	86
λ (W/(m·K))	0.90

Mechanical Properties	
HK (10^7Pa)	539
F_A	142
E (GPa)	86.1
G (GPa)	34.1
μ	0.263
σ_b (MPa)	83
B (10^{-12}/Pa)	2.12

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	65
-40/-30	68
-30/-20	70
-20/-10	71
-10/0	72
0/10	73
10/20	74
20/30	75
30/40	76
40/50	77
50/60	78
60/70	78
70/80	78
80/90	79
90/100	80
100/110	80
110/120	81
120/130	82
130/140	83
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.918	0.844
2200	0.952	0.908
2000	0.982	0.965
1800	0.992	0.984
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.994
460	0.995	0.992
440	0.993	0.988
420	0.990	0.982
400	0.984	0.970
390	0.972	0.947
380	0.944	0.893
370	0.892	0.800
360	0.770	0.597
350	0.518	0.273
340	0.167	0.038
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.56767884E+00
A_1	-1.00060261E-02
A_2	1.66107744E-02
A_3	6.51052393E-04
A_4	-4.11297812E-05
A_5	3.35427062E-06

Density	
ρ (g/cm^3)	3.16

Solarization	
△λ (%)	-1.2

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.1	2.3	2.5	2.5	2.6	2.7	2.9	3.3	3.3	3.8
-40～-20	2.1	2.3	2.5	2.5	2.6	2.7	3.0	3.3	3.4	3.8
-20～0	2.1	2.3	2.5	2.6	2.6	2.8	3.0	3.4	3.5	3.9
0～20	2.1	2.4	2.5	2.6	2.6	2.8	3.1	3.4	3.5	4.0
20～40	2.2	2.4	2.6	2.6	2.7	2.9	3.1	3.5	3.6	4.0
40～60	2.3	2.5	2.7	2.7	2.7	2.9	3.1	3.6	3.8	4.1
60～80	2.3	2.7	2.8	2.9	2.9	3.0	3.3	3.7	3.8	4.3
80～100	2.5	2.8	2.9	3.0	3.0	3.2	3.3	3.7	3.8	4.3
100～120	2.5	2.8	3.0	3.1	3.1	3.2	3.4	3.8	3.9	4.4
120～140	2.7	2.9	3.1	3.1	3.1	3.3	3.5	3.9	3.9	4.5
140～160	2.7	3.0	3.2	3.2	3.3	3.4	3.6	4.0	4.1	4.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	385/345
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	370/341

Constants of dn/dt		
D_0	D_1	D_2
9.42E-07	1.44E-08	-2.13E-11
E_0	E_1	λ_{TK}
4.74E-07	3.62E-11	2.61E-01

H-ZBaF16	667484	n_d = 1.66672	υ_d = 48.42	$n_F - n_C$ = 0.013769
		n_e = 1.67000	υ_e = 48.13	$n_{F'} - n_{C'}$ = 0.013920

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.63548
n_{1970}	1970.09	1.64006
n_{1530}	1529.58	1.64527
n_{1129}	1128.64	1.65037
n_{1064}	1064.00	1.65137
n_t	1013.98	1.65221
n_s	852.11	1.65561
$n_{A'}$	768.19	1.65803
n_r	706.52	1.66030
n_C	656.27	1.66260
$n_{C'}$	643.85	1.66325
n_{He-Ne}	632.80	1.66386
n_D	589.29	1.66660
n_d	587.56	1.66672
n_e	546.07	1.67000
n_F	486.13	1.67637
$n_{F'}$	479.99	1.67717
n_g	435.84	1.68412
n_h	404.66	1.69065
n_i	365.01	1.70204

Relative Partial Dispersion	
$P_{d,C}$	0.2992
$P_{e,d}$	0.2382
$P_{g,F}$	0.5629
$P'_{d,c'}$	0.2493
$P'_{e,d}$	0.2356
$P'_{g,F'}$	0.4993

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0008
$\triangle P_{g,F}$	-0.0003
$\triangle P_{C,t}$	-0.0201
$\triangle P_{C,s}$	-0.0089

Thermal Properties	
Tg (℃)	581
Ts (℃)	631
$T_{10}^{14.5}$ (℃)	516
T_{10}^{13} (℃)	545
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	93
λ (W/(m·K))	1.02

Mechanical Properties	
HK (10^7Pa)	555
F_A	153
E (GPa)	91.5
G (GPa)	35.4
μ	0.291
σ_b (MPa)	78
B (10^{-12}/Pa)	1.87

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	66
-40/-30	68
-30/-20	69
-20/-10	71
-10/0	73
0/10	74
10/20	75
20/30	76
30/40	77
40/50	78
50/60	78
60/70	79
70/80	79
80/90	80
90/100	81
100/110	82
110/120	83
120/130	84
130/140	86
140/150	87
150/160	88

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.924	0.870
2200	0.959	0.935
2000	0.980	0.970
1800	0.988	0.982
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.994
440	0.996	0.990
420	0.993	0.985
400	0.987	0.975
390	0.979	0.959
380	0.963	0.925
370	0.931	0.854
360	0.858	0.724
350	0.710	0.486
340	0.440	0.177
330	0.148	0.023
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.71895180E+00
A_1	-8.85402223E-03
A_2	2.00773116E-02
A_3	4.62134195E-04
A_4	-2.90064565E-06
A_5	1.15588784E-06

Density	
ρ (g/cm^3)	3.67

Solarization	
△λ (%)	0.4

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.3	3.7	4.0	4.1	4.1	4.3	4.5	5.0	5.1	5.6
-40～-20	3.3	3.7	3.9	4.1	4.1	4.3	4.5	5.0	5.1	5.6
-20～0	3.3	3.7	4.0	4.1	4.1	4.3	4.6	5.0	5.1	5.7
0～20	3.4	3.8	4.0	4.1	4.1	4.3	4.6	5.0	5.1	5.7
20～40	3.4	3.8	4.0	4.1	4.1	4.3	4.6	5.1	5.2	5.8
40～60	3.4	3.8	4.1	4.1	4.2	4.3	4.7	5.2	5.3	5.9
60～80	3.4	3.8	4.1	4.2	4.2	4.5	4.8	5.3	5.4	6.1
80～100	3.5	4.0	4.3	4.4	4.4	4.6	4.9	5.5	5.6	6.3
100～120	3.6	4.1	4.4	4.5	4.5	4.8	5.1	5.7	5.8	6.4
120～140	3.7	4.2	4.5	4.6	4.6	4.9	5.3	5.8	5.9	6.5
140～160	3.8	4.3	4.6	4.6	4.7	5.0	5.3	5.9	6.0	6.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	365/334

Constants of dn/dt		
D_0	D_1	D_2
2.85E-06	1.16E-08	-1.32E-11
E_0	E_1	λ_{TK}
7.06E-07	5.45E-10	2.04E-01

H-ZBaF16A	667484	n_d = 1.66672	υ_d = 48.42	$n_F - n_C$ = 0.013769
		n_e = 1.67000	υ_e = 48.13	$n_{F'} - n_{C'}$ = 0.013920

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.65042
n_{1064}	1064.00	1.65140
n_t	1013.98	1.65223
n_s	852.11	1.65560
$n_{A'}$	768.19	1.65802
n_r	706.52	1.66030
n_C	656.27	1.66260
$n_{C'}$	643.85	1.66325
n_{He-Ne}	632.80	1.66385
n_D	589.29	1.66660
n_d	587.56	1.66672
n_e	546.07	1.67000
n_F	486.13	1.67637
$n_{F'}$	479.99	1.67717
n_g	435.84	1.68408
n_h	404.66	1.69056
n_i	365.01	1.70179

Constants of Dispersion Formula	
A_0	2.71734266E+00
A_1	-7.93439759E-03
A_2	2.10245027E-02
A_3	2.14586811E-04
A_4	2.86536993E-05
A_5	-6.94769473E-07

Density	
ρ (g/cm^3)	3.63

Solarization	
△λ (%)	-0.2

Relative Partial Dispersion	
$P_{d,C}$	0.2992
$P_{e,d}$	0.2382
$P_{g,F}$	0.5600
$P'_{d,c'}$	0.2493
$P'_{e,d}$	0.2356
$P'_{g,F'}$	0.4964

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0008
$\triangle P_{g,F}$	-0.0032
$\triangle P_{C,t}$	-0.0216
$\triangle P_{C,s}$	-0.0082

Thermal Properties	
Tg (℃)	626
Ts (℃)	687
$T_{10}^{14.5}$ (℃)	561
T_{10}^{13} (℃)	590
$\alpha_{-50/80℃}$ (10^{-7}/K)	81
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	0.81

Mechanical Properties	
HK (10^7Pa)	544
F_A	247
E (GPa)	92.2
G (GPa)	35.7
μ	0.293
σ_b (MPa)	72
B (10^{-12}/Pa)	1.84

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	73
-40/-30	75
-30/-20	77
-20/-10	79
-10/0	80
0/10	81
10/20	82
20/30	82
30/40	84
40/50	85
50/60	85
60/70	86
70/80	87
80/90	89
90/100	89
100/110	89
110/120	90
120/130	91
130/140	94
140/150	94
150/160	96

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.946	0.895
2200	0.976	0.953
2000	0.987	0.975
1800	0.993	0.986
1600	0.997	0.995
1400	0.998	0.996
1200	0.999	0.997
1060	0.998	0.997
1000	0.998	0.997
950	0.998	0.996
900	0.998	0.996
850	0.997	0.995
800	0.998	0.997
750	0.999	0.997
700	0.998	0.997
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.997	0.995
480	0.997	0.993
460	0.996	0.991
440	0.995	0.990
420	0.994	0.989
400	0.987	0.975
390	0.984	0.968
380	0.976	0.952
370	0.924	0.854
360	0.892	0.796
350	0.824	0.679
340	0.682	0.465
330	0.394	0.155
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.0	1.2	1.5	1.8	2.1	2.3	2.5	2.6	2.8	3.3
-40～-20	1.0	1.3	1.5	1.8	2.1	2.3	2.6	2.7	2.8	3.3
-20～0	1.0	1.3	1.5	1.8	2.2	2.3	2.7	2.8	2.8	3.3
0～20	1.2	1.4	1.6	1.9	2.2	2.4	2.7	2.8	2.9	3.5
20～40	1.2	1.4	1.5	1.9	2.2	2.5	2.7	2.8	3.0	3.6
40～60	1.3	1.6	1.6	2.0	2.3	2.6	2.8	2.9	3.1	3.7
60～80	1.4	1.6	1.7	2.0	2.3	2.7	3.0	3.0	3.1	3.9
80～100	1.4	1.7	1.8	2.0	2.4	2.8	3.1	3.2	3.2	4.0
100～120	1.5	1.8	1.9	2.1	2.5	3.0	3.2	3.3	3.4	4.1
120～140	1.5	1.9	2.0	2.2	2.6	3.2	3.2	3.3	3.5	4.2
140～160	1.6	2.0	2.2	2.3	2.7	3.3	3.4	3.5	3.6	4.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	353/324

Constants of dn/dt		
D_0	D_1	D_2
-1.65E-06	1.28E-08	-1.94E-11
E_0	E_1	λ_{TK}
9.82E-07	4.78E-10	1.52E-08

H-ZBaF20	702412	n_d = 1.70154	υ_d = 41.15	$n_F - n_C$ = 0.017049
		n_e = 1.70559	υ_e = 40.86	$n_{F'} - n_{C'}$ = 0.017270

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.68168
n_{1064}	1064.00	1.68293
n_t	1013.98	1.68396
n_s	852.11	1.68811
$n_{A'}$	768.19	1.69103
n_r	706.52	1.69375
n_C	656.27	1.69651
$n_{C'}$	643.85	1.69730
n_{He-Ne}	632.80	1.69806
n_D	589.29	1.70139
n_d	587.56	1.70154
n_e	546.07	1.70559
n_F	486.13	1.71356
$n_{F'}$	479.99	1.71457
n_g	435.84	1.72339
n_h	404.66	1.73179
n_i	365.01	1.74679

Constants of Dispersion Formula	
A_0	2.82868941E+00
A_1	-1.38728820E-02
A_2	2.03272973E-02
A_3	1.79527923E-03
A_4	-1.30823668E-04
A_5	8.20715361E-06

Density	
ρ (g/cm^3)	3.64

Solarization	
△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2950
$P_{e,d}$	0.2376
$P_{g,F}$	0.5766
$P'_{d,c'}$	0.2455
$P'_{e,d}$	0.2345
$P'_{g,F'}$	0.5107

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	0.0013
$\triangle P_{C,t}$	-0.0034
$\triangle P_{C,s}$	-0.0065

Thermal Properties	
Tg (℃)	599
Ts (℃)	657
$T_{10}^{14.5}$ (℃)	555
T_{10}^{13} (℃)	595
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	84
λ (W/(m·K))	0.99

Mechanical Properties	
HK (10^7Pa)	618
F_A	125
E (GPa)	98.5
G (GPa)	38.4
μ	0.284
σ_b (MPa)	78
B (10^{-12}/Pa)	2.05

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	61
-30/-20	62
-20/-10	62
-10/0	66
0/10	67
10/20	67
20/30	68
30/40	68
40/50	70
50/60	70
60/70	73
70/80	73
80/90	73
90/100	74
100/110	76
110/120	77
120/130	78
130/140	79
140/150	79
150/160	82

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.949	0.901
2200	0.976	0.952
2000	0.991	0.982
1800	0.995	0.990
1600	0.998	0.996
1400	0.998	0.996
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.997
600	0.998	0.997
550	0.998	0.997
500	0.997	0.994
480	0.996	0.992
460	0.994	0.989
440	0.993	0.986
420	0.989	0.978
400	0.979	0.958
390	0.964	0.930
380	0.935	0.874
370	0.861	0.741
360	0.681	0.464
350	0.343	0.118
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.5	3.1	3.6	3.6	3.7	4.1	4.7	5.4	5.5	5.9
-40～-20	2.6	3.3	3.7	3.8	3.9	4.4	4.9	5.6	5.7	6.2
-20～0	2.8	3.4	4.0	4.1	4.2	4.6	5.0	5.7	5.9	6.4
0～20	3.1	3.6	4.3	4.4	4.4	4.7	5.1	5.8	6.0	6.6
20～40	3.4	3.9	4.6	4.6	4.7	5.0	5.2	6.1	6.2	6.9
40～60	3.7	4.2	4.8	4.9	4.9	5.2	5.3	6.2	6.3	7.1
60～80	4.1	4.4	4.9	5.3	5.3	5.5	5.7	6.4	6.6	7.5
80～100	4.4	4.6	5.1	5.3	5.4	5.7	5.9	6.7	6.9	7.9
100～120	4.7	4.9	5.3	5.4	5.6	6.0	6.1	7.0	7.2	8.3
120～140	5.0	5.1	5.4	5.6	5.7	6.1	6.3	7.3	7.5	8.7
140～160	5.2	5.3	5.7	5.8	5.9	6.3	6.6	7.6	7.7	9.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	373/347

Constants of dn/dt		
D_0	D_1	D_2
2.34E-06	2.11E-08	-2.27E-11
E_0	E_1	λ_{TK}
1.04E-06	-3.84E-11	1.99E-01

H-ZBaF21	723380	n_d = 1.72341	υ_d = 37.99	$n_F - n_C$ = 0.019041
		n_e = 1.72793	υ_e = 37.72	$n_{F'} - n_{C'}$ = 0.019297

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68318
n_{1970}	1970.09	1.68884
n_{1530}	1529.58	1.69529
n_{1129}	1128.64	1.70170
n_{1064}	1064.00	1.70299
n_t	1013.98	1.70407
n_s	852.11	1.70850
$n_{A'}$	768.19	1.71169
n_r	706.52	1.71471
n_C	656.27	1.71781
$n_{C'}$	643.85	1.71869
n_{He-Ne}	632.80	1.71952
n_D	589.29	1.72325
n_d	587.56	1.72341
n_e	546.07	1.72793
n_F	486.13	1.73685
$n_{F'}$	479.99	1.73798
n_g	435.84	1.74793
n_h	404.66	1.75759
n_i	365.01	1.77526

Constants of Dispersion Formula	
A_0	2.88881294E+00
A_1	-1.12014238E-02
A_2	2.61117044E-02
A_3	1.31652955E-03
A_4	-9.02985011E-05
A_5	1.01643068E-05

Density	
ρ (g/cm^3)	3.61

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2941
$P_{e,d}$	0.2374
$P_{g,F}$	0.5819
$P'_{d,c'}$	0.2446
$P'_{e,d}$	0.2342
$P'_{g,F'}$	0.5156

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0008
$\triangle P_{g,F}$	0.0014
$\triangle P_{C,t}$	-0.0026
$\triangle P_{C,s}$	-0.0026

Thermal Properties	
Tg (℃)	614
Ts (℃)	666
$T_{10}^{14.5}$ (℃)	558
T_{10}^{13} (℃)	596
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	565
F_A	158
E (GPa)	100.6
G (GPa)	39.4
μ	0.276
σ_b (MPa)	90
B (10^{-12}/Pa)	1.98

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	61
-30/-20	63
-20/-10	63
-10/0	65
0/10	65
10/20	66
20/30	67
30/40	68
40/50	68
50/60	69
60/70	69
70/80	70
80/90	71
90/100	71
100/110	72
110/120	73
120/130	75
130/140	76
140/150	77
150/160	78

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.949	0.901
2200	0.980	0.960
2000	0.992	0.984
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.995	0.989
480	0.993	0.986
460	0.990	0.981
440	0.987	0.974
420	0.980	0.961
400	0.959	0.920
390	0.932	0.868
380	0.873	0.762
370	0.739	0.547
360	0.463	0.215
350	0.131	0.017
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.6	4.0	4.4	4.4	4.5	4.7	5.0	5.7	5.8	6.6
-40～-20	3.7	4.1	4.4	4.4	4.5	4.7	5.1	5.7	5.8	6.6
-20～0	3.6	4.2	4.5	4.5	4.5	4.7	5.2	5.8	5.9	6.7
0～20	3.6	4.3	4.5	4.5	4.6	4.8	5.2	5.8	6.0	6.8
20～40	3.7	4.3	4.5	4.5	4.6	4.8	5.2	5.9	6.0	6.8
40～60	3.7	4.3	4.5	4.5	4.6	4.9	5.3	6.1	6.2	7.0
60～80	3.7	4.5	4.7	4.7	4.8	5.0	5.4	6.2	6.3	7.3
80～100	3.8	4.5	4.7	4.8	4.9	5.1	5.5	6.3	6.4	7.4
100～120	3.9	4.7	4.8	4.9	5.0	5.1	5.4	6.5	6.6	7.5
120～140	4.0	4.8	4.9	4.9	5.1	5.2	5.6	6.6	6.7	7.6
140～160	4.1	4.9	5.0	5.0	5.2	5.3	5.7	6.7	6.8	7.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	383/355

Constants of dn/dt		
D_0	D_1	D_2
3.29E-06	1.22E-08	-2.04E-11
E_0	E_1	λ_{TK}
6.43E-07	3.41E-10	2.74E-01

H-ZBaF50	658509	n_d = 1.65844	υ_d = 50.85	$n_F - n_C$ = 0.012948
		n_e = 1.66152	υ_e = 50.57	$n_{F'} - n_{C'}$ = 0.013082

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.62814
n_{1970}	1970.09	1.63271
n_{1530}	1529.58	1.63788
n_{1129}	1128.64	1.64287
n_{1064}	1064.00	1.64384
n_t	1013.98	1.64466
n_s	852.11	1.64791
$n_{A'}$	768.19	1.65021
n_r	706.52	1.65237
n_C	656.27	1.65455
$n_{C'}$	643.85	1.65517
n_{He-Ne}	632.80	1.65575
n_D	589.29	1.65833
n_d	587.56	1.65844
n_e	546.07	1.66152
n_F	486.13	1.66750
$n_{F'}$	479.99	1.66825
n_g	435.84	1.67472
n_h	404.66	1.68081
n_i	365.01	1.69138

Relative Partial Dispersion	
$P_{d,C}$	0.3004
$P_{e,d}$	0.2379
$P_{g,F}$	0.5576
$P'_{d,c'}$	0.2500
$P'_{e,d}$	0.2354
$P'_{g,F'}$	0.4946

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0003
$\triangle P_{g,F}$	-0.0015
$\triangle P_{C,t}$	-0.0227
$\triangle P_{C,s}$	-0.0096

Thermal Properties	
Tg (℃)	650
Ts (℃)	695
$T_{10}^{14.5}$ (℃)	572
T_{10}^{13} (℃)	630
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	86
λ (W/(m·K))	0.69

Mechanical Properties	
HK (10^7Pa)	520
F_A	132
E (GPa)	93.4
G (GPa)	37.3
μ	0.253
σ_b (MPa)	60
B (10^{-12}/Pa)	1.84

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	66
-40/-30	68
-30/-20	70
-20/-10	71
-10/0	72
0/10	73
10/20	74
20/30	75
30/40	76
40/50	77
50/60	77
60/70	78
70/80	78
80/90	79
90/100	80
100/110	81
110/120	82
120/130	83
130/140	83
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.937	0.880
2200	0.971	0.946
2000	0.993	0.982
1800	0.995	0.992
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.994
420	0.996	0.992
400	0.991	0.983
390	0.983	0.970
380	0.969	0.946
370	0.937	0.893
360	0.876	0.787
350	0.752	0.585
340	0.521	0.275
330	0.203	0.037
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.69513820E+00
A_1	-8.84212838E-03
A_2	1.89677206E-02
A_3	4.17388089E-04
A_4	-9.33466805E-06
A_5	1.53699645E-06

Density	
ρ (g/cm^3)	3.90

Solarization	
△λ (%)	-0.7

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.4	2.7	3.0	3.0	3.0	3.2	3.4	3.7	3.8	4.5
-40～-20	2.4	2.8	3.0	3.0	3.0	3.2	3.4	3.8	3.9	4.5
-20～0	2.4	2.7	3.0	3.0	3.0	3.2	3.4	3.9	4.0	4.5
0～20	2.4	2.7	3.0	3.1	3.1	3.2	3.4	3.9	4.0	4.5
20～40	2.4	2.7	3.0	3.0	3.0	3.2	3.4	4.0	4.1	4.6
40～60	2.3	2.9	3.2	3.2	3.2	3.3	3.5	4.2	4.3	4.7
60～80	2.5	3.0	3.2	3.3	3.3	3.4	3.6	4.3	4.4	4.9
80～100	2.6	3.1	3.3	3.4	3.4	3.6	3.8	4.5	4.6	5.0
100～120	2.7	3.2	3.4	3.5	3.5	3.7	3.9	4.6	4.7	5.2
120～140	2.7	3.3	3.5	3.6	3.6	3.8	4.0	4.7	4.8	5.3
140～160	2.7	3.3	3.6	3.6	3.7	3.9	4.1	4.9	5.0	5.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	360/330

Constants of dn/dt		
D_0	D_1	D_2
1.19E-06	1.20E-08	-1.58E-11
E_0	E_1	λ_{TK}
6.13E-07	5.48E-10	2.23E-01

H-ZBaF52	670472	n_d = 1.67003	υ_d = 47.20	$n_F - n_C$ = 0.014197
		n_e = 1.67340	υ_e = 46.90	$n_{F'} - n_{C'}$ = 0.014358

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.63652
n_{1970}	1970.09	1.64169
n_{1530}	1529.58	1.64750
n_{1129}	1128.64	1.65305
n_{1064}	1064.00	1.65411
n_t	1013.98	1.65500
n_s	852.11	1.65856
$n_{A'}$	768.19	1.66107
n_r	706.52	1.66342
n_C	656.27	1.66579
$n_{C'}$	643.85	1.66646
n_{He-Ne}	632.80	1.66709
n_D	589.29	1.66990
n_d	587.56	1.67003
n_e	546.07	1.67340
n_F	486.13	1.67999
$n_{F'}$	479.99	1.68082
n_g	435.84	1.68798
n_h	404.66	1.69475
n_i	365.01	1.70662

Relative Partial Dispersion	
$P_{d,C}$	0.2987
$P_{e,d}$	0.2374
$P_{g,F}$	0.5628
$P'_{d,c'}$	0.2486
$P'_{e,d}$	0.2347
$P'_{g,F'}$	0.4987

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	-0.0024
$\triangle P_{C,t}$	-0.0088
$\triangle P_{C,s}$	-0.0044

Thermal Properties	
Tg (℃)	605
Ts (℃)	649
$T_{10}^{14.5}$ (℃)	539
T_{10}^{13} (℃)	582
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	1.08

Mechanical Properties	
HK (10^7Pa)	626
F_A	151
E (GPa)	96.3
G (GPa)	37.6
μ	0.279
σ_b (MPa)	70
B (10^{-12}/Pa)	1.90

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	55
-40/-30	59
-30/-20	62
-20/-10	64
-10/0	66
0/10	68
10/20	70
20/30	71
30/40	72
40/50	73
50/60	73
60/70	74
70/80	74
80/90	75
90/100	76
100/110	77
110/120	77
120/130	78
130/140	79
140/150	81
150/160	82

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.938	0.877
2200	0.970	0.944
2000	0.989	0.978
1800	0.993	0.987
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.996
480	0.996	0.993
460	0.995	0.991
440	0.994	0.988
420	0.992	0.983
400	0.983	0.967
390	0.973	0.947
380	0.952	0.907
370	0.909	0.826
360	0.807	0.652
350	0.596	0.355
340	0.269	0.072
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.72917137E+00
A_1	-1.01247435E-02
A_2	2.03135768E-02
A_3	5.48969301E-04
A_4	-1.03383424E-05
A_5	1.79727765E-06

Density	
ρ (g/cm^3)	3.49

Solarization	
△λ (%)	-1.0

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.5	3.9	4.1	4.2	4.3	4.5	4.7	5.2	5.2	5.6
-40～-20	3.5	3.8	4.1	4.2	4.3	4.5	4.7	5.2	5.2	5.6
-20～0	3.6	3.9	4.1	4.2	4.2	4.5	4.7	5.2	5.3	5.8
0～20	3.6	3.9	4.1	4.2	4.2	4.5	4.7	5.2	5.3	5.8
20～40	3.6	3.9	4.0	4.1	4.3	4.5	4.7	5.3	5.4	5.9
40～60	3.6	4.0	4.1	4.2	4.3	4.5	4.8	5.4	5.5	6.0
60～80	3.6	4.0	4.1	4.2	4.3	4.6	4.9	5.5	5.6	6.2
80～100	3.6	4.0	4.2	4.3	4.4	4.6	4.9	5.7	5.8	6.3
100～120	3.7	4.1	4.4	4.5	4.5	4.6	5.1	6.0	6.1	6.4
120～140	3.7	4.1	4.5	4.6	4.6	4.7	5.1	6.1	6.2	6.5
140～160	3.8	4.2	4.6	4.7	4.7	4.7	5.2	6.3	6.4	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	369/340

Constants of dn/dt		
D_0	D_1	D_2
3.13E-06	9.94E-09	-1.48E-11
E_0	E_1	λ_{TK}
6.71E-07	8.33E-10	2.17E-01

H-ZBaF65	654397	n_d = 1.65412	υ_d = 39.68	$n_F - n_C$ = 0.016484
		n_e = 1.65803	υ_e = 39.46	$n_{F'} - n_{C'}$ = 0.016678

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.61564
n_{1970}	1970.09	1.62166
n_{1530}	1529.58	1.62838
n_{1129}	1128.64	1.63471
n_{1064}	1064.00	1.63592
n_t	1013.98	1.63693
n_s	852.11	1.64097
$n_{A'}$	768.19	1.64383
n_r	706.52	1.64651
n_C	656.27	1.64922
$n_{C'}$	643.85	1.65000
n_{He-Ne}	632.80	1.65072
n_D	589.29	1.65397
n_d	587.56	1.65412
n_e	546.07	1.65803
n_F	486.13	1.66571
$n_{F'}$	479.99	1.66668
n_g	435.84	1.67515
n_h	404.66	1.68327
n_i	365.01	1.69784

Constants of Dispersion Formula	
A_0	2.66955809E+00
A_1	-1.17053780E-02
A_2	2.16385159E-02
A_3	1.09755393E-03
A_4	-7.38357886E-05
A_5	6.82335888E-06

Density	
ρ (g/cm^3)	3.01

Solarization	
△λ (%)	-1.6

Relative Partial Dispersion	
$P_{d,C}$	0.2973
$P_{e,d}$	0.2372
$P_{g,F}$	0.5727
$P'_{d,c'}$	0.2470
$P'_{e,d}$	0.2344
$P'_{g,F'}$	0.5079

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0024
$\triangle P_{g,F}$	-0.0050
$\triangle P_{C,t}$	0.0132
$\triangle P_{C,s}$	0.0049

Thermal Properties	
Tg (℃)	609
Ts (℃)	671
$T_{10}^{14.5}$ (℃)	549
T_{10}^{13} (℃)	590
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	565
F_A	141
E (GPa)	92.0
G (GPa)	37.0
μ	0.243
σ_b (MPa)	88
B (10^{-12}/Pa)	2.77

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	66
-40/-30	69
-30/-20	71
-20/-10	72
-10/0	73
0/10	74
10/20	75
20/30	75
30/40	76
40/50	77
50/60	78
60/70	78
70/80	79
80/90	79
90/100	80
100/110	81
110/120	82
120/130	83
130/140	84
140/150	85
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.917	0.840
2200	0.950	0.900
2000	0.987	0.974
1800	0.993	0.986
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.997	0.994
440	0.996	0.992
420	0.994	0.990
400	0.991	0.983
390	0.988	0.974
380	0.977	0.958
370	0.957	0.919
360	0.899	0.813
350	0.751	0.568
340	0.401	0.164
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.0	2.4	2.7	2.8	2.9	3.1	3.3	3.7	3.8	4.6
-40～-20	2.1	2.5	2.7	2.8	2.9	3.2	3.5	3.8	3.9	4.8
-20～0	2.4	2.7	2.9	2.9	3.0	3.3	3.5	3.9	3.9	4.9
0～20	2.6	2.9	3.1	3.1	3.2	3.5	3.6	4.1	4.1	4.9
20～40	2.7	3.0	3.2	3.2	3.3	3.6	3.7	4.3	4.3	5.1
40～60	2.7	3.0	3.3	3.3	3.4	3.7	4.0	4.6	4.6	5.4
60～80	2.9	3.1	3.3	3.3	3.4	3.9	4.3	4.8	4.8	5.6
80～100	3.0	3.2	3.4	3.5	3.6	4.0	4.4	5.0	5.0	5.8
100～120	3.2	3.4	3.6	3.7	3.8	4.1	4.5	5.2	5.2	6.0
120～140	3.3	3.5	3.8	3.9	4.0	4.3	4.6	5.3	5.3	6.1
140～160	3.4	3.6	3.9	4.0	4.1	4.4	4.8	5.3	5.4	6.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	360/336

Constants of dn/dt		
D_0	D_1	D_2
1.44E-06	1.63E-08	-2.55E-11
E_0	E_1	λ_{TK}
5.71E-07	3.95E-10	2.77E-01

H-LaF1	694492	n_d = 1.69362	υ_d = 49.20	$n_F - n_C$ = 0.014099
		n_e = 1.69696	υ_e = 48.85	$n_{F'} - n_{C'}$ = 0.014266

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65990
n_{1970}	1970.09	1.66516
n_{1530}	1529.58	1.67106
n_{1129}	1128.64	1.67666
n_{1064}	1064.00	1.67773
n_t	1013.98	1.67863
n_s	852.11	1.68220
$n_{A'}$	768.19	1.68471
n_r	706.52	1.68705
n_C	656.27	1.68941
$n_{C'}$	643.85	1.69007
n_{He-Ne}	632.80	1.69070
n_D	589.29	1.69350
n_d	587.56	1.69362
n_e	546.07	1.69696
n_F	486.13	1.70351
$n_{F'}$	479.99	1.70433
n_g	435.84	1.71141
n_h	404.66	1.71805
n_i	365.01	1.72957

Relative Partial Dispersion	
$P_{d,C}$	0.2986
$P_{e,d}$	0.2369
$P_{g,F}$	0.5603
$P'_{d,c'}$	0.2488
$P'_{e,d}$	0.2341
$P'_{g,F'}$	0.4963

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.922	0.850
2200	0.976	0.953
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.994
460	0.995	0.990
440	0.992	0.986
420	0.987	0.982
400	0.981	0.971
390	0.974	0.957
380	0.961	0.931
370	0.932	0.876
360	0.866	0.759
350	0.716	0.521
340	0.409	0.174
330	0.078	0.010
320		
310		
300		
290		
280		

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0015
$\triangle P_{g,F}$	-0.0016
$\triangle P_{C,t}$	-0.0139
$\triangle P_{C,s}$	-0.0071

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	65
-40/-30	68
-30/-20	70
-20/-10	71
-10/0	72
0/10	73
10/20	73
20/30	75
30/40	76
40/50	76
50/60	77
60/70	78
70/80	78
80/90	79
90/100	80
100/110	80
110/120	81
120/130	82
130/140	83
140/150	83
150/160	84

Thermal Properties	
Tg (℃)	663
Ts (℃)	699
$T_{10}^{14.5}$ (℃)	603
T_{10}^{13} (℃)	640
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	87
λ (W/(m·K))	0.87

Constants of Dispersion Formula	
A_0	2.80794251E+00
A_1	-1.04533648E-02
A_2	2.07773005E-02
A_3	4.06086547E-04
A_4	1.98268226E-05
A_5	-7.40077504E-07

Mechanical Properties	
HK (10^7Pa)	545
F_A	159
E (GPa)	91.9
G (GPa)	36.0
μ	0.277
σ_b (MPa)	74
B (10^{-12}/Pa)	1.70

Density	
ρ (g/cm^3)	3.97

Solarization	
△λ (%)	-0.5

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.3	1.6	1.8	1.8	1.9	2.0	2.2	2.6	2.7	3.2
-40～-20	1.3	1.7	1.9	1.9	1.9	2.0	2.2	2.6	2.7	3.2
-20～0	1.3	1.6	1.9	1.9	1.9	2.1	2.3	2.7	2.8	3.3
0～20	1.3	1.7	1.9	1.9	1.9	2.1	2.3	2.7	2.8	3.3
20～40	1.3	1.8	2.0	2.0	2.0	2.1	2.4	2.7	2.8	3.5
40～60	1.4	1.8	2.1	2.1	2.1	2.1	2.4	2.8	2.9	3.5
60～80	1.5	1.9	2.1	2.1	2.1	2.3	2.5	3.0	3.1	3.6
80～100	1.5	1.9	2.1	2.2	2.2	2.3	2.6	3.1	3.3	3.7
100～120	1.5	1.9	2.1	2.2	2.2	2.3	2.7	3.2	3.4	3.8
120～140	1.6	2.0	2.1	2.2	2.3	2.4	2.8	3.3	3.4	3.9
140～160	1.7	2.1	2.2	2.3	2.4	2.6	3.0	3.5	3.6	4.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	363/334

Constants of dn/dt		
D_0	D_1	D_2
-7.87E-07	1.19E-08	-2.18E-11
E_0	E_1	λ_{TK}
5.08E-07	3.70E-10	2.42E-01

H-LaF2	717479	n_d = 1.71700	υ_d = 47.89	$n_F - n_C$ = 0.014972
		n_e = 1.72056	υ_e = 47.65	$n_{F'} - n_{C'}$ = 0.015122

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68162
n_{1970}	1970.09	1.68709
n_{1530}	1529.58	1.69323
n_{1129}	1128.64	1.69906
n_{1064}	1064.00	1.70018
n_t	1013.98	1.70112
n_s	852.11	1.70486
$n_{A'}$	768.19	1.70752
n_r	706.52	1.70999
n_C	656.27	1.71250
$n_{C'}$	643.85	1.71321
n_{He-Ne}	632.80	1.71387
n_D	589.29	1.71685
n_d	587.56	1.71700
n_e	546.07	1.72056
n_F	486.13	1.72747
$n_{F'}$	479.99	1.72833
n_g	435.84	1.73583
n_h	404.66	1.74287
n_i	365.01	1.75517

Relative Partial Dispersion	
$P_{d,C}$	0.3006
$P_{e,d}$	0.2378
$P_{g,F}$	0.5584
$P'_{d,c'}$	0.2506
$P'_{e,d}$	0.2354
$P'_{g,F'}$	0.4960

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.904	0.817
2200	0.966	0.933
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.998	0.996
400	0.991	0.986
390	0.988	0.978
380	0.983	0.967
370	0.972	0.947
360	0.946	0.899
350	0.890	0.799
340	0.767	0.591
330	0.508	0.258
320	0.184	0.033
310		
300		
290		
280		

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0022
$\triangle P_{g,F}$	-0.0057
$\triangle P_{C,t}$	-0.0121
$\triangle P_{C,s}$	-0.0051

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	66
-40/-30	69
-30/-20	70
-20/-10	71
-10/0	72
0/10	73
10/20	74
20/30	75
30/40	75
40/50	76
50/60	77
60/70	77
70/80	77
80/90	76
90/100	77
100/110	78
110/120	79
120/130	81
130/140	82
140/150	83
150/160	84

Thermal Properties	
Tg (℃)	645
Ts (℃)	693
$T_{10}^{14.5}$ (℃)	577
T_{10}^{13} (℃)	618
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	87
λ (W/(m·K))	0.77

Mechanical Properties	
HK (10^7Pa)	516
F_A	180
E (GPa)	95.4
G (GPa)	36.1
μ	0.320
σ_b (MPa)	68
B (10^{-12}/Pa)	1.49

Constants of Dispersion Formula	
A_0	2.88352222E+00
A_1	-1.10333797E-02
A_2	2.14058991E-02
A_3	9.16188540E-04
A_4	-7.10356524E-05
A_5	5.14524697E-06

Density		Solarization	
ρ (g/cm^3)	4.18	△λ (%)	-0.6

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.3	1.5	1.8	1.8	1.8	2.0	2.3	2.7	2.7	3.3
-40～-20	1.3	1.5	1.8	1.8	1.8	2.0	2.3	2.7	2.7	3.3
-20～0	1.3	1.5	1.8	1.8	1.8	2.0	2.3	2.7	2.7	3.3
0～20	1.3	1.5	1.8	1.8	1.8	2.0	2.3	2.7	2.7	3.3
20～40	1.3	1.5	1.8	1.8	1.8	2.0	2.3	2.7	2.7	3.3
40～60	1.3	1.5	1.8	1.8	1.8	2.0	2.3	2.8	2.8	3.2
60～80	1.4	1.6	1.8	1.8	1.9	2.1	2.4	2.9	3.0	3.5
80～100	1.4	1.8	2.0	2.0	2.0	2.3	2.6	3.0	3.1	3.7
100～120	1.4	1.9	2.1	2.1	2.1	2.4	2.7	3.1	3.2	3.9
120～140	1.4	2.0	2.2	2.2	2.2	2.4	2.7	3.3	3.4	4.0
140～160	1.5	2.2	2.3	2.3	2.3	2.5	2.8	3.4	3.5	4.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	350/323

Constants of dn/dt		
D_0	D_1	D_2
-1.08E-06	1.10E-08	-1.36E-11
E_0	E_1	λ_{TK}
5.02E-07	3.02E-10	2.53E-01

H-LaF2A	717479	n_d = 1.71700	υ_d = 47.89	$n_F - n_C$ = 0.014972
		n_e = 1.72056	υ_e = 47.65	$n_{F'} - n_{C'}$ = 0.015122

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.69904
n_{1064}	1064.00	1.70015
n_t	1013.98	1.70108
n_s	852.11	1.70484
$n_{A'}$	768.19	1.70750
n_r	706.52	1.70999
n_C	656.27	1.71251
$n_{C'}$	643.85	1.71323
n_{He-Ne}	632.80	1.71388
n_D	589.29	1.71687
n_d	587.56	1.71700
n_e	546.07	1.72056
n_F	486.13	1.72748
$n_{F'}$	479.99	1.72835
n_g	435.84	1.73587
n_h	404.66	1.74295
n_i	365.01	1.75527

Constants of Dispersion Formula	
A_0	2.88020693E+00
A_1	-9.72282525E-03
A_2	2.40408618E-02
A_3	2.48389828E-05
A_4	6.26809703E-05
A_5	-1.98030657E-06

Density	
ρ (g/cm^3)	4.21

Solarization	
△λ (%)	0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2999
$P_{e,d}$	0.2378
$P_{g,F}$	0.5604
$P'_{d,c'}$	0.2493
$P'_{e,d}$	0.2354
$P'_{g,F'}$	0.4973

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0016
$\triangle P_{g,F}$	-0.0037
$\triangle P_{C,t}$	-0.0087
$\triangle P_{C,s}$	-0.0030

Thermal Properties	
Tg (℃)	689
Ts (℃)	731
$T_{10}^{14.5}$ (℃)	621
T_{10}^{13} (℃)	662
$\alpha_{-50/80℃}$ (10^{-7}/K)	77
$\alpha_{100/300℃}$ (10^{-7}/K)	90
λ (W/(m·K))	0.63

Mechanical Properties	
HK (10^7Pa)	530
F_A	122
E (GPa)	91.7
G (GPa)	35.5
μ	0.293
σ_b (MPa)	85
B (10^{-12}/Pa)	1.29

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	67
-40/-30	72
-30/-20	73
-20/-10	75
-10/0	75
0/10	76
10/20	78
20/30	78
30/40	78
40/50	80
50/60	80
60/70	83
70/80	83
80/90	84
90/100	84
100/110	84
110/120	85
120/130	85
130/140	86
140/150	88
150/160	89

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.907	0.822
2200	0.967	0.935
2000	0.986	0.971
1800	0.994	0.988
1600	0.998	0.995
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.997
600	0.999	0.997
550	0.999	0.997
500	0.998	0.996
480	0.997	0.994
460	0.996	0.992
440	0.995	0.990
420	0.993	0.986
400	0.989	0.977
390	0.983	0.967
380	0.974	0.948
370	0.951	0.905
360	0.900	0.810
350	0.770	0.593
340	0.488	0.238
330	0.143	0.020
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.2	0.1	0.3	0.4	0.4	0.7	0.9	1.2	1.2	1.6
-40～-20	-0.2	0.1	0.3	0.4	0.5	0.7	0.9	1.3	1.3	1.6
-20～0	-0.1	0.2	0.4	0.4	0.5	0.7	1.0	1.3	1.3	1.7
0～20	-0.2	0.3	0.4	0.5	0.5	0.8	1.0	1.3	1.3	1.7
20～40	-0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.3	1.4	1.8
40～60	-0.2	0.3	0.4	0.5	0.6	0.9	1.1	1.3	1.4	1.8
60～80	-0.2	0.4	0.5	0.6	0.7	0.9	1.1	1.3	1.4	1.8
80～100	-0.1	0.5	0.5	0.7	0.9	1.0	1.3	1.5	1.6	2.0
100～120	-0.1	0.6	0.6	0.7	1.0	1.2	1.4	1.7	1.9	2.1
120～140	0.0	0.6	0.8	0.8	1.1	1.4	1.5	1.9	2.1	2.3
140～160	0.0	0.6	0.8	0.9	1.2	1.6	1.8	1.9	2.1	2.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	360/332

Constants of dn/dt		
D_0	D_1	D_2
-3.77E-06	1.15E-08	-1.71E-11
E_0	E_1	λ_{TK}
7.48E-07	4.03E-10	8.88E-09

H-LaF3B	744449	n_d = 1.74400	υ_d = 44.90	$n_F - n_C$ = 0.016570
		n_e = 1.74794	υ_e = 44.63	$n_{F'} - n_{C'}$ = 0.016760

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70713
n_{1970}	1970.09	1.71244
n_{1530}	1529.58	1.71852
n_{1129}	1128.64	1.72451
n_{1064}	1064.00	1.72568
n_t	1013.98	1.72667
n_s	852.11	1.73070
$n_{A'}$	768.19	1.73359
n_r	706.52	1.73630
n_C	656.27	1.73906
$n_{C'}$	643.85	1.73984
n_{He-Ne}	632.80	1.74057
n_D	589.29	1.74386
n_d	587.56	1.74400
n_e	546.07	1.74794
n_F	486.13	1.75563
$n_{F'}$	479.99	1.75660
n_g	435.84	1.76496
n_h	404.66	1.77285
n_i	365.01	1.78666

Constants of Dispersion Formula	
A_0	2.96773191E+00
A_1	-1.07334025E-02
A_2	2.46639798E-02
A_3	7.96273827E-04
A_4	-3.49870097E-05
A_5	3.36130613E-06

Density	
ρ (g/cm^3)	4.32

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2981
$P_{e,d}$	0.2378
$P_{g,F}$	0.5631
$P'_{d,c'}$	0.2482
$P'_{e,d}$	0.2351
$P'_{g,F'}$	0.4988

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0013
$\triangle P_{g,F}$	-0.0060
$\triangle P_{C,t}$	-0.0099
$\triangle P_{C,s}$	-0.0036

Thermal Properties	
Tg (℃)	630
Ts (℃)	683
$T_{10}^{14.5}$ (℃)	557
T_{10}^{13} (℃)	602
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	551
F_A	149
E (GPa)	97.3
G (GPa)	37.6
μ	0.295
σ_b (MPa)	77
B (10^{-12}/Pa)	1.57

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	67
-40/-30	69
-30/-20	71
-20/-10	72
-10/0	73
0/10	74
10/20	75
20/30	76
30/40	77
40/50	77
50/60	78
60/70	78
70/80	78
80/90	79
90/100	80
100/110	81
110/120	82
120/130	83
130/140	84
140/150	85
150/160	86

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.914	0.835
2200	0.960	0.922
2000	0.983	0.966
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.997	0.995
400	0.994	0.990
390	0.990	0.984
380	0.987	0.974
370	0.977	0.954
360	0.954	0.911
350	0.922	0.849
340	0.864	0.745
330	0.759	0.575
320	0.556	0.310
310	0.212	0.048
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.1	2.4	2.6	2.6	2.6	2.9	3.2	3.7	3.8	4.4
-40～-20	2.0	2.3	2.6	2.7	2.7	2.9	3.2	3.7	3.8	4.4
-20～0	2.0	2.4	2.6	2.7	2.7	2.9	3.2	3.7	3.9	4.5
0～20	2.0	2.4	2.6	2.7	2.7	2.9	3.2	3.8	3.9	4.6
20～40	2.0	2.4	2.6	2.7	2.7	2.9	3.2	3.9	4.0	4.6
40～60	2.0	2.4	2.7	2.8	2.8	3.0	3.3	4.0	4.0	4.7
60～80	2.0	2.5	2.7	2.8	2.8	3.0	3.3	4.0	4.1	4.8
80～100	2.1	2.6	2.9	3.0	2.9	3.1	3.5	4.1	4.2	4.9
100～120	2.1	2.7	2.9	3.0	3.0	3.1	3.5	4.1	4.2	2.0
120～140	2.2	2.7	3.0	3.1	3.0	3.3	3.6	4.2	4.3	5.1
140～160	2.3	2.8	3.0	3.1	3.1	3.3	3.6	4.2	4.3	5.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	365/310
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	345/310

Constants of dn/dt		
D_0	D_1	D_2
3.99E-08	1.22E-08	-2.10E-11
E_0	E_1	λ_{TK}
7.06E-07	-1.18E-10	1.86E-01

H-LaF3C	744449

n_d = 1.74400	υ_d = 44.90	$n_F - n_C$ = 0.016570
n_e = 1.74794	υ_e = 44.63	$n_{F'} - n_{C'}$ = 0.016760

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.72461
n_{1064}	1064.00	1.72577
n_t	1013.98	1.72675
n_s	852.11	1.73074
$n_{A'}$	768.19	1.73361
n_r	706.52	1.73633
n_C	656.27	1.73906
$n_{C'}$	643.85	1.73984
n_{He-Ne}	632.80	1.74058
n_D	589.29	1.74386
n_d	587.56	1.74400
n_e	546.07	1.74794
n_F	486.13	1.75563
$n_{F'}$	479.99	1.75660
n_g	435.84	1.76496
n_h	404.66	1.77287
n_i	365.01	1.78671

Constants of Dispersion Formula	
A_0	2.96730744E+00
A_1	-1.01565086E-02
A_2	2.47645800E-02
A_3	7.87107350E-04
A_4	-3.51755571E-05
A_5	3.47733569E-06

Density	
ρ (g/cm^3)	4.34

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2981
$P_{e,d}$	0.2378
$P_{g,F}$	0.5631
$P'_{d,c'}$	0.2482
$P'_{e,d}$	0.2351
$P'_{g,F'}$	0.4988

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0013
$\triangle P_{g,F}$	-0.0060
$\triangle P_{C,t}$	-0.0148
$\triangle P_{C,s}$	-0.0060

Thermal Properties	
Tg (℃)	626
Ts (℃)	676
$T_{10}^{14.5}$ (℃)	553
T_{10}^{13} (℃)	598
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	91
λ (W/(m·K))	0.70

Mechanical Properties	
HK (10^7Pa)	502
F_A	195
E (GPa)	
G (GPa)	
μ	
σ_b (MPa)	
B (10^{-12}/Pa)	

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	78
-40/-30	81
-30/-20	84
-20/-10	86
-10/0	88
0/10	89
10/20	90
20/30	90
30/40	91
40/50	92
50/60	92
60/70	93
70/80	93
80/90	94
90/100	95
100/110	97
110/120	98
120/130	99
130/140	100
140/150	101
150/160	102

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.910	0.828
2200	0.962	0.926
2000	0.982	0.965
1800	0.992	0.983
1600	0.998	0.995
1400	0.999	0.997
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.997
460	0.998	0.996
440	0.998	0.995
420	0.997	0.993
400	0.995	0.991
390	0.993	0.984
380	0.986	0.971
370	0.972	0.943
360	0.934	0.870
350	0.828	0.685
340	0.565	0.325
330	0.187	0.038
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	0.5	0.8	0.9	1.1	1.2	1.4	1.6	1.8	2.0	2.5
-40 ~ -20	0.5	0.8	1.1	1.2	1.2	1.4	1.7	1.9	2.1	2.6
-20 ~ 0	0.5	0.8	1.1	1.2	1.3	1.4	1.8	2.0	2.1	2.8
0 ~ 20	0.6	1.0	1.1	1.2	1.3	1.6	1.8	2.0	2.2	2.9
20 ~ 40	0.6	1.1	1.2	1.3	1.4	1.6	1.9	2.1	2.2	3.1
40 ~ 60	0.6	1.2	1.2	1.3	1.4	1.7	1.9	2.1	2.3	3.2
60 ~ 80	0.7	1.3	1.3	1.4	1.6	1.9	2.0	2.2	2.4	3.4
80 ~ 100	0.7	1.3	1.4	1.5	1.8	2.0	2.0	2.3	2.5	3.4
100 ~ 120	0.7	1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.5	3.6
120 ~ 140	0.7	1.5	1.6	1.8	2.1	2.2	2.3	2.5	2.6	3.8
140 ~ 160	0.8	1.5	1.6	1.8	2.1	2.3	2.5	2.6	2.6	3.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	355/331

Constants of dn/dt		
D_0	D_1	D_2
-2.11E-06	1.25E-08	-2.36E-11
E_0	E_1	λ_{TK}
5.31E-07	3.26E-10	2.44E-01

H-LaF4	750350	n_d = 1.74950	υ_d = 35.04	$n_F - n_C$ = 0.021390
		n_e = 1.75456	υ_e = 34.77	$n_{F'} - n_{C'}$ = 0.021700

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70492
n_{1970}	1970.09	1.71111
n_{1530}	1529.58	1.71821
n_{1129}	1128.64	1.72529
n_{1064}	1064.00	1.72671
n_t	1013.98	1.72791
n_s	852.11	1.73282
$n_{A'}$	768.19	1.73638
n_r	706.52	1.73976
n_C	656.27	1.74324
$n_{C'}$	643.85	1.74422
n_{He-Ne}	632.80	1.74513
n_D	589.29	1.74931
n_d	587.56	1.74950
n_e	546.07	1.75456
n_F	486.13	1.76463
$n_{F'}$	479.99	1.76592
n_g	435.84	1.77718
n_h	404.66	1.78813
n_i	365.01	1.80817

Relative Partial Dispersion	
$P_{d,C}$	0.2927
$P_{e,d}$	0.2366
$P_{g,F}$	0.5867
$P'_{d,c'}$	0.2433
$P'_{e,d}$	0.2332
$P'_{g,F'}$	0.5189

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0001
$\triangle P_{g,F}$	0.0013
$\triangle P_{C,t}$	0.0068
$\triangle P_{C,s}$	0.0026

Thermal Properties	
Tg (℃)	597
Ts (℃)	643
$T_{10}^{14.5}$ (℃)	528
T_{10}^{13} (℃)	569
$\alpha_{-50/80℃}$ (10^{-7}/K)	78
$\alpha_{100/300℃}$ (10^{-7}/K)	95
λ (W/(m·K))	0.94

Mechanical Properties	
HK (10^7Pa)	514
F_A	173
E (GPa)	92.4
G (GPa)	36.4
μ	0.269
σ_b (MPa)	56
B (10^{-12}/Pa)	2.10

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	71
-40/-30	73
-30/-20	75
-20/-10	76
-10/0	77
0/10	78
10/20	81
20/30	82
30/40	82
40/50	83
50/60	83
60/70	84
70/80	84
80/90	85
90/100	86
100/110	87
110/120	88
120/130	90
130/140	91
140/150	92
150/160	93

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.934	0.872
2200	0.978	0.956
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.993	0.986
460	0.990	0.980
440	0.982	0.964
420	0.970	0.941
400	0.924	0.854
390	0.888	0.789
380	0.819	0.671
370	0.707	0.500
360	0.506	0.256
350	0.202	0.041
340		
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.96835124E+00
A_1	-1.24121364E-02
A_2	2.96121393E-02
A_3	1.42472271E-03
A_4	-7.04844466E-05
A_5	9.47263949E-06

Density	
ρ (g/cm^3)	3.85

Solarization	
△λ (%)	-0.4

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.5	0.9	1.2	1.2	1.2	1.4	1.9	2.4	2.4	3.4
-40～-20	0.5	0.9	1.3	1.3	1.3	1.6	2.0	2.6	2.7	3.5
-20～0	0.4	0.9	1.2	1.2	1.3	1.6	2.0	2.7	2.8	3.7
0～20	0.4	0.9	1.3	1.3	1.4	1.7	2.1	2.8	2.9	3.8
20～40	0.6	1.0	1.3	1.4	1.4	1.9	2.2	3.0	3.1	4.1
40～60	0.6	1.1	1.4	1.5	1.6	1.9	2.1	3.2	3.3	4.2
60～80	0.7	1.3	1.6	1.6	1.7	2.0	2.4	3.3	3.4	4.5
80～100	0.7	1.4	1.8	1.8	1.9	2.1	2.4	3.6	3.7	4.7
100～120	0.9	1.6	1.9	1.9	2.0	2.4	2.6	3.7	3.8	4.8
120～140	1.0	1.7	2.1	2.1	2.2	2.5	2.9	3.9	3.9	5.1
140～160	1.2	1.8	2.2	2.3	2.4	2.8	3.0	4.0	4.1	5.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/350

Constants of dn/dt		
D_0	D_1	D_2
-2.48E-06	1.26E-08	-1.65E-11
E_0	E_1	λ_{TK}
7.19E-07	5.75E-10	2.71E-01

H-LaF4A	750350	n_d = 1.74950	υ_d = 35.04	$n_F - n_C$ = 0.021390
		n_e = 1.75456	υ_e = 34.77	$n_{F'} - n_{C'}$ = 0.021700

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.72537
n_{1064}	1064.00	1.72677
n_t	1013.98	1.72796
n_s	852.11	1.73284
$n_{A'}$	768.19	1.73640
n_r	706.52	1.73977
n_C	656.27	1.74324
$n_{C'}$	643.85	1.74422
n_{He-Ne}	632.80	1.74513
n_D	589.29	1.74931
n_d	587.56	1.74950
n_e	546.07	1.75456
n_F	486.13	1.76463
$n_{F'}$	479.99	1.76592
n_g	435.84	1.77721
n_h	404.66	1.78821
n_i	365.01	1.80840

Constants of Dispersion Formula	
A_0	2.96710812E+00
A_1	-1.16353219E-02
A_2	3.04712653E-02
A_3	1.14514132E-03
A_4	-3.15749319E-05
A_5	7.84016441E-06

Density	
ρ (g/cm^3)	3.84

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2927
$P_{e,d}$	0.2366
$P_{g,F}$	0.5881
$P'_{d,c'}$	0.2433
$P'_{e,d}$	0.2332
$P'_{g,F'}$	0.5203

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0001
$\triangle P_{g,F}$	0.0027
$\triangle P_{C,t}$	0.0044
$\triangle P_{C,s}$	0.0017

Thermal Properties	
Tg (℃)	576
Ts (℃)	620
$T_{10}^{14.5}$ (℃)	507
T_{10}^{13} (℃)	548
$\alpha_{-50/80℃}$ (10^{-7}/K)	80
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	0.81

Mechanical Properties	
HK (10^7Pa)	526
F_A	177
E (GPa)	93.7
G (GPa)	36.3
μ	0.290
σ_b (MPa)	72
B (10^{-12}/Pa)	2.36

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	72
-40/-30	74
-30/-20	75
-20/-10	75
-10/0	77
0/10	78
10/20	80
20/30	81
30/40	83
40/50	85
50/60	85
60/70	86
70/80	87
80/90	87
90/100	87
100/110	88
110/120	89
120/130	89
130/140	96
140/150	96
150/160	97

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.933	0.871
2200	0.980	0.960
2000	0.992	0.983
1800	0.996	0.992
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.998	0.997
650	0.998	0.997
600	0.998	0.996
550	0.997	0.995
500	0.994	0.989
480	0.991	0.983
460	0.988	0.976
440	0.982	0.965
420	0.971	0.943
400	0.941	0.886
390	0.910	0.829
380	0.853	0.727
370	0.733	0.537
360	0.489	0.239
350	0.161	0.026
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.6	1.0	1.4	1.4	1.5	1.6	2.1	2.5	2.6	3.5
-40～-20	0.6	1.0	1.4	1.4	1.5	1.6	2.1	2.6	2.7	3.6
-20～0	0.6	1.0	1.5	1.5	1.5	1.6	2.2	2.6	2.7	3.8
0～20	0.7	1.1	1.5	1.6	1.6	1.7	2.3	2.7	2.8	3.9
20～40	0.7	1.1	1.6	1.6	1.7	1.8	2.4	2.8	3.0	4.2
40～60	0.8	1.3	1.8	1.8	1.9	2.0	2.2	3.0	3.2	4.3
60～80	0.9	1.5	1.9	2.0	2.1	2.2	2.6	3.3	3.4	4.6
80～100	1.0	1.7	2.1	2.1	2.2	2.3	2.7	3.6	3.7	4.8
100～120	1.2	1.9	2.1	2.2	2.3	2.5	2.9	3.9	4.0	5.0
120～140	1.2	2.1	2.4	2.4	2.5	2.6	3.1	4.1	4.1	5.3
140～160	1.4	2.2	2.5	2.5	2.6	2.7	3.3	4.2	4.3	5.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	387/353

Constants of dn/dt		
D_0	D_1	D_2
-1.97E-06	1.30E-08	-1.43E-11
E_0	E_1	λ_{TK}
6.27E-07	5.47E-10	2.84E-01

H-LaF6LB	757477	n_d = 1.75700	υ_d = 47.71	$n_F - n_C$ = 0.015866
		n_e = 1.76078	υ_e = 47.47	$n_{F'} - n_{C'}$ = 0.016028

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.71608
n_{1970}	1970.09	1.72302
n_{1530}	1529.58	1.73065
n_{1129}	1128.64	1.73755
n_{1064}	1064.00	1.73882
n_t	1013.98	1.73988
n_s	852.11	1.74401
$n_{A'}$	768.19	1.74688
n_r	706.52	1.74954
n_C	656.27	1.75223
$n_{C'}$	643.85	1.75298
n_{He-Ne}	632.80	1.75368
n_D	589.29	1.75686
n_d	587.56	1.75700
n_e	546.07	1.76078
n_F	486.13	1.76809
$n_{F'}$	479.99	1.76901
n_g	435.84	1.77689
n_h	404.66	1.78427
n_i	365.01	1.79708

Relative Partial Dispersion	
$P_{d,C}$	0.3006
$P_{e,d}$	0.2382
$P_{g,F}$	0.5546
$P'_{d,c'}$	0.2508
$P'_{e,d}$	0.2358
$P'_{g,F'}$	0.4916

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0031
$\triangle P_{g,F}$	-0.0097
$\triangle P_{C,t}$	0.0071
$\triangle P_{C,s}$	0.0032

Thermal Properties	
Tg (℃)	606
Ts (℃)	631
$T_{10}^{14.5}$ (℃)	538
T_{10}^{13} (℃)	580
$\alpha_{-50/80℃}$ (10^{-7}/K)	54
$\alpha_{100/300℃}$ (10^{-7}/K)	70
λ (W/(m·K))	0.90

Mechanical Properties	
HK (10^7Pa)	654
F_A	78
E (GPa)	108.3
G (GPa)	41.3
μ	0.312
σ_b (MPa)	73
B (10^{-12}/Pa)	2.20

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	48
-40/-30	51
-30/-20	52
-20/-10	53
-10/0	54
0/10	55
10/20	55
20/30	56
30/40	57
40/50	57
50/60	58
60/70	58
70/80	58
80/90	59
90/100	60
100/110	61
110/120	62
120/130	63
130/140	64
140/150	65
150/160	65

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.839	0.704
2200	0.971	0.943
2000	0.996	0.992
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.997
460	0.998	0.996
440	0.997	0.994
420	0.994	0.989
400	0.991	0.981
390	0.988	0.974
380	0.982	0.961
370	0.972	0.939
360	0.956	0.895
350	0.928	0.841
340	0.881	0.758
330	0.802	0.627
320	0.652	0.412
310	0.361	0.125
300		
290		
280		

Constants of Dispersion Formula	
A_0	3.01951070E+00
A_1	-1.45577999E-02
A_2	2.21379040E-02
A_3	1.27974562E-03
A_4	-1.16064079E-04
A_5	7.16841005E-06

Density	
ρ (g/cm^3)	4.25

Solarization	
△λ (%)	-0.5

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	7.2	7.7	8.0	8.0	8.1	8.2	8.5	9.2	9.2	9.8
-40～-20	7.2	7.7	8.0	8.1	8.1	8.2	8.6	9.2	9.2	9.8
-20～0	7.3	7.7	8.0	8.1	8.1	8.4	8.6	9.3	9.3	9.9
0～20	7.4	7.7	8.0	8.1	8.2	8.4	8.6	9.4	9.4	10.0
20～40	7.4	7.9	8.1	8.2	8.2	8.6	8.7	9.4	9.4	10.0
40～60	7.4	8.0	8.2	8.3	8.4	8.7	9.0	9.5	9.5	10.4
60～80	7.7	8.2	8.4	8.5	8.6	8.9	9.0	9.8	9.8	10.5
80～100	7.7	8.3	8.5	8.6	8.8	9.0	9.2	10.0	10.0	10.8
100～120	7.9	8.6	8.9	9.0	9.1	9.2	9.4	10.2	10.2	10.9
120～140	8.0	8.8	9.0	9.2	9.3	9.4	9.5	10.3	10.3	11.1
140～160	8.1	8.9	9.2	9.3	9.4	9.5	9.7	10.6	10.6	11.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/305
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	345/306

Constants of dn/dt		
D_0	D_1	D_2
9.40E-06	1.36E-08	-1.08E-11
E_0	E_1	λ_{TK}
6.21E-07	2.74E-10	2.21E-01

H-LaF7	782371	n_d = 1.78179	υ_d = 37.09	$n_F - n_C$ = 0.021077
		n_e = 1.78679	υ_e = 36.83	$n_{F'} - n_{C'}$ = 0.021366

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.73781
n_{1970}	1970.09	1.74384
n_{1530}	1529.58	1.75079
n_{1129}	1128.64	1.75779
n_{1064}	1064.00	1.75919
n_t	1013.98	1.76038
n_s	852.11	1.76527
$n_{A'}$	768.19	1.76881
n_r	706.52	1.77216
n_C	656.27	1.77559
$n_{C'}$	643.85	1.77657
n_{He-Ne}	632.80	1.77748
n_D	589.29	1.78161
n_d	587.56	1.78179
n_e	546.07	1.78679
n_F	486.13	1.79667
$n_{F'}$	479.99	1.79793
n_g	435.84	1.80893
n_h	404.66	1.81955
n_i	365.01	1.83869

Constants of Dispersion Formula	
A_0	3.08047013E+00
A_1	-1.22464411E-02
A_2	3.09400964E-02
A_3	1.05872727E-03
A_4	-1.30807247E-05
A_5	4.91706463E-06

Density		Solarization	
ρ (g/cm^3)	4.13	△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2942
$P_{e,d}$	0.2372
$P_{g,F}$	0.5817
$P'_{d,c'}$	0.2443
$P'_{e,d}$	0.2340
$P'_{g,F'}$	0.5148

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0010
$\triangle P_{g,F}$	-0.0003
$\triangle P_{C,t}$	0.0018
$\triangle P_{C,s}$	0.0002

Thermal Properties	
Tg (℃)	661
Ts (℃)	685
$T_{10}^{14.5}$ (℃)	581
T_{10}^{13} (℃)	623
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	0.97

Mechanical Properties	
HK (10^7Pa)	566
F_A	151
E (GPa)	119.1
G (GPa)	46.1
μ	0.291
σ_b (MPa)	
B (10^{-12}/Pa)	1.94

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	54
-40/-30	58
-30/-20	61
-20/-10	63
-10/0	65
0/10	67
10/20	69
20/30	70
30/40	71
40/50	72
50/60	72
60/70	73
70/80	73
80/90	74
90/100	75
100/110	76
110/120	76
120/130	77
130/140	78
140/150	80
150/160	81

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.939	0.882
2200	0.980	0.960
2000	0.997	0.994
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.997	0.994
500	0.997	0.994
480	0.995	0.990
460	0.989	0.978
440	0.981	0.962
420	0.967	0.935
400	0.935	0.874
390	0.906	0.821
380	0.848	0.719
370	0.744	0.554
360	0.582	0.339
350	0.329	0.108
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.1	3.6	4.0	4.0	4.0	4.2	4.6	5.3	5.4	6.0
-40～-20	3.1	3.6	4.0	4.0	4.0	4.3	4.7	5.3	5.4	6.3
-20～0	3.2	3.7	4.0	4.1	4.1	4.3	4.7	5.4	5.5	6.3
0～20	3.2	3.7	4.1	4.1	4.1	4.4	4.7	5.5	5.6	6.4
20～40	3.3	3.8	4.1	4.1	4.2	4.4	4.8	5.6	5.7	6.5
40～60	3.4	3.8	4.2	4.2	4.4	4.5	5.0	5.8	5.9	6.9
60～80	3.6	4.0	4.3	4.4	4.5	4.8	5.1	6.0	6.1	7.1
80～100	3.7	4.1	4.4	4.5	4.6	4.9	5.3	6.3	6.4	7.1
100～120	3.9	4.3	4.6	4.6	4.7	5.0	5.5	6.4	6.5	7.3
120～140	4.2	4.5	4.7	4.7	4.8	5.2	5.6	6.5	6.6	7.6
140～160	4.3	4.6	4.8	4.8	4.9	5.3	5.7	6.6	6.7	8.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	420/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	384/346

Constants of dn/dt		
D_0	D_1	D_2
2.32E-06	1.27E-08	-1.60E-11
E_0	E_1	λ_{TK}
5.87E-07	4.07E-10	2.86E-01

H-LaF10A	788475	n_d = 1.78800	υ_d = 47.49	$n_F - n_C$ = 0.016592
		n_e = 1.79195	υ_e = 47.26	$n_{F'} - n_{C'}$ = 0.016758

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.74466
n_{1970}	1970.09	1.75204
n_{1530}	1529.58	1.76016
n_{1129}	1128.64	1.76750
n_{1064}	1064.00	1.76885
n_t	1013.98	1.76996
n_s	852.11	1.77435
$n_{A'}$	768.19	1.77738
n_r	706.52	1.78018
n_C	656.27	1.78300
$n_{C'}$	643.85	1.78379
n_{He-Ne}	632.80	1.78453
n_D	589.29	1.78785
n_d	587.56	1.78800
n_e	546.07	1.79195
n_F	486.13	1.79959
$n_{F'}$	479.99	1.80055
n_g	435.84	1.80878
n_h	404.66	1.81649
n_i	365.01	1.82981

Constants of Dispersion Formula	
A_0	3.12424071E+00
A_1	-1.57101635E-02
A_2	2.44837290E-02
A_3	1.02164022E-03
A_4	-7.05302601E-05
A_5	4.58907154E-06

Density		Solarization	
ρ (g/cm^3)	4.28	△λ (%)	-3.1

Relative Partial Dispersion	
$P_{d,C}$	0.3014
$P_{e,d}$	0.2381
$P_{g,F}$	0.5539
$P'_{d,c'}$	0.2512
$P'_{e,d}$	0.2357
$P'_{g,F'}$	0.4911

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0035
$\triangle P_{g,F}$	-0.0108
$\triangle P_{C,t}$	0.0157
$\triangle P_{C,s}$	0.0070

Thermal Properties	
Tg (℃)	688
Ts (℃)	709
$T_{10}^{14.5}$ (℃)	617
T_{10}^{13} (℃)	645
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	73
λ (W/(m·K))	1.00

Mechanical Properties	
HK (10^7Pa)	718
F_A	97
E (GPa)	123.4
G (GPa)	46.9
μ	0.315
σ_b (MPa)	90
B (10^{-12}/Pa)	1.35

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	55
-40/-30	57
-30/-20	59
-20/-10	60
-10/0	61
0/10	61
10/20	62
20/30	63
30/40	63
40/50	64
50/60	64
60/70	65
70/80	65
80/90	66
90/100	67
100/110	68
110/120	69
120/130	69
130/140	70
140/150	71
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.787	0.620
2200	0.927	0.859
2000	0.976	0.953
1800	0.991	0.982
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.997	0.994
420	0.995	0.990
400	0.990	0.982
390	0.982	0.972
380	0.973	0.955
370	0.958	0.927
360	0.936	0.882
350	0.892	0.803
340	0.818	0.677
330	0.678	0.468
320	0.413	0.178
310	0.091	0.012
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.8	4.1	4.5	4.5	4.5	4.8	5.1	5.5	5.6	6.0
-40～-20	3.9	4.2	4.5	4.5	4.6	4.8	5.1	5.6	5.7	6.1
-20～0	3.9	4.3	4.5	4.5	4.6	4.8	5.1	5.7	5.7	6.2
0～20	3.9	4.3	4.5	4.5	4.6	4.8	5.2	5.7	5.8	6.2
20～40	4.0	4.3	4.5	4.6	4.7	5.0	5.2	5.8	5.8	6.3
40～60	4.0	4.5	4.7	4.7	4.8	5.0	5.3	5.9	6.0	6.5
60～80	4.2	4.6	4.8	4.8	5.0	5.2	5.5	6.1	6.2	6.7
80～100	4.3	4.7	5.0	5.0	5.2	5.4	5.6	6.4	6.4	6.9
100～120	4.4	4.8	5.1	5.1	5.3	5.5	5.7	6.5	6.5	7.1
120～140	4.5	4.9	5.2	5.2	5.4	5.6	5.8	6.6	6.6	7.3
140～160	4.6	5.0	5.3	5.3	5.5	5.7	5.9	6.7	6.8	7.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/315
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	347/314

Constants of dn/dt		
D_0	D_1	D_2
3.30E-06	1.21E-08	-1.61E-11
E_0	E_1	λ_{TK}
5.85E-07	4.50E-10	2.21E-01

H-LaF50	773496	n_d = 1.77250	υ_d = 49.60	$n_F - n_C$ = 0.015575
		n_e = 1.77621	υ_e = 49.36	$n_{F'} - n_{C'}$ = 0.015725

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.73108
n_{1970}	1970.09	1.73821
n_{1530}	1529.58	1.74604
n_{1129}	1128.64	1.75310
n_{1064}	1064.00	1.75439
n_t	1013.98	1.75547
n_s	852.11	1.75963
$n_{A'}$	768.19	1.76250
n_r	706.52	1.76514
n_C	656.27	1.76780
$n_{C'}$	643.85	1.76854
n_{He-Ne}	632.80	1.76924
n_D	589.29	1.77236
n_d	587.56	1.77250
n_e	546.07	1.77621
n_F	486.13	1.78337
$n_{F'}$	479.99	1.78427
n_g	435.84	1.79197
n_h	404.66	1.79916
n_i	365.01	1.81154

Constants of Dispersion Formula	
A_0	3.07395250E+00
A_1	-1.50954523E-02
A_2	2.31138211E-02
A_3	8.38501873E-04
A_4	-5.02227252E-05
A_5	3.23074191E-06

Density	
ρ (g/cm^3)	4.27

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3018
$P_{e,d}$	0.2382
$P_{g,F}$	0.5522
$P'_{d,c'}$	0.2518
$P'_{e,d}$	0.2359
$P'_{g,F'}$	0.4897

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0031
$\triangle P_{g,F}$	-0.0090
$\triangle P_{C,t}$	0.0112
$\triangle P_{C,s}$	0.0051

Thermal Properties	
Tg (℃)	685
Ts (℃)	708
$T_{10}^{14.5}$ (℃)	622
T_{10}^{13} (℃)	668
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	73
λ (W/(m·K))	1.01

Mechanical Properties	
HK (10^7Pa)	698
F_A	61
E (GPa)	120.9
G (GPa)	46.6
μ	0.298
σ_b (MPa)	60
B (10^{-12}/Pa)	1.46

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	55
-30/-20	56
-20/-10	57
-10/0	58
0/10	59
10/20	60
20/30	61
30/40	61
40/50	62
50/60	62
60/70	63
70/80	63
80/90	65
90/100	66
100/110	67
110/120	68
120/130	69
130/140	70
140/150	71
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.853	0.728
2200	0.974	0.949
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.996	0.992
390	0.992	0.984
380	0.986	0.972
370	0.977	0.955
360	0.960	0.922
350	0.932	0.869
340	0.886	0.785
330	0.815	0.564
320	0.695	0.380
310	0.481	0.160
300	0.173	0.017
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.0	4.2	4.4	4.4	4.5	4.6	4.8	4.9	5.0	5.7
-40～-20	4.1	4.2	4.5	4.5	4.5	4.6	4.8	5.2	5.4	5.9
-20～0	4.2	4.3	4.5	4.5	4.6	4.9	5.0	5.3	5.4	6.1
0～20	4.2	4.4	4.6	4.6	4.6	4.8	5.1	5.4	5.5	6.1
20～40	4.2	4.5	4.6	4.6	4.6	4.8	5.2	5.6	5.6	6.3
40～60	4.3	4.5	4.7	4.8	4.7	4.9	5.2	5.7	5.7	6.3
60～80	4.3	4.5	4.7	4.8	4.8	4.9	5.2	5.7	5.8	6.3
80～100	4.4	4.6	4.7	4.8	4.9	5.0	5.3	5.8	5.9	6.5
100～120	4.4	4.7	4.8	4.8	5.0	5.0	5.3	5.9	6.0	6.5
120～140	4.6	4.8	4.9	4.9	5.1	5.1	5.5	6.0	6.0	6.6
140～160	4.7	4.8	4.9	5.0	5.1	5.2	5.5	6.1	6.1	6.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/305
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	342/303

Constants of dn/dt		
D_0	D_1	D_2
4.06E-06	1.23E-08	-2.71E-11
E_0	E_1	λ_{TK}
2.85E-07	2.10E-10	3.13E-01

H-LaF50B	773496	n_d = 1.77250	υ_d = 49.60	$n_F - n_C$ = 0.015575
		n_e = 1.77621	υ_e = 49.36	$n_{F'} - n_{C'}$ = 0.015725

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	
n_{1064}	1064.00	1.75428
n_t	1013.98	1.75538
n_s	852.11	1.75960
$n_{A'}$	768.19	1.76249
n_r	706.52	1.76514
n_C	656.27	1.76780
$n_{C'}$	643.85	1.76854
n_{He-Ne}	632.80	1.76924
n_D	589.29	1.77236
n_d	587.56	1.77250
n_e	546.07	1.77621
n_F	486.13	1.78337
$n_{F'}$	479.99	1.78427
n_g	435.84	1.79196
n_h	404.66	1.79913
n_i	365.01	1.81144

Constants of Dispersion Formula	
A_0	3.07486227E+00
A_1	-1.60709812E-02
A_2	2.28883031E-02
A_3	8.28871954E-04
A_4	-4.04256219E-05
A_5	2.26879435E-06

Density	
ρ (g/cm^3)	4.23

Solarization	
△λ (%)	-1.2

Relative Partial Dispersion	
$P_{d,C}$	0.3018
$P_{e,d}$	0.2382
$P_{g,F}$	0.5515
$P'_{d,c'}$	0.2518
$P'_{e,d}$	0.2359
$P'_{g,F'}$	0.4890

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0031
$\triangle P_{g,F}$	-0.0097
$\triangle P_{C,t}$	0.0170
$\triangle P_{C,s}$	0.0070

Thermal Properties	
Tg (℃)	682
Ts (℃)	701
$T_{10}^{14.5}$ (℃)	619
T_{10}^{13} (℃)	665
$\alpha_{-50/80℃}$ (10^{-7}/K)	56
$\alpha_{100/300℃}$ (10^{-7}/K)	72
λ (W/(m·K))	0.95

Mechanical Properties	
HK (10^7Pa)	713
F_A	62
E (GPa)	117.3
G (GPa)	46.9
μ	0.250
σ_b (MPa)	108
B (10^{-12}/Pa)	1.37

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	53
-30/-20	54
-20/-10	54
-10/0	54
0/10	55
10/20	57
20/30	57
30/40	57
40/50	58
50/60	59
60/70	61
70/80	61
80/90	63
90/100	63
100/110	64
110/120	65
120/130	66
130/140	66
140/150	67
150/160	70

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.759	0.576
2200	0.905	0.818
2000	0.969	0.939
1800	0.986	0.972
1600	0.994	0.987
1400	0.994	0.987
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.994
420	0.995	0.990
400	0.990	0.980
390	0.984	0.968
380	0.974	0.948
370	0.957	0.915
360	0.928	0.861
350	0.883	0.780
340	0.812	0.660
330	0.699	0.488
320	0.528	0.279
310	0.288	0.083
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.1	2.4	2.7	2.8	2.8	3.0	3.3	3.5	3.7	4.2
-40～-20	2.2	2.4	2.8	2.9	3.0	3.1	3.4	3.7	3.8	4.4
-20～0	2.3	2.5	2.8	2.9	3.0	3.3	3.6	3.9	4.0	4.6
0～20	2.3	2.5	2.9	3.0	3.1	3.4	3.7	3.9	4.1	4.8
20～40	2.3	2.6	2.9	3.0	3.1	3.4	3.8	4.1	4.2	5.0
40～60	2.3	2.7	3.0	3.1	3.2	3.6	3.9	4.1	4.3	5.0
60～80	2.4	2.7	3.0	3.1	3.3	3.7	3.9	4.1	4.3	5.1
80～100	2.4	2.7	3.1	3.2	3.4	3.8	4.0	4.2	4.4	5.3
100～120	2.4	2.9	3.2	3.3	3.5	3.8	4.1	4.3	4.5	5.3
120～140	2.5	3.0	3.3	3.4	3.6	3.9	4.2	4.4	4.6	5.4
140～160	2.6	3.0	3.3	3.5	3.6	4.0	4.2	4.4	4.6	5.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	375/310
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	352/307

Constants of dn/dt		
D_0	D_1	D_2
4.34E-07	1.20E-08	-2.81E-11
E_0	E_1	λ_{TK}
7.25E-07	5.31E-10	1.62E-01

H-LaF51	700481	n_d = 1.70000	υ_d = 48.08	$n_F - n_C$ = 0.014559
		n_e = 1.70346	υ_e = 47.80	$n_{F'} - n_{C'}$ = 0.014717

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.66549
n_{1970}	1970.09	1.67085
n_{1530}	1529.58	1.67686
n_{1129}	1128.64	1.68256
n_{1064}	1064.00	1.68365
n_t	1013.98	1.68456
n_s	852.11	1.68821
$n_{A'}$	768.19	1.69079
n_r	706.52	1.69320
n_C	656.27	1.69564
$n_{C'}$	643.85	1.69633
n_{He-Ne}	632.80	1.69697
n_D	589.29	1.69987
n_d	587.56	1.70000
n_e	546.07	1.70346
n_F	486.13	1.71020
$n_{F'}$	479.99	1.71104
n_g	435.84	1.71838
n_h	404.66	1.72530
n_i	365.01	1.73740

Constants of Dispersion Formula	
A_0	2.82781336E+00
A_1	-1.06938171E-02
A_2	2.08610635E-02
A_3	7.26796327E-04
A_4	-3.73066587E-05
A_5	3.28626126E-06

Density	
ρ (g/cm^3)	4.01

Solarization	
△λ (%)	-0.2

Relative Partial Dispersion	
$P_{d,C}$	0.2995
$P_{e,d}$	0.2377
$P_{g,F}$	0.5619
$P'_{d,c'}$	0.2494
$P'_{e,d}$	0.2351
$P'_{g,F'}$	0.4987

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0007
$\triangle P_{g,F}$	-0.0019
$\triangle P_{C,t}$	-0.0121
$\triangle P_{C,s}$	-0.0055

Thermal Properties	
Tg (℃)	661
Ts (℃)	703
$T_{10}^{14.5}$ (℃)	591
T_{10}^{13} (℃)	635
$\alpha_{-50/80℃}$ (10^{-7}/K)	77
$\alpha_{100/300℃}$ (10^{-7}/K)	91
λ (W/(m·K))	0.90

Mechanical Properties	
HK (10^7Pa)	532
F_A	171
E (GPa)	89.9
G (GPa)	34.9
μ	0.299
σ_b (MPa)	79
B (10^{-12}/Pa)	1.49

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	68
-40/-30	71
-30/-20	72
-20/-10	74
-10/0	75
0/10	75
10/20	76
20/30	77
30/40	77
40/50	78
50/60	79
60/70	79
70/80	80
80/90	81
90/100	82
100/110	83
110/120	84
120/130	85
130/140	86
140/150	87
150/160	87

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.920	0.845
2200	0.972	0.944
2000	0.990	0.977
1800	0.999	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.997	0.996
420	0.995	0.993
400	0.992	0.985
390	0.987	0.977
380	0.978	0.958
370	0.959	0.921
360	0.914	0.836
350	0.798	0.638
340	0.538	0.290
330	0.180	0.032
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.5	1.7	1.9	1.9	2.0	2.1	2.4	2.8	2.8	3.5
-40～-20	1.4	1.7	1.9	2.0	1.9	2.2	2.4	2.8	2.9	3.4
-20～0	1.4	1.6	1.9	1.9	1.9	2.1	2.4	2.8	2.9	3.4
0～20	1.3	1.7	1.9	1.9	1.9	2.1	2.3	2.8	2.9	3.5
20～40	1.3	1.7	2.0	2.0	2.0	2.2	2.4	2.9	3.0	3.5
40～60	1.4	1.7	2.0	2.0	2.0	2.2	2.5	3.0	3.1	3.7
60～80	1.5	1.7	2.0	2.0	2.1	2.4	2.6	3.2	3.2	3.8
80～100	1.6	1.8	2.1	2.1	2.1	2.5	2.6	3.3	3.4	3.9
100～120	1.7	2.0	2.2	2.2	2.2	2.6	2.7	3.4	3.5	3.9
120～140	1.8	2.1	2.3	2.4	2.4	2.7	2.9	3.4	3.5	4.0
140～160	1.8	2.2	2.5	2.6	2.6	2.8	3.0	3.5	3.6	4.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	358/332

Constants of dn/dt		
D_0	D_1	D_2
-8.69E-07	1.19E-08	-1.44E-11
E_0	E_1	λ_{TK}
5.39E-07	1.97E-10	2.48E-01

H-LaF52	786442	n_d = 1.78590	υ_d = 44.19	$n_F - n_C$ = 0.017786
		n_e = 1.79013	υ_e = 43.93	$n_{F'} - n_{C'}$ = 0.017988

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.74308
n_{1970}	1970.09	1.74989
n_{1530}	1529.58	1.75749
n_{1129}	1128.64	1.76459
n_{1064}	1064.00	1.76594
n_t	1013.98	1.76706
n_s	852.11	1.77153
$n_{A'}$	768.19	1.77468
n_r	706.52	1.77761
n_C	656.27	1.78059
$n_{C'}$	643.85	1.78142
n_{He-Ne}	632.80	1.78221
n_D	589.29	1.78574
n_d	587.56	1.78590
n_e	546.07	1.79013
n_F	486.13	1.79837
$n_{F'}$	479.99	1.79941
n_g	435.84	1.80839
n_h	404.66	1.81685
n_i	365.01	1.83170

Constants of Dispersion Formula	
A_0	3.11096434E+00
A_1	-1.43300745E-02
A_2	2.60159962E-02
A_3	1.10002413E-03
A_4	-6.28685795E-05
A_5	4.85754790E-06

Density	
ρ (g/cm^3)	4.38

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2985
$P_{e,d}$	0.2378
$P_{g,F}$	0.5634
$P'_{d,c'}$	0.2491
$P'_{e,d}$	0.2352
$P'_{g,F'}$	0.4992

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0025
$\triangle P_{g,F}$	-0.0068
$\triangle P_{C,t}$	0.0065
$\triangle P_{C,s}$	0.0029

Thermal Properties	
Tg (℃)	606
Ts (℃)	638
$T_{10}^{14.5}$ (℃)	548
T_{10}^{13} (℃)	574
$\alpha_{-50/80℃}$ (10^{-7}/K)	56
$\alpha_{100/300℃}$ (10^{-7}/K)	72
λ (W/(m·K))	0.85

Mechanical Properties	
HK (10^7Pa)	649
F_A	76
E (GPa)	112.5
G (GPa)	41.8
μ	0.346
σ_b (MPa)	90
B (10^{-12}/Pa)	2.06

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	50
-40/-30	53
-30/-20	54
-20/-10	55
-10/0	56
0/10	57
10/20	58
20/30	59
30/40	59
40/50	60
50/60	60
60/70	61
70/80	61
80/90	62
90/100	63
100/110	64
110/120	65
120/130	66
130/140	67
140/150	68
150/160	68

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.830	0.689
2200	0.958	0.918
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.996	0.993
440	0.994	0.990
420	0.988	0.985
400	0.982	0.975
390	0.975	0.963
380	0.966	0.945
370	0.949	0.913
360	0.920	0.858
350	0.873	0.774
340	0.793	0.639
330	0.639	0.418
320	0.349	0.127
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	7.3	7.7	8.0	8.0	8.1	8.4	8.7	9.4	9.4	10.2
-40～-20	7.3	7.7	8.0	8.0	8.1	8.4	8.7	9.5	9.5	10.2
-20～0	7.3	7.7	8.1	8.1	8.2	8.5	8.9	9.6	9.6	10.3
0～20	7.4	7.8	8.2	8.2	8.2	8.5	8.9	9.6	9.6	10.4
20～40	7.4	7.8	8.2	8.2	8.3	8.6	8.9	9.7	9.7	10.5
40～60	7.5	7.9	8.3	8.4	8.4	8.6	9.0	9.7	9.9	10.6
60～80	7.7	8.2	8.4	8.5	8.6	8.8	9.2	10.1	10.2	10.8
80～100	7.8	8.3	8.6	8.7	8.7	8.8	9.4	10.3	10.4	11.0
100～120	8.1	8.4	8.7	8.8	8.8	9.0	9.0	10.5	10.6	11.3
120～140	8.0	8.6	8.9	9.0	9.0	9.3	9.3	10.8	10.8	11.5
140～160	8.2	8.7	9.0	9.1	9.2	9.4	9.4	11.0	11.1	11.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	350/316

Constants of dn/dt		
D_0	D_1	D_2
9.08E-06	1.24E-08	-1.32E-11
E_0	E_1	λ_{TK}
5.76E-07	4.15E-10	2.72E-01

H-LaF53	743492	n_d = 1.74330	υ_d = 49.22	$n_F - n_C$ = 0.015101
		n_e = 1.74690	υ_e = 48.99	$n_{F'} - n_{C'}$ = 0.015246

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70297
n_{1970}	1970.09	1.70999
n_{1530}	1529.58	1.71767
n_{1129}	1128.64	1.72455
n_{1064}	1064.00	1.72580
n_t	1013.98	1.72685
n_s	852.11	1.73087
$n_{A'}$	768.19	1.73364
n_r	706.52	1.73619
n_C	656.27	1.73875
$n_{C'}$	643.85	1.73947
n_{He-Ne}	632.80	1.74015
n_D	589.29	1.74317
n_d	587.56	1.74330
n_e	546.07	1.74690
n_F	486.13	1.75385
$n_{F'}$	479.99	1.75472
n_g	435.84	1.76221
n_h	404.66	1.76921
n_i	365.01	1.78127

Constants of Dispersion Formula	
A_0	2.97513891E+00
A_1	-1.46215956E-02
A_2	2.17492662E-02
A_3	8.02001413E-04
A_4	-3.64703266E-05
A_5	2.12357903E-06

Density	
ρ (g/cm^3)	4.15

Solarization	
△λ (%)	-1.1

Relative Partial Dispersion	
$P_{d,C}$	0.3013
$P_{e,d}$	0.2384
$P_{g,F}$	0.5536
$P'_{d,c'}$	0.2512
$P'_{e,d}$	0.2361
$P'_{g,F'}$	0.4913

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0028
$\triangle P_{g,F}$	-0.0082
$\triangle P_{C,t}$	0.0094
$\triangle P_{C,s}$	0.0033

Thermal Properties	
Tg (℃)	608
Ts (℃)	634
$T_{10}^{14.5}$ (℃)	550
T_{10}^{13} (℃)	578
$\alpha_{-50/80℃}$ (10^{-7}/K)	50
$\alpha_{100/300℃}$ (10^{-7}/K)	66
λ (W/(m·K))	0.83

Mechanical Properties	
HK (10^7Pa)	661
F_A	83
E (GPa)	110.1
G (GPa)	41.5
μ	0.327
σ_b (MPa)	75
B (10^{-12}/Pa)	2.18

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	44
-40/-30	47
-30/-20	49
-20/-10	50
-10/0	51
0/10	52
10/20	53
20/30	53
30/40	53
40/50	54
50/60	54
60/70	54
70/80	55
80/90	56
90/100	57
100/110	58
110/120	59
120/130	60
130/140	61
140/150	62
150/160	63

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.761	0.580
2200	0.914	0.835
2000	0.975	0.951
1800	0.993	0.986
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.994
420	0.996	0.992
400	0.992	0.987
390	0.987	0.980
380	0.981	0.970
370	0.970	0.950
360	0.951	0.914
350	0.924	0.862
340	0.880	0.786
330	0.815	0.673
320	0.705	0.508
310	0.505	0.263
300	0.187	0.039
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	7.4	7.7	7.9	7.9	7.9	8.1	8.5	8.9	9.0	9.5
-40～-20	7.3	7.8	8.1	8.1	8.0	8.2	8.5	9.0	9.1	9.6
-20～0	7.3	7.9	8.1	8.1	8.1	8.2	8.6	9.1	9.2	9.7
0～20	7.4	8.0	8.2	8.2	8.2	8.3	8.7	9.2	9.3	9.8
20～40	7.4	8.0	8.2	8.2	8.2	8.4	8.7	9.3	9.4	9.9
40～60	7.5	8.1	8.3	8.3	8.3	8.5	8.8	9.4	9.6	10.0
60～80	7.6	8.2	8.4	8.4	8.5	8.6	9.0	9.6	9.7	10.2
80～100	7.7	8.3	8.5	8.6	8.6	8.7	9.1	9.8	9.9	10.4
100～120	7.8	8.5	8.6	8.6	8.6	9.0	9.3	10.0	10.1	10.7
120～140	7.9	8.5	8.7	8.7	8.7	9.1	9.5	10.2	10.3	11.0
140～160	8.1	8.7	8.8	8.8	8.8	9.3	9.7	10.4	10.5	11.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/300
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	342/301

Constants of dn/dt		
D_0	D_1	D_2
9.82E-06	1.23E-08	-1.80E-11
E_0	E_1	λ_{TK}
5.12E-07	6.03E-10	2.46E-01

H-LaF54	800423	n_d = 1.79950	υ_d = 42.34	$n_F - n_C$ = 0.018883
		n_e = 1.80399	υ_e = 42.09	$n_{F'} - n_{C'}$ = 0.019101

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75473
n_{1970}	1970.09	1.76179
n_{1530}	1529.58	1.76966
n_{1129}	1128.64	1.77705
n_{1064}	1064.00	1.77846
n_t	1013.98	1.77963
n_s	852.11	1.78432
$n_{A'}$	768.19	1.78763
n_r	706.52	1.79073
n_C	656.27	1.79388
$n_{C'}$	643.85	1.79476
n_{He-Ne}	632.80	1.79559
n_D	589.29	1.79934
n_d	587.56	1.79950
n_e	546.07	1.80399
n_F	486.13	1.81276
$n_{F'}$	479.99	1.81386
n_g	435.84	1.82345
n_h	404.66	1.83254
n_i	365.01	1.84858

Constants of Dispersion Formula	
A_0	3.15463077E+00
A_1	-1.49142692E-02
A_2	2.73983671E-02
A_3	1.30082902E-03
A_4	-8.39080192E-05
A_5	6.66808513E-06

Density	
ρ (g/cm^3)	4.40

Solarization	
△λ (%)	-1.7

Relative Partial Dispersion	
$P_{d,C}$	0.2976
$P_{e,d}$	0.2378
$P_{g,F}$	0.5661
$P'_{d,c'}$	0.2482
$P'_{e,d}$	0.2351
$P'_{g,F'}$	0.5021

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0024
$\triangle P_{g,F}$	-0.0072
$\triangle P_{C,t}$	0.0094
$\triangle P_{C,s}$	0.0043

Thermal Properties	
Tg (℃)	606
Ts (℃)	637
$T_{10}^{14.5}$ (℃)	539
T_{10}^{13} (℃)	580
$\alpha_{-50/80℃}$ (10^{-7}/K)	53
$\alpha_{100/300℃}$ (10^{-7}/K)	68
λ (W/(m·K))	1.30

Mechanical Properties	
HK (10^7Pa)	630
F_A	84
E (GPa)	114.4
G (GPa)	42.7
μ	0.340
σ_b (MPa)	74
B (10^{-12}/Pa)	2.07

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	47
-40/-30	49
-30/-20	51
-20/-10	53
-10/0	53
0/10	54
10/20	55
20/30	56
30/40	57
40/50	57
50/60	58
60/70	58
70/80	59
80/90	60
90/100	61
100/110	62
110/120	63
120/130	64
130/140	65
140/150	66
150/160	66

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.811	0.658
2200	0.944	0.891
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.996
460	0.995	0.994
440	0.993	0.992
420	0.991	0.986
400	0.984	0.973
390	0.978	0.960
380	0.966	0.935
370	0.941	0.890
360	0.900	0.811
350	0.815	0.665
340	0.638	0.408
330	0.316	0.102
320	0.048	0.011
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	6.4	6.9	7.2	7.3	7.3	7.6	7.8	8.5	8.6	9.1
-40～-20	6.6	7.0	7.4	7.4	7.5	7.6	8.1	8.7	8.8	9.4
-20～0	6.8	7.1	7.7	7.7	7.8	7.8	8.3	9.0	9.1	9.9
0～20	7.0	7.3	7.8	7.9	8.0	8.1	8.6	9.2	9.3	10.0
20～40	7.0	7.3	7.9	8.0	8.0	8.2	8.6	9.3	9.4	10.3
40～60	7.0	7.4	7.9	8.0	8.0	8.3	8.8	9.5	9.5	10.4
60～80	7.2	7.5	8.0	8.0	8.1	8.6	9.0	9.7	9.8	10.6
80～100	7.4	7.7	8.1	8.2	8.2	8.8	9.1	10.1	10.1	10.9
100～120	7.6	7.8	8.2	8.3	8.4	9.0	9.3	10.3	10.3	11.0
120～140	7.7	8.0	8.4	8.5	8.6	9.2	9.5	10.5	10.5	11.4
140～160	7.8	8.1	8.5	8.6	8.7	9.3	9.6	10.7	10.8	11.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	358/327

Constants of dn/dt		
D_0	D_1	D_2
7.96E-06	1.37E-08	-2.59E-11
E_0	E_1	λ_{TK}
7.10E-07	8.49E-10	2.31E-01

H-LaF55	750353	n_d = 1.74950	υ_d = 35.33	$n_F - n_C$ = 0.021214
		n_e = 1.75453	υ_e = 35.10	$n_{F'} - n_{C'}$ = 0.021498

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70383
n_{1970}	1970.09	1.71040
n_{1530}	1529.58	1.71787
n_{1129}	1128.64	1.72521
n_{1064}	1064.00	1.72665
n_t	1013.98	1.72788
n_s	852.11	1.73284
$n_{A'}$	768.19	1.73642
n_r	706.52	1.73980
n_C	656.27	1.74326
$n_{C'}$	643.85	1.74424
n_{He-Ne}	632.80	1.74516
n_D	589.29	1.74932
n_d	587.56	1.74950
n_e	546.07	1.75453
n_F	486.13	1.76447
$n_{F'}$	479.99	1.76574
n_g	435.84	1.77675
n_h	404.66	1.78738
n_i	365.01	1.80661

Constants of Dispersion Formula	
A_0	2.96935883E+00
A_1	-1.32774456E-02
A_2	2.93044954E-02
A_3	1.50919828E-03
A_4	-9.11873783E-05
A_5	9.40030979E-06

Density	
ρ (g/cm^3)	3.23

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2941
$P_{e,d}$	0.2371
$P_{g,F}$	0.5789
$P'_{d,c'}$	0.2447
$P'_{e,d}$	0.2340
$P'_{g,F'}$	0.5121

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0021
$\triangle P_{g,F}$	-0.0061
$\triangle P_{C,t}$	0.0137
$\triangle P_{C,s}$	0.0060

Thermal Properties	
Tg (℃)	551
Ts (℃)	589
$T_{10}^{14.5}$ (℃)	482
T_{10}^{13} (℃)	533
$\alpha_{-50/80℃}$ (10^{-7}/K)	78
$\alpha_{100/300℃}$ (10^{-7}/K)	104
λ (W/(m·K))	1.29

Mechanical Properties	
HK (10^7Pa)	580
F_A	156
E (GPa)	109.7
G (GPa)	42.5
μ	0.290
σ_b (MPa)	81
B (10^{-12}/Pa)	2.44

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	70
-40/-30	72
-30/-20	74
-20/-10	76
-10/0	77
0/10	78
10/20	79
20/30	80
30/40	81
40/50	82
50/60	83
60/70	84
70/80	84
80/90	85
90/100	86
100/110	88
110/120	89
120/130	91
130/140	92
140/150	94
150/160	95

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.967	0.936
2200	0.982	0.965
2000	0.993	0.987
1800	0.996	0.992
1600	0.998	0.995
1400	0.998	0.996
1200	0.999	0.997
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.996	0.992
480	0.994	0.989
460	0.992	0.985
440	0.990	0.980
420	0.987	0.975
400	0.981	0.963
390	0.974	0.949
380	0.963	0.928
370	0.946	0.895
360	0.919	0.845
350	0.872	0.760
340	0.759	0.576
330	0.486	0.236
320	0.118	0.014
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.0	4.4	4.6	4.7	4.7	5.0	5.5	6.3	6.3	7.1
-40～-20	4.0	4.3	4.6	4.7	4.8	5.0	5.5	6.4	6.4	7.2
-20～0	3.8	4.3	4.7	4.7	4.8	5.1	5.4	6.4	6.4	7.3
0～20	3.8	4.3	4.7	4.7	4.8	5.1	5.4	6.4	6.4	7.4
20～40	3.7	4.3	4.7	4.7	4.8	5.1	5.4	6.4	6.4	7.4
40～60	3.7	4.3	4.7	4.7	4.8	5.1	5.5	6.6	6.6	7.5
60～80	3.8	4.4	4.8	4.8	4.9	5.2	5.7	6.8	6.8	7.8
80～100	4.0	4.4	4.9	4.9	5.0	5.3	5.8	6.9	6.9	7.9
100～120	4.1	4.5	4.9	4.9	5.0	5.4	6.0	7.0	7.0	8.1
120～140	4.2	4.5	5.0	5.1	5.2	5.5	6.2	7.1	7.1	8.2
140～160	4.2	4.6	5.1	5.2	5.3	5.6	6.3	7.3	7.3	8.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/325
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	354/324

Constants of dn/dt		
D_0	D_1	D_2
3.12E-06	9.87E-09	-1.45E-11
E_0	E_1	λ_{TK}
7.63E-07	6.00E-10	2.65E-01

H-LaF56	800422	n_d = 1.79952	υ_d = 42.24	$n_F - n_C$ = 0.018928
		n_e = 1.80402	υ_e = 41.98	$n_{F'} - n_{C'}$ = 0.019154

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.77750
n_{1064}	1064.00	1.77880
n_t	1013.98	1.77991
n_s	852.11	1.78443
$n_{A'}$	768.19	1.78769
n_r	706.52	1.79076
n_C	656.27	1.79389
$n_{C'}$	643.85	1.79478
n_{He-Ne}	632.80	1.79561
n_D	589.29	1.79935
n_d	587.56	1.79952
n_e	546.07	1.80402
n_F	486.13	1.81282
$n_{F'}$	479.99	1.81393
n_g	435.84	1.82356
n_h	404.66	1.83269
n_i	365.01	1.84872

Constants of Dispersion Formula	
A_0	3.14996339E+00
A_1	-1.12409199E-02
A_2	2.99099759E-02
A_3	5.96811598E-04
A_4	1.91751228E-05
A_5	9.69165865E-07

Density	
ρ (g/cm^3)	4.60

Solarization	
△λ (%)	-0.8

Relative Partial Dispersion	
$P_{d,C}$	0.2974
$P_{e,d}$	0.2377
$P_{g,F}$	0.5674
$P'_{d,c'}$	0.2475
$P'_{e,d}$	0.2349
$P'_{g,F'}$	0.5028

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0020
$\triangle P_{g,F}$	-0.0060
$\triangle P_{C,t}$	-0.0062
$\triangle P_{C,s}$	-0.0020

Thermal Properties	
Tg (℃)	583
Ts (℃)	619
$T_{10}^{14.5}$ (℃)	537
T_{10}^{13} (℃)	562
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	79
λ (W/(m·K))	0.93

Mechanical Properties	
HK (10^7Pa)	628
F_A	96
E (GPa)	111.7
G (GPa)	42.2
μ	0.322
σ_b (MPa)	141
B (10^{-12}/Pa)	2.28

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	52
-40/-30	55
-30/-20	58
-20/-10	59
-10/0	60
0/10	61
10/20	63
20/30	63
30/40	64
40/50	64
50/60	66
60/70	67
70/80	67
80/90	68
90/100	69
100/110	71
110/120	71
120/130	72
130/140	74
140/150	74
150/160	75

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.903	0.815
2200	0.975	0.952
2000	0.989	0.978
1800	0.997	0.994
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.995
480	0.996	0.993
460	0.995	0.990
440	0.992	0.985
420	0.989	0.978
400	0.982	0.963
390	0.974	0.949
380	0.961	0.923
370	0.935	0.873
360	0.872	0.760
350	0.722	0.522
340	0.424	0.179
330	0.112	0.013
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	7.5	8.2	9.2	9.4	9.6	10.0	10.5	11.2	11.3	12.0
-40～-20	7.7	8.4	9.3	9.6	9.8	10.1	10.7	11.2	11.4	12.0
-20～0	7.8	8.6	9.5	9.7	9.9	10.3	10.8	11.4	11.6	12.1
0～20	8.1	8.7	9.6	9.8	10.0	10.5	10.9	11.5	11.7	12.2
20～40	8.2	8.8	9.8	9.9	10.1	10.5	11.2	11.7	11.9	12.5
40～60	8.5	9.0	10.1	10.2	10.4	10.7	11.3	11.8	12.0	12.6
60～80	8.6	9.2	10.4	10.5	10.6	10.9	11.5	12.1	12.3	12.9
80～100	8.7	9.5	10.5	10.6	10.7	11.1	11.7	12.1	12.3	13.0
100～120	8.9	9.7	10.7	10.8	10.9	11.2	11.8	12.4	12.5	13.1
120～140	9.1	9.8	10.8	10.9	11.0	11.3	12.0	12.5	12.6	13.3
140～160	9.2	9.8	10.9	11.0	11.2	11.5	12.1	12.5	12.7	13.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	363/336

Constants of dn/dt		
D_0	D_1	D_2
9.77E-06	1.76E-08	-2.54E-11
E_0	E_1	λ_{TK}
1.41E-06	-2.80E-10	4.92E-10

H-LaF62	720437	n_d = 1.72000	υ_d = 43.68	$n_F - n_C$ = 0.016483
		n_e = 1.72391	υ_e = 43.39	$n_{F'} - n_{C'}$ = 0.016682

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68074
n_{1970}	1970.09	1.68697
n_{1530}	1529.58	1.69391
n_{1129}	1128.64	1.70040
n_{1064}	1064.00	1.70163
n_t	1013.98	1.70266
n_s	852.11	1.70676
$n_{A'}$	768.19	1.70965
n_r	706.52	1.71235
n_C	656.27	1.71511
$n_{C'}$	643.85	1.71588
n_{He-Ne}	632.80	1.71660
n_D	589.29	1.71985
n_d	587.56	1.72000
n_e	546.07	1.72391
n_F	486.13	1.73159
$n_{F'}$	479.99	1.73256
n_g	435.84	1.74094
n_h	404.66	1.74893
n_i	365.01	1.76316

Constants of Dispersion Formula	
A_0	2.88897190E+00
A_1	-1.26328327E-02
A_2	2.26898960E-02
A_3	1.15077142E-03
A_4	-8.54940157E-05
A_5	7.07758016E-06

Density	
ρ (g/cm^3)	3.71

Solarization	
△λ (%)	-0.9

Relative Partial Dispersion	
$P_{d,C}$	0.2967
$P_{e,d}$	0.2372
$P_{g,F}$	0.5673
$P'_{d,c'}$	0.2470
$P'_{e,d}$	0.2344
$P'_{g,F'}$	0.5023

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	-0.0038
$\triangle P_{C,t}$	0.0036
$\triangle P_{C,s}$	0.0014

Thermal Properties	
Tg (℃)	604
Ts (℃)	640
$T_{10}^{14.5}$ (℃)	530
T_{10}^{13} (℃)	581
$\alpha_{-50/80℃}$ (10^{-7}/K)	71
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	0.95

Mechanical Properties	
HK (10^7Pa)	564
F_A	149
E (GPa)	106.1
G (GPa)	40.3
μ	0.317
σ_b (MPa)	70
B (10^{-12}/Pa)	2.25

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	61
-40/-30	64
-30/-20	66
-20/-10	67
-10/0	68
0/10	69
10/20	70
20/30	71
30/40	72
40/50	73
50/60	74
60/70	75
70/80	75
80/90	76
90/100	77
100/110	79
110/120	80
120/130	81
130/140	83
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.872	0.760
2200	0.954	0.910
2000	0.991	0.982
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.996
480	0.996	0.993
460	0.994	0.990
440	0.992	0.985
420	0.984	0.975
400	0.976	0.958
390	0.966	0.940
380	0.946	0.901
370	0.901	0.819
360	0.788	0.625
350	0.517	0.272
340	0.127	0.020
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.4	2.8	3.1	3.1	3.1	3.3	3.6	4.1	4.2	4.7
-40～-20	2.4	2.8	3.1	3.1	3.1	3.3	3.5	4.2	4.3	4.8
-20～0	2.5	2.8	3.1	3.1	3.2	3.4	3.6	4.2	4.3	4.9
0～20	2.4	2.9	3.1	3.1	3.2	3.4	3.6	4.2	4.3	5.0
20～40	2.4	2.9	3.1	3.1	3.2	3.4	3.7	4.3	4.4	5.0
40～60	2.4	2.9	3.1	3.1	3.2	3.5	3.7	4.4	4.5	5.2
60～80	2.5	3.0	3.2	3.3	3.4	3.6	3.8	4.6	4.7	5.3
80～100	2.5	3.1	3.3	3.4	3.5	3.7	3.9	4.7	4.8	5.5
100～120	2.7	3.2	3.5	3.5	3.6	3.9	4.1	4.9	5.0	5.7
120～140	2.8	3.3	3.6	3.6	3.7	4.0	4.3	5.1	5.2	5.8
140～160	3.0	3.4	3.8	3.8	3.9	4.2	4.4	5.2	5.3	5.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	365/342

Constants of dn/dt		
D_0	D_1	D_2
9.15E-07	1.15E-08	-1.32E-11
E_0	E_1	λ_{TK}
6.49E-07	4.46E-10	2.36E-01

H-LaF72	720460	n_d = 1.72000	υ_d = 46.02	$n_F - n_C$ = 0.015645
		n_e = 1.72372	υ_e = 45.77	$n_{F'} - n_{C'}$ = 0.015811

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68194
n_{1970}	1970.09	1.68799
n_{1530}	1529.58	1.69476
n_{1129}	1128.64	1.70111
n_{1064}	1064.00	1.70232
n_t	1013.98	1.70333
n_s	852.11	1.70732
$n_{A'}$	768.19	1.71011
n_r	706.52	1.71271
n_C	656.27	1.71533
$n_{C'}$	643.85	1.71607
n_{He-Ne}	632.80	1.71676
n_D	589.29	1.71987
n_d	587.56	1.72000
n_e	546.07	1.72372
n_F	486.13	1.73097
$n_{F'}$	479.99	1.73188
n_g	435.84	1.73981
n_h	404.66	1.74732
n_i	365.01	1.76051

Constants of Dispersion Formula	
A_0	2.89068995E+00
A_1	-1.22258397E-02
A_2	2.34463603E-02
A_3	3.98991928E-04
A_4	2.73296394E-05
A_5	1.01579894E-07

Density	
ρ (g/cm^3)	3.88

Solarization	
△λ (%)	-1.2

Relative Partial Dispersion	
$P_{d,C}$	0.2985
$P_{e,d}$	0.2378
$P_{g,F}$	0.5650
$P'_{d,c'}$	0.2486
$P'_{e,d}$	0.2353
$P'_{g,F'}$	0.5015

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0014
$\triangle P_{g,F}$	-0.0021
$\triangle P_{C,t}$	0.0039
$\triangle P_{C,s}$	0.0011

Thermal Properties	
Tg (℃)	660
Ts (℃)	692
$T_{10}^{14.5}$ (℃)	584
T_{10}^{13} (℃)	628
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	585
F_A	128
E (GPa)	98.1
G (GPa)	38.4
μ	0.277
σ_b (MPa)	70
B (10^{-12}/Pa)	1.77

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	60
-40/-30	63
-30/-20	64
-20/-10	65
-10/0	66
0/10	67
10/20	68
20/30	70
30/40	70
40/50	71
50/60	71
60/70	72
70/80	72
80/90	73
90/100	74
100/110	75
110/120	76
120/130	77
130/140	78
140/150	79
150/160	80

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.902	0.806
2200	0.982	0.949
2000	0.993	0.986
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.997	0.994
460	0.995	0.992
440	0.993	0.987
420	0.988	0.982
400	0.978	0.964
390	0.967	0.946
380	0.948	0.910
370	0.908	0.839
360	0.826	0.698
350	0.638	0.423
340	0.303	0.098
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.7	2.9	3.2	3.2	3.3	3.5	3.6	4.2	4.3	4.7
-40～-20	2.7	3.0	3.2	3.3	3.3	3.5	3.6	4.2	4.3	4.8
-20～0	2.7	3.0	3.2	3.3	3.4	3.6	3.8	4.2	4.3	4.9
0～20	2.7	3.0	3.2	3.3	3.4	3.6	3.8	4.2	4.3	5.0
20～40	2.7	3.1	3.3	3.3	3.4	3.6	3.9	4.3	4.4	5.1
40～60	2.7	3.1	3.4	3.4	3.5	3.7	4.1	4.3	4.4	5.2
60～80	2.8	3.2	3.5	3.5	3.6	3.8	4.1	4.5	4.6	5.3
80～100	2.9	3.2	3.6	3.6	3.7	3.9	4.1	4.7	4.8	5.4
100～120	2.9	3.3	3.7	3.7	3.8	4.0	4.3	4.9	5.0	5.5
120～140	2.9	3.4	3.8	3.8	3.9	4.1	4.5	5.1	5.2	5.7
140～160	3.0	3.5	3.9	4.0	4.0	4.3	4.6	5.2	5.3	5.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	366/337

Constants of dn/dt		
D_0	D_1	D_2
1.36E-06	1.16E-08	-1.71E-11
E_0	E_1	λ_{TK}
6.48E-07	4.94E-10	1.99E-01

H-LaF76	762401	n_d = 1.76200	υ_d = 40.09	$n_F - n_C$ = 0.019010
		n_e = 1.76651	υ_e = 39.86	$n_{F'} - n_{C'}$ = 0.019232

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.71750
n_{1970}	1970.09	1.72452
n_{1530}	1529.58	1.73233
n_{1129}	1128.64	1.73966
n_{1064}	1064.00	1.74105
n_t	1013.98	1.74222
n_s	852.11	1.74686
$n_{A'}$	768.19	1.75016
n_r	706.52	1.75325
n_C	656.27	1.75638
$n_{C'}$	643.85	1.75727
n_{He-Ne}	632.80	1.75809
n_D	589.29	1.76183
n_d	587.56	1.76200
n_e	546.07	1.76651
n_F	486.13	1.77539
$n_{F'}$	479.99	1.77651
n_g	435.84	1.78629
n_h	404.66	1.79568
n_i	365.01	1.81262

Constants of Dispersion Formula	
A_0	3.02351576E+00
A_1	-1.45336956E-02
A_2	2.61746880E-02
A_3	1.46334106E-03
A_4	-1.07305803E-04
A_5	9.60593182E-06

Density	
ρ (g/cm^3)	3.97

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2956
$P_{e,d}$	0.2372
$P_{g,F}$	0.5734
$P'_{d,c'}$	0.2459
$P'_{e,d}$	0.2345
$P'_{g,F'}$	0.5085

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0009
$\triangle P_{g,F}$	-0.0036
$\triangle P_{C,t}$	0.0105
$\triangle P_{C,s}$	0.0042

Thermal Properties	
Tg (℃)	656
Ts (℃)	682
$T_{10}^{14.5}$ (℃)	589
T_{10}^{13} (℃)	625
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	1.11

Mechanical Properties	
HK (10^7Pa)	563
F_A	118
E (GPa)	103.1
G (GPa)	39.3
μ	0.310
σ_b (MPa)	69
B (10^{-12}/Pa)	1.84

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	55
-40/-30	57
-30/-20	59
-20/-10	60
-10/0	61
0/10	62
10/20	63
20/30	63
30/40	64
40/50	64
50/60	65
60/70	65
70/80	66
80/90	66
90/100	67
100/110	68
110/120	69
120/130	70
130/140	71
140/150	72
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.872	0.760
2200	0.976	0.953
2000	0.990	0.980
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.996	0.992
480	0.994	0.989
460	0.992	0.984
440	0.990	0.980
420	0.984	0.970
400	0.972	0.942
390	0.959	0.916
380	0.932	0.860
370	0.871	0.745
360	0.713	0.487
350	0.368	0.124
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.7	2.8	3.1	3.1	3.2	3.5	3.6	4.1	4.1	4.7
-40～-20	2.7	2.9	3.1	3.1	3.2	3.6	3.7	4.1	4.2	4.9
-20～0	2.7	2.9	3.1	3.2	3.3	3.6	3.8	4.3	4.4	5.0
0～20	2.7	2.9	3.1	3.3	3.4	3.6	3.8	4.3	4.4	5.1
20～40	2.7	3.0	3.2	3.3	3.4	3.8	3.9	4.4	4.5	5.3
40～60	2.9	3.1	3.3	3.4	3.4	3.8	4.0	4.5	4.6	5.5
60～80	3.0	3.3	3.5	3.5	3.6	3.8	4.1	4.7	4.8	5.7
80～100	3.0	3.4	3.6	3.7	3.7	4.0	4.2	4.9	5.0	5.9
100～120	3.1	3.4	3.7	3.7	3.7	4.1	4.3	5.0	5.1	6.1
120～140	3.0	3.5	3.7	3.8	3.8	4.2	4.4	5.2	5.3	6.4
140～160	3.2	3.5	3.8	3.9	4.0	4.4	4.6	5.3	5.4	6.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	374/347

Constants of dn/dt		
D_0	D_1	D_2
1.58E-06	1.15E-08	-2.00E-11
E_0	E_1	λ_{TK}
4.02E-07	5.35E-10	3.07E-01

H-ZLaF1	802443	n_d = 1.80166	υ_d = 44.27	$n_F - n_C$ = 0.018110
		n_e = 1.80596	υ_e = 44.05	$n_{F'} - n_{C'}$ = 0.018298

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75717
n_{1970}	1970.09	1.76442
n_{1530}	1529.58	1.77245
n_{1129}	1128.64	1.77986
n_{1064}	1064.00	1.78125
n_t	1013.98	1.78241
n_s	852.11	1.78700
$n_{A'}$	768.19	1.79021
n_r	706.52	1.79321
n_C	656.27	1.79624
$n_{C'}$	643.85	1.79710
n_{He-Ne}	632.80	1.79790
n_D	589.29	1.80150
n_d	587.56	1.80166
n_e	546.07	1.80596
n_F	486.13	1.81435
$n_{F'}$	479.99	1.81540
n_g	435.84	1.82451
n_h	404.66	1.83312
n_i	365.01	1.84826

Relative Partial Dispersion	
$P_{d,C}$	0.2993
$P_{e,d}$	0.2374
$P_{g,F}$	0.5610
$P'_{d,c'}$	0.2492
$P'_{e,d}$	0.2350
$P'_{g,F'}$	0.4979

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0025
$\triangle P_{g,F}$	-0.0091
$\triangle P_{C,t}$	0.0090
$\triangle P_{C,s}$	0.0036

Thermal Properties	
Tg (℃)	658
Ts (℃)	687
$T_{10}^{14.5}$ (℃)	596
T_{10}^{13} (℃)	627
$\alpha_{-50/80℃}$ (10^{-7}/K)	56
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	0.92

Mechanical Properties	
HK (10^7Pa)	681
F_A	75
E (GPa)	121.2
G (GPa)	45.9
μ	0.319
σ_b (MPa)	63
B (10^{-12}/Pa)	1.76

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	48
-40/-30	50
-30/-20	50
-20/-10	52
-10/0	57
0/10	54
10/20	55
20/30	59
30/40	61
40/50	58
50/60	59
60/70	61
70/80	62
80/90	62
90/100	64
100/110	62
110/120	64
120/130	68
130/140	70
140/150	71
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.803	0.645
2200	0.935	0.874
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.994
460	0.995	0.991
440	0.994	0.987
420	0.990	0.981
400	0.984	0.968
390	0.976	0.953
380	0.963	0.927
370	0.936	0.876
360	0.881	0.776
350	0.747	0.558
340	0.485	0.235
330	0.156	0.024
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	3.16628243E+00
A_1	-1.54411440E-02
A_2	2.61007358E-02
A_3	1.37123320E-03
A_4	-1.09192053E-04
A_5	7.83345535E-06

Density	
ρ (g/cm^3)	4.41

Solarization	
△λ (%)	-0.7

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.6	5.0	5.3	5.3	5.4	5.6	5.7	6.4	6.5	7.0
-40～-20	4.6	4.9	5.3	5.3	5.4	5.6	5.7	6.4	6.5	7.2
-20～0	4.7	4.9	5.3	5.3	5.4	5.7	5.8	6.5	6.5	7.4
0～20	4.7	4.9	5.3	5.4	5.4	5.8	6.0	6.6	6.6	7.4
20～40	4.8	4.9	5.4	5.5	5.5	5.8	6.1	6.7	6.7	7.5
40～60	4.8	5.0	5.5	5.6	5.7	6.0	6.3	6.8	6.9	7.7
60～80	5.0	5.2	5.7	5.8	5.9	6.3	6.5	7.0	7.1	7.9
80～100	5.0	5.4	5.9	6.0	6.1	6.4	6.6	7.2	7.2	8.1
100～120	5.0	5.5	6.1	6.2	6.3	6.6	6.8	7.3	7.4	8.2
120～140	5.1	5.6	6.2	6.4	6.4	6.7	7.0	7.4	7.5	8.4
140～160	5.1	5.6	6.3	6.5	6.6	6.9	7.2	7.5	7.6	8.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	363/334

Constants of dn/dt		
D_0	D_1	D_2
4.19E-06	1.23E-08	-1.53E-11
E_0	E_1	λ_{TK}
7.59E-07	5.64E-10	1.65E-01

H-ZLaF2	803468	n_d = 1.80279	υ_d = 46.76	$n_F - n_C$ = 0.017168
		n_e = 1.80687	υ_e = 46.52	$n_{F'} - n_{C'}$ = 0.017345

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75864
n_{1970}	1970.09	1.76610
n_{1530}	1529.58	1.77430
n_{1129}	1128.64	1.78174
n_{1064}	1064.00	1.78312
n_t	1013.98	1.78426
n_s	852.11	1.78874
$n_{A'}$	768.19	1.79184
n_r	706.52	1.79473
n_C	656.27	1.79763
$n_{C'}$	643.85	1.79845
n_{He-Ne}	632.80	1.79921
n_D	589.29	1.80264
n_d	587.56	1.80279
n_e	546.07	1.80687
n_F	486.13	1.81480
$n_{F'}$	479.99	1.81579
n_g	435.84	1.82438
n_h	404.66	1.83241
n_i	365.01	1.84644

Constants of Dispersion Formula	
A_0	3.17454812E+00
A_1	-1.59776958E-02
A_2	2.51277775E-02
A_3	1.18617161E-03
A_4	-8.90435226E-05
A_5	6.03380469E-06

Density	
ρ (g/cm^3)	4.68

Solarization	
△λ (%)	-1.1

Relative Partial Dispersion	
$P_{d,C}$	0.3006
$P_{e,d}$	0.2377
$P_{g,F}$	0.5580
$P'_{d,c'}$	0.2502
$P'_{e,d}$	0.2352
$P'_{g,F'}$	0.4952

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0025
$\triangle P_{g,F}$	-0.0079
$\triangle P_{C,t}$	0.0121
$\triangle P_{C,s}$	0.0052

Thermal Properties	
Tg (℃)	690
Ts (℃)	708
$T_{10}^{14.5}$ (℃)	612
T_{10}^{13} (℃)	648
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	0.96

Mechanical Properties	
HK (10^7Pa)	702
F_A	68
E (GPa)	123.6
G (GPa)	47.8
μ	0.292
σ_b (MPa)	95
B (10^{-12}/Pa)	1.36

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	53
-40/-30	55
-30/-20	57
-20/-10	58
-10/0	59
0/10	60
10/20	60
20/30	61
30/40	61
40/50	62
50/60	62
60/70	63
70/80	63
80/90	64
90/100	65
100/110	66
110/120	67
120/130	68
130/140	69
140/150	70
150/160	71

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.826	0.682
2200	0.959	0.920
2000	0.993	0.986
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.998	0.997
550	0.998	0.996
500	0.997	0.995
480	0.996	0.993
460	0.994	0.989
440	0.994	0.988
420	0.993	0.986
400	0.988	0.976
390	0.983	0.973
380	0.975	0.956
370	0.959	0.925
360	0.929	0.870
350	0.881	0.781
340	0.791	0.629
330	0.620	0.383
320	0.322	0.103
310	0.043	0.007
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.6	4.0	4.3	4.3	4.4	4.5	4.7	5.3	5.4	5.9
-40～-20	3.7	4.0	4.3	4.3	4.4	4.5	4.8	5.3	5.3	5.9
-20～0	3.6	4.0	4.3	4.3	4.4	4.6	4.8	5.3	5.3	6.0
0～20	3.8	4.0	4.3	4.4	4.4	4.6	4.8	5.4	5.4	5.9
20～40	3.9	4.0	4.4	4.5	4.5	4.7	5.0	5.6	5.6	6.2
40～60	4.0	4.1	4.5	4.6	4.7	4.9	5.1	5.8	5.9	6.4
60～80	4.0	4.2	4.6	4.7	4.8	5.1	5.4	6.0	6.1	6.6
80～100	4.1	4.3	4.7	4.8	4.9	5.3	5.6	6.2	6.3	6.9
100～120	4.2	4.4	4.9	5.0	5.0	5.5	5.7	6.5	6.6	6.9
120～140	4.3	4.5	5.1	5.1	5.1	5.6	5.9	6.8	6.9	7.2
140～160	4.4	4.6	5.2	5.2	5.3	5.8	6.1	7.0	7.1	7.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	350/316

Constants of dn/dt		
D_0	D_1	D_2
2.69E-06	1.08E-08	-1.22E-11
E_0	E_1	λ_{TK}
6.81E-07	9.88E-10	1.72E-01

H-ZLaF3	855366	n_d = 1.85544	υ_d = 36.59	$n_F - n_C$ = 0.023381
		n_e = 1.86099	υ_e = 36.35	$n_{F'} - n_{C'}$ = 0.023687

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.80540
n_{1970}	1970.09	1.81252
n_{1530}	1529.58	1.82064
n_{1129}	1128.64	1.82866
n_{1064}	1064.00	1.83025
n_t	1013.98	1.83159
n_s	852.11	1.83706
$n_{A'}$	768.19	1.84100
n_r	706.52	1.84474
n_C	656.27	1.84856
$n_{C'}$	643.85	1.84964
n_{He-Ne}	632.80	1.85065
n_D	589.29	1.85524
n_d	587.56	1.85544
n_e	546.07	1.86099
n_F	486.13	1.87194
$n_{F'}$	479.99	1.87333
n_g	435.84	1.88549
n_h	404.66	1.89719
n_i	365.01	1.91828

Constants of Dispersion Formula	
A_0	3.33508086E+00
A_1	-1.51809916E-02
A_2	3.47880996E-02
A_3	1.57445974E-03
A_4	-7.28030297E-05
A_5	8.73416251E-06

Density	
ρ (g/cm^3)	4.59

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2943
$P_{e,d}$	0.2374
$P_{g,F}$	0.5795
$P'_{d,c'}$	0.2449
$P'_{e,d}$	0.2343
$P'_{g,F'}$	0.5134

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0017
$\triangle P_{g,F}$	-0.0033
$\triangle P_{C,t}$	0.0084
$\triangle P_{C,s}$	0.0036

Thermal Properties	
Tg (℃)	625
Ts (℃)	653
$T_{10}^{14.5}$ (℃)	557
T_{10}^{13} (℃)	591
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	622
F_A	77
E (GPa)	114.3
G (GPa)	43.7
μ	0.308
σ_b (MPa)	58
B (10^{-12}/Pa)	1.90

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	53
-40/-30	56
-30/-20	57
-20/-10	58
-10/0	59
0/10	60
10/20	61
20/30	61
30/40	62
40/50	62
50/60	63
60/70	63
70/80	64
80/90	65
90/100	66
100/110	67
110/120	68
120/130	69
130/140	70
140/150	71
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.885	0.782
2200	0.970	0.940
2000	0.991	0.981
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.994	0.989
460	0.988	0.976
440	0.982	0.964
420	0.975	0.948
400	0.959	0.911
390	0.940	0.871
380	0.904	0.803
370	0.832	0.680
360	0.680	0.449
350	0.376	0.136
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.6	5.2	5.6	5.6	5.7	5.9	6.4	7.1	7.1	7.9
-40～-20	4.9	5.5	5.8	5.9	5.9	6.3	6.7	7.6	7.6	8.5
-20～0	5.4	5.9	6.2	6.3	6.4	6.6	7.1	8.0	8.0	9.1
0～20	5.6	6.1	6.5	6.6	6.7	7.0	7.4	8.4	8.4	9.5
20～40	5.8	6.4	6.8	6.8	6.9	7.3	7.7	8.6	8.6	9.9
40～60	5.9	6.6	7.0	7.0	7.1	7.5	7.8	8.9	8.9	10.1
60～80	6.1	6.7	7.2	7.2	7.3	7.6	8.2	9.3	9.3	10.4
80～100	6.4	6.9	7.3	7.3	7.4	7.9	8.4	9.5	9.5	10.7
100～120	6.6	7.1	7.5	7.5	7.6	8.1	8.6	9.7	9.7	10.9
120～140	6.8	7.3	7.7	7.7	7.8	8.3	8.8	9.9	9.9	11.2
140～160	6.9	7.4	7.8	7.9	8.0	8.5	9.0	10.1	10.1	11.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(390)/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	378/345

Constants of dn/dt		
D_0	D_1	D_2
5.56E-06	1.86E-08	-3.98E-11
E_0	E_1	λ_{TK}
7.03E-07	5.83E-10	2.68E-01

H-ZLaF50	804466	n_d = 1.80400	υ_d = 46.58	$n_F - n_C$ = 0.017262
		n_e = 1.80811	υ_e = 46.33	$n_{F'} - n_{C'}$ = 0.017443

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.76102
n_{1970}	1970.09	1.76802
n_{1530}	1529.58	1.77579
n_{1129}	1128.64	1.78299
n_{1064}	1064.00	1.78434
n_t	1013.98	1.78546
n_s	852.11	1.78990
$n_{A'}$	768.19	1.79302
n_r	706.52	1.79590
n_C	656.27	1.79882
$n_{C'}$	643.85	1.79964
n_{He-Ne}	632.80	1.80041
n_D	589.29	1.80385
n_d	587.56	1.80400
n_e	546.07	1.80811
n_F	486.13	1.81608
$n_{F'}$	479.99	1.81708
n_g	435.84	1.82569
n_h	404.66	1.83377
n_i	365.01	1.84783

Constants of Dispersion Formula	
A_0	3.17704600E+00
A_1	-1.49215351E-02
A_2	2.59816690E-02
A_3	1.02205007E-03
A_4	-6.86208852E-05
A_5	4.99362397E-06

Density	
ρ (g/cm^3)	4.47

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.3001
$P_{e,d}$	0.2381
$P_{g,F}$	0.5567
$P'_{d,c'}$	0.2500
$P'_{e,d}$	0.2356
$P'_{g,F'}$	0.4936

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0028
$\triangle P_{g,F}$	-0.0095
$\triangle P_{C,t}$	0.0081
$\triangle P_{C,s}$	0.0045

Thermal Properties	
Tg (℃)	688
Ts (℃)	713
$T_{10}^{14.5}$ (℃)	619
T_{10}^{13} (℃)	663
$\alpha_{-50/80℃}$ (10^{-7}/K)	61
$\alpha_{100/300℃}$ (10^{-7}/K)	76
λ (W/(m·K))	1.00

Mechanical Properties	
HK (10^7Pa)	712
F_A	65
E (GPa)	123.2
G (GPa)	46.2
μ	0.334
σ_b (MPa)	110
B (10^{-12}/Pa)	1.27

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	54
-40/-30	57
-30/-20	58
-20/-10	59
-10/0	60
0/10	61
10/20	62
20/30	63
30/40	63
40/50	64
50/60	64
60/70	64
70/80	65
80/90	66
90/100	67
100/110	68
110/120	69
120/130	70
130/140	71
140/150	72
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.834	0.705
2200	0.956	0.916
2000	0.990	0.978
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.995
480	0.996	0.993
460	0.995	0.991
440	0.993	0.986
420	0.990	0.981
400	0.987	0.973
390	0.983	0.963
380	0.974	0.948
370	0.961	0.918
360	0.931	0.869
350	0.891	0.795
340	0.818	0.676
330	0.690	0.489
320	0.460	0.223
310	0.136	0.022
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.7	4.1	4.3	4.3	4.4	4.6	4.9	5.5	5.5	6.0
-40～-20	3.7	4.1	4.3	4.4	4.5	4.6	4.9	5.5	5.6	6.0
-20～0	3.8	4.1	4.3	4.4	4.5	4.6	4.9	5.6	5.6	6.1
0～20	3.8	4.1	4.3	4.4	4.5	4.6	4.9	5.6	5.6	6.1
20～40	3.8	4.1	4.4	4.4	4.6	4.7	4.9	5.6	5.7	6.1
40～60	3.8	4.2	4.5	4.5	4.7	4.7	5.0	5.7	5.7	6.3
60～80	3.9	4.3	4.6	4.7	4.8	4.9	5.2	5.7	5.8	6.5
80～100	3.9	4.4	4.7	4.7	4.9	5.0	5.3	5.8	6.0	6.7
100～120	3.9	4.5	4.8	4.8	4.9	5.1	5.5	6.0	6.2	6.8
120～140	4.0	4.7	4.8	4.9	5.0	5.2	5.6	6.1	6.2	6.8
140～160	4.1	4.7	4.9	4.9	5.0	5.3	5.7	6.2	6.3	7.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/315
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	351/312

Constants of dn/dt		
D_0	D_1	D_2
2.88E-06	1.10E-08	-1.72E-11
E_0	E_1	λ_{TK}
5.90E-07	3.72E-10	2.17E-01

H-ZLaF51	805396	n_d = 1.80450	υ_d = 39.64	$n_F - n_C$ = 0.020298
		n_e = 1.80932	υ_e = 39.39	$n_{F'} - n_{C'}$ = 0.020549

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75651
n_{1970}	1970.09	1.76414
n_{1530}	1529.58	1.77262
n_{1129}	1128.64	1.78054
n_{1064}	1064.00	1.78205
n_t	1013.98	1.78330
n_s	852.11	1.78830
$n_{A'}$	768.19	1.79183
n_r	706.52	1.79513
n_C	656.27	1.79849
$n_{C'}$	643.85	1.79943
n_{He-Ne}	632.80	1.80032
n_D	589.29	1.80432
n_d	587.56	1.80450
n_e	546.07	1.80932
n_F	486.13	1.81879
$n_{F'}$	479.99	1.81998
n_g	435.84	1.83042
n_h	404.66	1.84042
n_i	365.01	1.85838

Constants of Dispersion Formula	
A_0	3.16743537E+00
A_1	-1.61763813E-02
A_2	2.88108896E-02
A_3	1.51509661E-03
A_4	-1.00494023E-04
A_5	9.19692892E-06

Density	
ρ (g/cm^3)	4.26

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2961
$P_{e,d}$	0.2375
$P_{g,F}$	0.5730
$P'_{d,c'}$	0.2467
$P'_{e,d}$	0.2346
$P'_{g,F'}$	0.5081

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0018
$\triangle P_{g,F}$	-0.0048
$\triangle P_{C,t}$	0.0162
$\triangle P_{C,s}$	0.0065

Thermal Properties	
Tg (℃)	597
Ts (℃)	630
$T_{10}^{14.5}$ (℃)	533
T_{10}^{13} (℃)	568
$\alpha_{-50/80℃}$ (10^{-7}/K)	55
$\alpha_{100/300℃}$ (10^{-7}/K)	70
λ (W/(m·K))	0.92

Mechanical Properties	
HK (10^7Pa)	664
F_A	76
E (GPa)	121.8
G (GPa)	45.7
μ	0.332
σ_b (MPa)	69
B (10^{-12}/Pa)	1.99

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	48
-40/-30	51
-30/-20	52
-20/-10	54
-10/0	54
0/10	55
10/20	56
20/30	57
30/40	57
40/50	58
50/60	58
60/70	58
70/80	59
80/90	59
90/100	60
100/110	61
110/120	62
120/130	63
130/140	64
140/150	66
150/160	67

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.825	0.681
2200	0.950	0.903
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.997	0.993
480	0.995	0.989
460	0.992	0.984
440	0.988	0.977
420	0.981	0.963
400	0.966	0.933
390	0.948	0.899
380	0.913	0.833
370	0.838	0.702
360	0.668	0.446
350	0.358	0.128
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	5.7	6.2	6.5	6.6	6.6	6.8	7.0	7.7	7.8	8.5
-40～-20	6.1	6.5	6.8	6.9	6.9	7.1	7.5	8.3	8.4	9.1
-20～0	6.5	6.9	7.1	7.2	7.2	7.5	7.9	8.9	9.0	10.0
0～20	6.9	7.3	7.5	7.5	7.6	8.0	8.3	9.4	9.5	10.5
20～40	7.0	7.5	7.9	7.9	7.9	8.3	8.7	9.6	9.7	10.6
40～60	7.2	7.9	8.2	8.2	8.2	8.6	9.1	9.9	10.0	11.0
60～80	7.5	8.2	8.5	8.5	8.5	9.0	9.4	10.2	10.3	11.5
80～100	7.7	8.5	8.8	8.8	8.8	9.2	9.8	10.6	10.7	11.7
100～120	7.9	8.7	9.0	9.0	9.1	9.4	10.0	10.9	11.0	12.0
120～140	8.2	8.9	9.3	9.3	9.4	9.7	10.3	11.2	11.3	12.4
140～160	8.4	9.1	9.6	9.6	9.7	10.0	10.6	11.6	11.7	12.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	410/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	378/347

Constants of dn/dt		
D_0	D_1	D_2
7.94E-06	2.19E-08	-3.80E-11
E_0	E_1	λ_{TK}
6.45E-07	6.29E-10	2.72E-01

H-ZLaF52	806410	n_d = 1.80610	υ_d = 40.95	$n_F - n_C$ = 0.019686
		n_e = 1.81077	υ_e = 40.69	$n_{F'} - n_{C'}$ = 0.019924

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75948
n_{1970}	1970.09	1.76685
n_{1530}	1529.58	1.77506
n_{1129}	1128.64	1.78274
n_{1064}	1064.00	1.78421
n_t	1013.98	1.78543
n_s	852.11	1.79030
$n_{A'}$	768.19	1.79376
n_r	706.52	1.79699
n_C	656.27	1.80025
$n_{C'}$	643.85	1.80117
n_{He-Ne}	632.80	1.80204
n_D	589.29	1.80592
n_d	587.56	1.80610
n_e	546.07	1.81077
n_F	486.13	1.81994
$n_{F'}$	479.99	1.82110
n_g	435.84	1.83112
n_h	404.66	1.84069
n_i	365.01	1.85767

Relative Partial Dispersion	
$P_{d,C}$	0.2972
$P_{e,d}$	0.2372
$P_{g,F}$	0.5679
$P'_{d,c'}$	0.2474
$P'_{e,d}$	0.2344
$P'_{g,F'}$	0.5029

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0018
$\triangle P_{g,F}$	-0.0077
$\triangle P_{C,t}$	0.0143
$\triangle P_{C,s}$	0.0068

Thermal Properties	
Tg (℃)	637
Ts (℃)	663
$T_{10}^{14.5}$ (℃)	590
T_{10}^{13} (℃)	613
$\alpha_{-50/80℃}$ (10^{-7}/K)	54
$\alpha_{100/300℃}$ (10^{-7}/K)	64
λ (W/(m·K))	0.90

Mechanical Properties	
HK (10^7Pa)	651
F_A	76
E (GPa)	113.9
G (GPa)	43.7
μ	0.303
σ_b (MPa)	92
B (10^{-12}/Pa)	1.80

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	47
-40/-30	50
-30/-20	51
-20/-10	52
-10/0	53
0/10	54
10/20	54
20/30	55
30/40	56
40/50	56
50/60	56
60/70	57
70/80	57
80/90	58
90/100	58
100/110	59
110/120	60
120/130	60
130/140	61
140/150	62
150/160	62

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.800	0.640
2200	0.930	0.865
2000	0.992	0.984
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.995
460	0.995	0.992
440	0.992	0.985
420	0.986	0.976
400	0.981	0.953
390	0.975	0.928
380	0.953	0.885
370	0.910	0.804
360	0.817	0.644
350	0.616	0.364
340	0.270	0.071
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	3.17490239E+00
A_1	-1.56120621E-02
A_2	2.84801080E-02
A_3	1.38932793E-03
A_4	-9.12625910E-05
A_5	7.77598184E-06

Density	
ρ (g/cm^3)	4.35

Solarization	
△λ (%)	-0.5

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	5.1	5.5	5.7	5.8	5.9	6.0	6.3	7.1	7.3	7.8
-40～-20	5.1	5.7	5.8	5.9	5.9	6.1	6.5	7.2	7.3	8.0
-20～0	5.1	5.8	5.9	6.0	6.0	6.2	6.5	7.3	7.4	8.1
0～20	5.2	5.9	5.9	6.0	6.1	6.3	6.6	7.3	7.4	8.1
20～40	5.3	6.0	6.0	6.1	6.2	6.4	6.7	7.4	7.5	8.2
40～60	5.3	6.0	6.1	6.2	6.3	6.5	6.9	7.5	7.6	8.4
60～80	5.4	6.1	6.2	6.3	6.4	6.7	7.0	7.7	7.8	8.7
80～100	5.6	6.2	6.3	6.4	6.6	6.9	7.3	8.0	8.0	8.9
100～120	5.7	6.3	6.5	6.5	6.7	7.1	7.5	8.2	8.2	9.2
120～140	5.8	6.4	6.6	6.7	6.9	7.2	7.6	8.4	8.4	9.4
140～160	6.0	6.6	6.8	6.9	7.1	7.4	7.8	8.6	8.7	9.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	368/339

Constants of dn/dt		
D_0	D_1	D_2
5.38E-06	1.23E-08	-1.43E-11
E_0	E_1	λ_{TK}
5.75E-07	4.96E-10	2.63E-01

H-ZLaF53	834373	n_d = 1.83400	υ_d = 37.34	$n_F - n_C$ = 0.022333
		n_e = 1.83930	υ_e = 37.09	$n_{F'} - n_{C'}$ = 0.022629

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.78596
n_{1970}	1970.09	1.79278
n_{1530}	1529.58	1.80056
n_{1129}	1128.64	1.80829
n_{1064}	1064.00	1.80983
n_t	1013.98	1.81113
n_s	852.11	1.81639
$n_{A'}$	768.19	1.82019
n_r	706.52	1.82376
n_C	656.27	1.82742
$n_{C'}$	643.85	1.82845
n_{He-Ne}	632.80	1.82942
n_D	589.29	1.83381
n_d	587.56	1.83400
n_e	546.07	1.83930
n_F	486.13	1.84975
$n_{F'}$	479.99	1.85108
n_g	435.84	1.86275
n_h	404.66	1.87398
n_i	365.01	1.89424

Constants of Dispersion Formula	
A_0	3.26066843E+00
A_1	-1.43061602E-02
A_2	3.42503276E-02
A_3	9.45194718E-04
A_4	1.66625589E-05
A_5	3.78744906E-06

Density	
ρ (g/cm^3)	4.56

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2946
$P_{e,d}$	0.2373
$P_{g,F}$	0.5821
$P'_{d,c'}$	0.2453
$P'_{e,d}$	0.2342
$P'_{g,F'}$	0.5157

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0017
$\triangle P_{g,F}$	0.0005
$\triangle P_{C,t}$	0.0084
$\triangle P_{C,s}$	0.0039

Thermal Properties	
Tg (℃)	596
Ts (℃)	626
$T_{10}^{14.5}$ (℃)	535
T_{10}^{13} (℃)	573
$\alpha_{-50/80℃}$ (10^{-7}/K)	54
$\alpha_{100/300℃}$ (10^{-7}/K)	69
λ (W/(m·K))	0.99

Mechanical Properties	
HK (10^7Pa)	631
F_A	80
E (GPa)	110.9
G (GPa)	41.6
μ	0.335
σ_b (MPa)	72
B (10^{-12}/Pa)	2.07

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	48
-40/-30	50
-30/-20	51
-20/-10	53
-10/0	54
0/10	54
10/20	55
20/30	56
30/40	56
40/50	57
50/60	57
60/70	57
70/80	58
80/90	58
90/100	59
100/110	60
110/120	61
120/130	62
130/140	63
140/150	64
150/160	65

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.828	0.685
2200	0.932	0.864
2000	0.967	0.933
1800	0.983	0.962
1600	0.992	0.980
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.996
650	0.999	0.995
600	0.999	0.995
550	0.999	0.994
500	0.997	0.989
480	0.994	0.984
460	0.991	0.977
440	0.986	0.967
420	0.983	0.952
400	0.964	0.913
390	0.942	0.871
380	0.901	0.792
370	0.809	0.633
360	0.605	0.343
350	0.250	0.057
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	7.6	8.0	8.4	8.5	8.6	8.9	9.3	10.0	10.1	11.1
-40～-20	7.6	8.1	8.5	8.6	8.7	9.0	9.4	10.2	10.3	11.3
-20～0	7.6	8.2	8.6	8.7	8.8	9.1	9.5	10.5	10.5	11.5
0～20	7.6	8.3	8.7	8.8	8.8	9.2	9.6	10.7	10.7	11.7
20～40	7.7	8.4	8.8	8.9	8.9	9.4	9.7	10.8	10.8	11.9
40～60	7.8	8.6	9.0	9.0	9.1	9.6	9.9	11.0	11.0	12.0
60～80	7.9	8.7	9.1	9.2	9.3	9.7	10.2	11.3	11.3	12.5
80～100	8.1	8.9	9.3	9.3	9.5	9.9	10.4	11.5	11.6	12.8
100～120	8.3	9.0	9.4	9.4	9.6	10.1	10.6	11.7	11.7	13.1
120～140	8.5	9.1	9.5	9.5	9.7	10.2	10.8	11.8	11.8	13.2
140～160	8.6	9.2	9.6	9.6	9.8	10.3	10.9	11.9	12.0	13.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	425/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	380/350

Constants of dn/dt		
D_0	D_1	D_2
9.00E-06	1.29E-08	-2.11E-11
E_0	E_1	λ_{TK}
7.75E-07	7.39E-10	2.56E-01

H-ZLaF54	816466	n_d = 1.81600	υ_d = 46.55	$n_F - n_C$ = 0.017528
		n_e = 1.82017	υ_e = 46.33	$n_{F'} - n_{C'}$ = 0.017704

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.77344
n_{1970}	1970.09	1.78023
n_{1530}	1529.58	1.78779
n_{1129}	1128.64	1.79484
n_{1064}	1064.00	1.79618
n_t	1013.98	1.79729
n_s	852.11	1.80174
$n_{A'}$	768.19	1.80487
n_r	706.52	1.80780
n_C	656.27	1.81074
$n_{C'}$	643.85	1.81157
n_{He-Ne}	632.80	1.81235
n_D	589.29	1.81584
n_d	587.56	1.81600
n_e	546.07	1.82017
n_F	486.13	1.82827
$n_{F'}$	479.99	1.82928
n_g	435.84	1.83800
n_h	404.66	1.84618
n_i	365.01	1.86037

Constants of Dispersion Formula	
A_0	3.21873957E+00
A_1	-1.45164245E-02
A_2	2.60917155E-02
A_3	1.26701532E-03
A_4	-1.06020539E-04
A_5	6.86627719E-06

Density	
ρ (g/cm^3)	5.04

Solarization	
△λ (%)	-3.9

Relative Partial Dispersion	
$P_{d,C}$	0.3001
$P_{e,d}$	0.2379
$P_{g,F}$	0.5551
$P'_{d,c'}$	0.2502
$P'_{e,d}$	0.2355
$P'_{g,F'}$	0.4925

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0024
$\triangle P_{g,F}$	-0.0112
$\triangle P_{C,t}$	0.0017
$\triangle P_{C,s}$	0.0013

Thermal Properties	
Tg (℃)	715
Ts (℃)	740
$T_{10}^{14.5}$ (℃)	643
T_{10}^{13} (℃)	662
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	0.84

Mechanical Properties	
HK (10^7Pa)	702
F_A	64
E (GPa)	126.0
G (GPa)	47.4
μ	0.330
σ_b (MPa)	86
B (10^{-12}/Pa)	1.23

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	54
-40/-30	57
-30/-20	59
-20/-10	60
-10/0	61
0/10	62
10/20	63
20/30	64
30/40	64
40/50	64
50/60	65
60/70	66
70/80	66
80/90	67
90/100	68
100/110	69
110/120	70
120/130	71
130/140	72
140/150	73
150/160	74

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.888	0.789
2200	0.980	0.960
2000	0.992	0.984
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.994
420	0.995	0.991
400	0.983	0.966
390	0.980	0.960
380	0.975	0.949
370	0.970	0.942
360	0.959	0.919
350	0.940	0.885
340	0.914	0.835
330	0.876	0.768
320	0.815	0.663
310	0.597	0.357
300	0.585	0.343
290	0.438	0.192
280	0.212	0.045

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.9	4.3	4.5	4.5	4.6	4.8	5.1	5.7	5.7	6.2
-40～-20	3.9	4.2	4.4	4.5	4.7	4.9	5.2	5.7	5.7	6.2
-20～0	3.9	4.3	4.6	4.6	4.7	4.9	5.2	5.7	5.8	6.4
0～20	3.9	4.4	4.6	4.6	4.7	5.0	5.3	5.7	5.8	6.5
20～40	3.9	4.5	4.7	4.7	4.8	5.0	5.3	5.8	6.0	6.5
40～60	4.0	4.5	4.8	4.8	4.9	5.2	5.4	6.0	6.1	6.7
60～80	4.1	4.6	4.9	4.9	5.0	5.2	5.5	6.2	6.3	7.0
80～100	4.2	4.7	5.0	5.0	5.1	5.4	5.5	6.3	6.4	7.2
100～120	4.4	4.9	5.1	5.1	5.2	5.5	5.7	6.5	6.5	7.3
120～140	4.5	5.0	5.2	5.2	5.3	5.7	5.9	6.6	6.7	7.6
140～160	4.6	5.1	5.3	5.3	5.5	5.8	6.0	6.8	6.9	7.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	334/281

Constants of dn/dt		
D_0	D_1	D_2
3.23E-06	1.15E-08	-1.53E-11
E_0	E_1	λ_{TK}
5.49E-07	4.69E-10	2.46E-01

H-ZLaF54A	816466

n_d = 1.81600	υ_d = 46.55	$n_F - n_C$ = 0.017528
n_e = 1.82017	υ_e = 46.33	$n_{F'} - n_{C'}$ = 0.017704

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.79487
n_{1064}	1064.00	1.79619
n_t	1013.98	1.79731
n_s	852.11	1.80175
$n_{A'}$	768.19	1.80488
n_r	706.52	1.80779
n_C	656.27	1.81074
$n_{C'}$	643.85	1.81158
n_{He-Ne}	632.80	1.81235
n_D	589.29	1.81585
n_d	587.56	1.81600
n_e	546.07	1.82017
n_F	486.13	1.82827
$n_{F'}$	479.99	1.82929
n_g	435.84	1.83804
n_h	404.66	1.84625
n_i	365.01	1.86049

Constants of Dispersion Formula	
A_0	3.21683817E+00
A_1	-1.36724876E-02
A_2	2.76347913E-02
A_3	7.16568289E-04
A_4	-1.97668563E-05
A_5	2.19878744E-06

Density	
ρ (g/cm^3)	4.99

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.3001
$P_{e,d}$	0.2379
$P_{g,F}$	0.5574
$P'_{d,c'}$	0.2497
$P'_{e,d}$	0.2355
$P'_{g,F'}$	0.4942

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0024
$\triangle P_{g,F}$	-0.0089
$\triangle P_{C,t}$	0.0005
$\triangle P_{C,s}$	0.0008

Thermal Properties	
Tg (℃)	718
Ts (℃)	744
$T_{10}^{14.5}$ (℃)	646
T_{10}^{13} (℃)	666
$\alpha_{-50/80℃}$ (10^{-7}/K)	61
$\alpha_{100/300℃}$ (10^{-7}/K)	76
λ (W/(m·K))	0.83

Mechanical Properties	
HK (10^7Pa)	693
F_A	71
E (GPa)	123.0
G (GPa)	47.4
μ	0.298
σ_b (MPa)	
B (10^{-12}/Pa)	1.12

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	57
-40/-30	58
-30/-20	60
-20/-10	61
-10/0	62
0/10	63
10/20	63
20/30	63
30/40	63
40/50	64
50/60	64
60/70	67
70/80	67
80/90	69
90/100	69
100/110	69
110/120	70
120/130	70
130/140	73
140/150	74
150/160	75

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.867	0.751
2200	0.965	0.931
2000	0.986	0.972
1800	0.996	0.992
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.997
480	0.997	0.995
460	0.996	0.992
440	0.994	0.988
420	0.991	0.982
400	0.985	0.971
390	0.980	0.961
380	0.971	0.942
370	0.953	0.908
360	0.920	0.846
350	0.847	0.718
340	0.701	0.491
330	0.432	0.186
320	0.137	0.019
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	2.1	2.4	2.8	3.0	3.1	3.3	3.6	3.9	4.0	4.5
-40 ~ -20	2.2	2.4	2.8	3.1	3.2	3.5	3.8	4.0	4.1	4.7
-20 ~ 0	2.2	2.4	2.9	3.1	3.3	3.6	3.9	4.1	4.2	5.0
0 ~ 20	2.3	2.5	3.0	3.2	3.4	3.8	4.1	4.2	4.4	5.1
20 ~ 40	2.3	2.6	3.1	3.3	3.5	4.0	4.2	4.4	4.6	5.3
40 ~ 60	2.4	2.8	3.3	3.5	3.7	4.2	4.4	4.6	4.7	5.6
60 ~ 80	2.4	2.9	3.4	3.6	3.9	4.4	4.6	4.8	4.9	5.8
80 ~ 100	2.4	3.0	3.6	3.8	4.1	4.6	4.7	5.0	5.1	6.0
100 ~ 120	2.6	3.2	3.8	4.0	4.2	4.8	4.9	5.2	5.3	6.3
120 ~ 140	2.8	3.3	4.1	4.2	4.4	5.0	5.1	5.4	5.5	6.6
140 ~ 160	2.9	3.4	4.3	4.4	4.5	5.1	5.3	5.5	5.7	6.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	385/325
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	355/322

Constants of dn/dt		
D_0	D_1	D_2
1.25E-07	1.24E-08	-1.76E-11
E_0	E_1	λ_{TK}
9.91E-07	1.10E-09	6.42E-09

H-ZLaF55F	835427	n_d = 1.83481	υ_d = 42.72	$n_F - n_C$ = 0.019541
		n_e = 1.83944	υ_e = 42.49	$n_{F'} - n_{C'}$ = 0.019757

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.79048
n_{1970}	1970.09	1.79707
n_{1530}	1529.58	1.80452
n_{1129}	1128.64	1.81175
n_{1064}	1064.00	1.81316
n_t	1013.98	1.81435
n_s	852.11	1.81912
$n_{A'}$	768.19	1.82253
n_r	706.52	1.82573
n_C	656.27	1.82897
$n_{C'}$	643.85	1.82989
n_{He-Ne}	632.80	1.83076
n_D	589.29	1.83463
n_d	587.56	1.83481
n_e	546.07	1.83944
n_F	486.13	1.84851
$n_{F'}$	479.99	1.84965
n_g	435.84	1.85955
n_h	404.66	1.86893
n_i	365.01	1.88543

Constants of Dispersion Formula	
A_0	3.27602602E+00
A_1	-1.40174355E-02
A_2	3.01024097E-02
A_3	1.06953465E-03
A_4	-5.08713944E-05
A_5	5.04484426E-06

Density	
ρ (g/cm^3)	4.66

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2989
$P_{e,d}$	0.2369
$P_{g,F}$	0.5650
$P'_{d,c'}$	0.2490
$P'_{e,d}$	0.2343
$P'_{g,F'}$	0.5011

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0025
$\triangle P_{g,F}$	-0.0077
$\triangle P_{C,t}$	0.0010
$\triangle P_{C,s}$	0.0011

Thermal Properties	
Tg (℃)	711
Ts (℃)	739
$T_{10}^{14.5}$ (℃)	640
T_{10}^{13} (℃)	687
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	84
λ (W/(m·K))	0.88

Mechanical Properties	
HK (10^7Pa)	679
F_A	69
E (GPa)	121.8
G (GPa)	45.1
μ	0.349
σ_b (MPa)	69
B (10^{-12}/Pa)	1.23

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	60
-40/-30	62
-30/-20	64
-20/-10	65
-10/0	66
0/10	67
10/20	68
20/30	69
30/40	70
40/50	71
50/60	71
60/70	72
70/80	72
80/90	73
90/100	74
100/110	75
110/120	76
120/130	77
130/140	79
140/150	80
150/160	81

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.903	0.808
2200	0.979	0.954
2000	0.993	0.985
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.997	0.994
460	0.995	0.990
440	0.992	0.984
420	0.987	0.974
400	0.978	0.957
390	0.969	0.939
380	0.956	0.913
370	0.934	0.866
360	0.897	0.801
350	0.829	0.681
340	0.726	0.522
330	0.544	0.290
320	0.250	0.065
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.8	3.2	3.6	3.6	3.6	3.8	4.2	4.9	5.0	5.4
-40～-20	2.8	3.3	3.6	3.6	3.7	3.8	4.2	4.9	5.0	5.5
-20～0	2.8	3.3	3.6	3.7	3.7	3.9	4.3	4.9	5.0	5.5
0～20	2.7	3.3	3.7	3.7	3.7	3.9	4.3	5.0	5.0	5.6
20～40	2.7	3.2	3.7	3.7	3.7	3.9	4.3	5.0	5.0	5.6
40～60	2.7	3.3	3.7	3.7	3.7	3.9	4.3	5.0	5.1	5.7
60～80	2.8	3.4	3.7	3.7	3.8	4.0	4.4	5.2	5.2	6.0
80～100	2.8	3.4	3.7	3.7	3.8	4.1	4.4	5.2	5.2	6.1
100～120	3.0	3.5	3.8	3.8	4.0	4.2	4.5	5.3	5.3	6.2
120～140	3.1	3.6	3.9	4.0	4.1	4.3	4.6	5.5	5.5	6.3
140～160	3.3	3.7	4.0	4.1	4.2	4.4	4.7	5.7	5.7	6.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	395/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	359/320

Constants of dn/dt		
D_0	D_1	D_2
1.12E-06	9.87E-09	-1.49E-11
E_0	E_1	λ_{TK}
6.99E-07	4.22E-10	2.11E-01

H-ZLaF56	806333	n_d = 1.80610	υ_d = 33.27	$n_F - n_C$ = 0.024229
		n_e = 1.81184	υ_e = 33.03	$n_{F'} - n_{C'}$ = 0.024579

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75788
n_{1970}	1970.09	1.76418
n_{1530}	1529.58	1.77151
n_{1129}	1128.64	1.77906
n_{1064}	1064.00	1.78060
n_t	1013.98	1.78192
n_s	852.11	1.78735
$n_{A'}$	768.19	1.79134
n_r	706.52	1.79512
n_C	656.27	1.79902
$n_{C'}$	643.85	1.80013
n_{He-Ne}	632.80	1.80117
n_D	589.29	1.80589
n_d	587.56	1.80610
n_e	546.07	1.81184
n_F	486.13	1.82325
$n_{F'}$	479.99	1.82471
n_g	435.84	1.83760
n_h	404.66	1.85020
n_i	365.01	1.87341

Constants of Dispersion Formula	
A_0	3.15298545E+00
A_1	-1.28281407E-02
A_2	3.50678569E-02
A_3	1.45594413E-03
A_4	-4.44157215E-05
A_5	1.00656359E-05

Density	
ρ (g/cm^3)	3.56

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2922
$P_{e,d}$	0.2369
$P_{g,F}$	0.5923
$P'_{d,c'}$	0.2429
$P'_{e,d}$	0.2335
$P'_{g,F'}$	0.5244

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0009
$\triangle P_{g,F}$	0.0039
$\triangle P_{C,t}$	0.0044
$\triangle P_{C,s}$	0.0014

Thermal Properties	
Tg (℃)	650
Ts (℃)	695
$T_{10}^{14.5}$ (℃)	582
T_{10}^{13} (℃)	614
$\alpha_{-50/80℃}$ (10^{-7}/K)	71
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	1.27

Mechanical Properties	
HK (10^7Pa)	617
F_A	133
E (GPa)	119.0
G (GPa)	46.0
μ	0.295
σ_b (MPa)	82
B (10^{-12}/Pa)	1.83

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	63
-40/-30	66
-30/-20	68
-20/-10	69
-10/0	70
0/10	71
10/20	72
20/30	73
30/40	74
40/50	74
50/60	75
60/70	76
70/80	76
80/90	78
90/100	79
100/110	80
110/120	81
120/130	82
130/140	83
140/150	84
150/160	86

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.963	0.930
2200	0.986	0.977
2000	0.998	0.996
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.996	0.991
500	0.991	0.990
480	0.989	0.986
460	0.986	0.980
440	0.981	0.971
420	0.972	0.942
400	0.951	0.900
390	0.925	0.851
380	0.876	0.759
370	0.755	0.559
360	0.474	0.216
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.6	4.0	4.4	4.5	4.6	4.9	5.3	6.2	6.3	7.4
-40～-20	3.7	4.0	4.4	4.5	4.6	4.9	5.3	6.3	6.3	7.4
-20～0	3.8	4.1	4.5	4.6	4.7	5.0	5.4	6.3	6.4	7.5
0～20	3.8	4.1	4.6	4.6	4.7	5.0	5.4	6.4	6.4	7.5
20～40	3.8	4.2	4.7	4.7	4.8	5.0	5.5	6.5	6.5	7.7
40～60	3.8	4.2	4.8	4.8	4.8	5.2	5.7	6.7	6.7	7.9
60～80	3.8	4.3	4.8	4.9	5.0	5.4	5.9	6.9	7.1	8.3
80～100	3.8	4.4	4.9	5.0	5.1	5.6	6.1	7.2	7.3	8.5
100～120	3.8	4.5	5.0	5.1	5.3	5.8	6.3	7.4	7.5	8.7
120～140	3.9	4.6	5.1	5.3	5.4	5.9	6.4	7.6	7.6	8.8
140～160	3.9	4.7	5.3	5.4	5.5	6.1	6.6	7.7	7.7	9.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	430/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	383/354

Constants of dn/dt		
D_0	D_1	D_2
2.40E-06	1.05E-08	-1.57E-11
E_0	E_1	λ_{TK}
8.61E-07	8.63E-10	2.53E-01

H-ZLaF56B	806333	n_d = 1.80610	υ_d = 33.27	$n_F - n_C$ = 0.024229
		n_e = 1.81184	υ_e = 33.03	$n_{F'} - n_{C'}$ = 0.024579

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75720
n_{1970}	1970.09	1.76373
n_{1530}	1529.58	1.77128
n_{1129}	1128.64	1.77899
n_{1064}	1064.00	1.78055
n_t	1013.98	1.78188
n_s	852.11	1.78735
$n_{A'}$	768.19	1.79134
n_r	706.52	1.79513
n_C	656.27	1.79902
$n_{C'}$	643.85	1.80013
n_{He-Ne}	632.80	1.80117
n_D	589.29	1.80589
n_d	587.56	1.80610
n_e	546.07	1.81184
n_F	486.13	1.82325
$n_{F'}$	479.99	1.82471
n_g	435.84	1.83761
n_h	404.66	1.85023
n_i	365.01	1.87349

Constants of Dispersion Formula	
A_0	3.15342504E+00
A_1	-1.33526633E-02
A_2	3.50785430E-02
A_3	1.38157034E-03
A_4	-2.77539295E-05
A_5	9.11774978E-06

Density	
ρ (g/cm^3)	3.75

Solarization	
△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2922
$P_{e,d}$	0.2369
$P_{g,F}$	0.5927
$P'_{d,c'}$	0.2429
$P'_{e,d}$	0.2335
$P'_{g,F'}$	0.5248

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0009
$\triangle P_{g,F}$	0.0043
$\triangle P_{C,t}$	0.0061
$\triangle P_{C,s}$	0.0014

Thermal Properties	
Tg (℃)	669
Ts (℃)	705
$T_{10}^{14.5}$ (℃)	601
T_{10}^{13} (℃)	633
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	1.07

Mechanical Properties	
HK (10^7Pa)	624
F_A	119
E (GPa)	109.5
G (GPa)	41.4
μ	0.322
σ_b (MPa)	117
B (10^{-12}/Pa)	1.57

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	66
-40/-30	70
-30/-20	71
-20/-10	71
-10/0	72
0/10	73
10/20	74
20/30	74
30/40	75
40/50	76
50/60	76
60/70	77
70/80	77
80/90	78
90/100	78
100/110	80
110/120	81
120/130	82
130/140	83
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.931	0.867
2200	0.980	0.959
2000	0.992	0.984
1800	0.996	0.993
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.996	0.994
500	0.993	0.986
480	0.990	0.981
460	0.986	0.973
440	0.981	0.962
420	0.970	0.940
400	0.944	0.890
390	0.915	0.836
380	0.853	0.725
370	0.692	0.478
360	0.370	0.138
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.8	4.2	4.7	4.8	4.9	5.1	5.4	6.3	6.4	6.8
-40～-20	3.8	4.3	4.8	4.9	4.9	5.2	5.5	6.5	6.6	6.8
-20～0	3.8	4.5	4.9	5.0	5.1	5.3	5.7	6.5	6.6	6.9
0～20	3.8	4.6	4.9	5.0	5.1	5.4	5.9	6.7	6.8	7.1
20～40	3.8	4.6	5.0	5.1	5.2	5.6	6.0	6.9	6.9	7.4
40～60	3.9	4.8	5.2	5.2	5.3	5.7	6.3	6.9	7.0	7.7
60～80	3.9	4.8	5.4	5.4	5.5	5.9	6.5	6.9	7.1	7.8
80～100	3.9	4.9	5.5	5.6	5.7	6.1	6.6	7.2	7.3	8.1
100～120	4.0	5.1	5.7	5.8	5.9	6.2	6.8	7.5	7.5	8.3
120～140	4.0	5.2	5.8	5.8	6.0	6.3	6.8	7.6	7.6	8.5
140～160	4.0	5.3	5.9	5.9	6.0	6.3	6.9	7.7	7.8	8.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	420/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	386/355

Constants of dn/dt		
D_0	D_1	D_2
2.71E-06	1.16E-08	-2.20E-11
E_0	E_1	λ_{TK}
1.17E-06	1.13E-09	3.91E-09

H-ZLaF57	800298	n_d = 1.80000	υ_d = 29.84	$n_F - n_C$ = 0.026806
		n_e = 1.80633	υ_e = 29.62	$n_{F'} - n_{C'}$ = 0.027224

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.74747
n_{1970}	1970.09	1.75431
n_{1530}	1529.58	1.76226
n_{1129}	1128.64	1.77044
n_{1064}	1064.00	1.77212
n_t	1013.98	1.77354
n_s	852.11	1.77945
$n_{A'}$	768.19	1.78380
n_r	706.52	1.78795
n_C	656.27	1.79223
$n_{C'}$	643.85	1.79344
n_{He-Ne}	632.80	1.79459
n_D	589.29	1.79977
n_d	587.56	1.80000
n_e	546.07	1.80633
n_F	486.13	1.81903
$n_{F'}$	479.99	1.82067
n_g	435.84	1.83511
n_h	404.66	1.84939
n_i	365.01	1.87619

Constants of Dispersion Formula	
A_0	3.12168528E+00
A_1	-1.38673767E-02
A_2	3.73009678E-02
A_3	1.94247273E-03
A_4	-9.80256201E-05
A_5	1.64841569E-05

Density		Solarization	
ρ (g/cm^3)	3.73	△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2899
$P_{e,d}$	0.2361
$P_{g,F}$	0.5999
$P'_{d,c'}$	0.2410
$P'_{e,d}$	0.2325
$P'_{g,F'}$	0.5304

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	0.0058
$\triangle P_{C,t}$	0.0125
$\triangle P_{C,s}$	0.0047

Thermal Properties	
Tg (℃)	623
Ts (℃)	658
$T_{10}^{14.5}$ (℃)	547
T_{10}^{13} (℃)	592
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	1.19

Mechanical Properties	
HK (10^7Pa)	543
F_A	167
E (GPa)	100.6
G (GPa)	39.0
μ	0.290
σ_b (MPa)	83
B (10^{-12}/Pa)	2.52

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	65
-40/-30	68
-30/-20	70
-20/-10	71
-10/0	72
0/10	73
10/20	74
20/30	75
30/40	75
40/50	76
50/60	77
60/70	77
70/80	78
80/90	78
90/100	79
100/110	80
110/120	81
120/130	82
130/140	83
140/150	84
150/160	84

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.945	0.893
2200	0.983	0.966
2000	0.996	0.992
1800	0.996	0.992
1600	0.996	0.992
1400	0.996	0.992
1200	0.996	0.992
1060	0.996	0.992
1000	0.996	0.992
950	0.996	0.992
900	0.996	0.992
850	0.996	0.992
800	0.996	0.992
750	0.996	0.992
700	0.996	0.992
650	0.996	0.992
600	0.996	0.988
550	0.993	0.983
500	0.984	0.970
480	0.981	0.964
460	0.977	0.957
440	0.972	0.946
420	0.964	0.927
400	0.939	0.880
390	0.910	0.826
380	0.848	0.716
370	0.694	0.475
360	0.347	0.117
350	0.042	0.013
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.8	2.4	2.8	2.8	2.9	3.2	3.6	4.5	4.6	5.8
-40～-20	1.9	2.5	2.8	2.9	2.9	3.3	3.7	4.6	4.7	6.0
-20～0	1.8	2.5	2.9	2.9	3.0	3.3	3.9	4.7	4.8	6.2
0～20	1.8	2.6	2.9	3.0	3.0	3.4	4.0	4.9	5.0	6.2
20～40	1.9	2.6	3.0	3.1	3.1	3.4	4.0	5.2	5.2	6.6
40～60	2.0	2.8	3.2	3.2	3.2	3.6	4.2	5.4	5.4	6.9
60～80	2.1	2.9	3.3	3.4	3.4	3.7	4.4	5.6	5.6	7.2
80～100	2.2	3.1	3.5	3.5	3.5	3.8	4.5	5.9	5.9	7.3
100～120	2.4	3.2	3.6	3.6	3.6	4.0	4.8	6.1	6.1	7.6
120～140	2.5	3.3	3.7	3.7	3.7	4.1	4.9	6.2	6.2	7.7
140～160	2.6	3.4	3.8	3.8	3.9	4.3	5.2	6.4	6.5	8.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	430/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	383/356

Constants of dn/dt		
D_0	D_1	D_2
-1.68E-07	1.19E-08	-1.81E-11
E_0	E_1	λ_{TK}
8.12E-07	7.58E-10	2.86E-01

H-ZLaF59	852408	n_d = 1.85150	υ_d = 40.78	$n_F - n_C$ = 0.020880
		n_e = 1.85646	υ_e = 40.53	$n_{F'} - n_{C'}$ = 0.021134

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.80328
n_{1970}	1970.09	1.81065
n_{1530}	1529.58	1.81893
n_{1129}	1128.64	1.82685
n_{1064}	1064.00	1.82837
n_t	1013.98	1.82965
n_s	852.11	1.83478
$n_{A'}$	768.19	1.83842
n_r	706.52	1.84183
n_C	656.27	1.84530
$n_{C'}$	643.85	1.84628
n_{He-Ne}	632.80	1.84719
n_D	589.29	1.85132
n_d	587.56	1.85150
n_e	546.07	1.85646
n_F	486.13	1.86618
$n_{F'}$	479.99	1.86741
n_g	435.84	1.87807
n_h	404.66	1.88823
n_i	365.01	1.90623

Constants of Dispersion Formula	
A_0	3.33177670E+00
A_1	-1.58867083E-02
A_2	3.20181245E-02
A_3	1.14888430E-03
A_4	-4.03184280E-05
A_5	5.06235629E-06

Density	
ρ (g/cm^3)	4.72

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2969
$P_{e,d}$	0.2375
$P_{g,F}$	0.5694
$P'_{d,c'}$	0.2470
$P'_{e,d}$	0.2347
$P'_{g,F'}$	0.5044

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0022
$\triangle P_{g,F}$	-0.0064
$\triangle P_{C,t}$	0.0118
$\triangle P_{C,s}$	0.0056

Thermal Properties	
Tg (℃)	677
Ts (℃)	701
$T_{10}^{14.5}$ (℃)	632
T_{10}^{13} (℃)	667
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	78
λ (W/(m·K))	1.02

Mechanical Properties	
HK (10^7Pa)	720
F_A	68
E (GPa)	121.8
G (GPa)	46.4
μ	0.312
σ_b (MPa)	65
B (10^{-12}/Pa)	1.25

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	56
-40/-30	58
-30/-20	60
-20/-10	61
-10/0	63
0/10	63
10/20	64
20/30	65
30/40	66
40/50	66
50/60	67
60/70	67
70/80	68
80/90	69
90/100	70
100/110	71
110/120	72
120/130	73
130/140	74
140/150	76
150/160	77

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.861	0.742
2200	0.972	0.945
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.998	0.996
500	0.996	0.993
480	0.994	0.990
460	0.991	0.987
440	0.988	0.979
420	0.982	0.971
400	0.972	0.950
390	0.961	0.929
380	0.942	0.893
370	0.906	0.829
360	0.827	0.693
350	0.666	0.451
340	0.357	0.131
330	0.059	0.010
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.7	4.1	4.5	4.5	4.6	4.7	5.1	5.8	5.9	6.7
-40～-20	3.7	4.1	4.5	4.6	4.6	4.8	5.2	5.9	6.0	6.8
-20～0	3.7	4.1	4.6	4.6	4.7	4.9	5.4	6.0	6.1	6.9
0～20	3.7	4.2	4.6	4.6	4.7	5.0	5.3	6.1	6.2	7.0
20～40	3.7	4.3	4.7	4.7	4.8	5.0	5.4	6.2	6.3	7.2
40～60	3.8	4.4	4.8	4.8	4.9	5.0	5.4	6.3	6.4	7.3
60～80	3.9	4.5	4.9	5.0	5.0	5.2	5.6	6.5	6.6	7.5
80～100	4.1	4.6	5.0	5.1	5.1	5.3	5.6	6.6	6.7	7.7
100～120	4.2	4.7	5.2	5.3	5.3	5.5	5.7	6.7	6.8	7.8
120～140	4.3	4.8	5.3	5.4	5.4	5.5	5.8	6.8	6.9	7.9
140～160	4.4	4.9	5.4	5.4	5.5	5.7	6.0	6.9	7.0	8.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(380)/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	367/335

Constants of dn/dt		
D_0	D_1	D_2
2.71E-06	1.23E-08	-1.91E-11
E_0	E_1	λ_{TK}
6.47E-07	2.76E-10	2.55E-01

H-ZLaF60	850323	n_d = 1.85026	υ_d = 32.27	$n_F - n_C$ = 0.026349
		n_e = 1.85649	υ_e = 32.05	$n_{F'} - n_{C'}$ = 0.026727

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.79843
n_{1970}	1970.09	1.80513
n_{1530}	1529.58	1.81293
n_{1129}	1128.64	1.82100
n_{1064}	1064.00	1.82266
n_t	1013.98	1.82407
n_s	852.11	1.82993
$n_{A'}$	768.19	1.83424
n_r	706.52	1.83835
n_C	656.27	1.84259
$n_{C'}$	643.85	1.84379
n_{He-Ne}	632.80	1.84491
n_D	589.29	1.85003
n_d	587.56	1.85026
n_e	546.07	1.85649
n_F	486.13	1.86893
$n_{F'}$	479.99	1.87052
n_g	435.84	1.88450
n_h	404.66	1.89819
n_i	365.01	1.92348

Relative Partial Dispersion	
$P_{d,C}$	0.2911
$P_{e,d}$	0.2364
$P_{g,F}$	0.5909
$P'_{d,c'}$	0.2421
$P'_{e,d}$	0.2331
$P'_{g,F'}$	0.5231

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0003
$\triangle P_{g,F}$	0.0009
$\triangle P_{C,t}$	0.0064
$\triangle P_{C,s}$	0.0026

Thermal Properties	
Tg (℃)	617
Ts (℃)	663
$T_{10}^{14.5}$ (℃)	569
T_{10}^{13} (℃)	591
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	92
λ (W/(m·K))	1.19

Mechanical Properties	
HK (10^7Pa)	625
F_A	98
E (GPa)	121.5
G (GPa)	46.5
μ	0.307
σ_b (MPa)	89
B (10^{-12}/Pa)	1.71

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	65
-40/-30	67
-30/-20	70
-20/-10	71
-10/0	71
0/10	73
10/20	74
20/30	75
30/40	76
40/50	77
50/60	77
60/70	78
70/80	79
80/90	80
90/100	81
100/110	82
110/120	83
120/130	84
130/140	85
140/150	86
150/160	87

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.942	0.882
2200	0.986	0.959
2000	0.993	0.985
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.996	0.994
500	0.988	0.976
480	0.982	0.965
460	0.976	0.952
440	0.965	0.932
420	0.948	0.899
400	0.905	0.821
390	0.859	0.740
380	0.807	0.653
370	0.665	0.439
360	0.373	0.137
350		
340		
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	3.30260921E+00
A_1	-1.39415408E-02
A_2	3.82606507E-02
A_3	1.95805494E-03
A_4	-1.07295242E-04
A_5	1.47824013E-05

Density	
ρ (g/cm^3)	4.00

Solarization	
△λ (%)	-0.2

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.2	3.7	4.1	4.1	4.2	4.5	4.9	5.8	5.8	6.9
-40～-20	3.1	3.7	4.1	4.1	4.2	4.5	5.0	5.9	5.9	7.1
-20～0	3.1	3.7	4.2	4.2	4.3	4.7	5.1	6.2	6.2	7.4
0～20	3.1	3.7	4.2	4.2	4.3	4.6	5.2	6.2	6.2	7.6
20～40	3.1	3.7	4.3	4.3	4.3	4.8	5.2	6.3	6.3	7.9
40～60	3.1	3.7	4.3	4.4	4.5	4.8	5.3	6.5	6.5	8.1
60～80	3.2	3.8	4.4	4.5	4.6	5.0	5.5	6.8	6.8	8.4
80～100	3.3	3.9	4.5	4.6	4.6	5.2	5.5	7.0	7.0	8.6
100～120	3.3	4.0	4.6	4.7	4.8	5.3	5.6	7.2	7.2	8.9
120～140	3.5	4.1	4.7	4.7	4.8	5.6	5.8	7.4	7.4	9.1
140～160	3.6	4.2	4.8	4.8	4.9	5.7	6.0	7.7	7.7	9.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(400)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	397/355

Constants of dn/dt		
D_0	D_1	D_2
1.56E-06	9.55E-09	-1.73E-11
E_0	E_1	λ_{TK}
8.08E-07	1.02E-09	2.78E-01

H-ZLaF60GT	850323	n_d = 1.85026	υ_d = 32.27	$n_F - n_C$ = 0.026349
		n_e = 1.85649	υ_e = 32.05	$n_{F'} - n_{C'}$ = 0.026727

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.79843
n_{1970}	1970.09	1.80513
n_{1530}	1529.58	1.81293
n_{1129}	1128.64	1.82100
n_{1064}	1064.00	1.82266
n_t	1013.98	1.82407
n_s	852.11	1.82993
$n_{A'}$	768.19	1.83424
n_r	706.52	1.83835
n_C	656.27	1.84259
$n_{C'}$	643.85	1.84379
n_{He-Ne}	632.80	1.84491
n_D	589.29	1.85003
n_d	587.56	1.85026
n_e	546.07	1.85649
n_F	486.13	1.86893
$n_{F'}$	479.99	1.87052
n_g	435.84	1.88450
n_h	404.66	1.89819
n_i	365.01	1.92348

Constants of Dispersion Formula	
A_0	3.30260921E+00
A_1	-1.39415408E-02
A_2	3.82606507E-02
A_3	1.95805494E-03
A_4	-1.07295242E-04
A_5	1.47824013E-05

Density	
ρ (g/cm^3)	4.00

Solarization	
△λ (%)	-0.2

Relative Partial Dispersion	
$P_{d,C}$	0.2911
$P_{e,d}$	0.2364
$P_{g,F}$	0.5909
$P'_{d,c'}$	0.2421
$P'_{e,d}$	0.2331
$P'_{g,F'}$	0.5231

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0003
$\triangle P_{g,F}$	0.0009
$\triangle P_{C,t}$	0.0064
$\triangle P_{C,s}$	0.0026

Thermal Properties	
Tg (℃)	617
Ts (℃)	663
$T_{10}^{14.5}$ (℃)	569
T_{10}^{13} (℃)	591
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	92
λ (W/(m·K))	1.19

Mechanical Properties	
HK (10^7Pa)	625
F_A	98
E (GPa)	121.5
G (GPa)	46.5
μ	0.307
σ_b (MPa)	89
B (10^{-12}/Pa)	1.71

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	65
-40/-30	67
-30/-20	70
-20/-10	71
-10/0	71
0/10	73
10/20	74
20/30	75
30/40	76
40/50	77
50/60	77
60/70	78
70/80	79
80/90	80
90/100	81
100/110	82
110/120	83
120/130	84
130/140	85
140/150	86
150/160	87

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.942	0.882
2200	0.986	0.959
2000	0.993	0.985
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.996	0.994
500	0.993	0.989
480	0.989	0.983
460	0.985	0.974
440	0.979	0.960
420	0.963	0.929
400	0.935	0.877
390	0.904	0.820
380	0.849	0.726
370	0.733	0.541
360	0.476	0.231
350	0.110	0.019
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.2	3.7	4.1	4.1	4.2	4.5	4.9	5.8	5.8	6.9
-40～-20	3.1	3.7	4.1	4.1	4.2	4.5	5.0	5.9	5.9	7.1
-20～0	3.1	3.7	4.2	4.2	4.3	4.7	5.1	6.2	6.2	7.4
0～20	3.1	3.7	4.2	4.2	4.3	4.6	5.2	6.2	6.2	7.6
20～40	3.1	3.7	4.3	4.3	4.3	4.8	5.2	6.3	6.3	7.9
40～60	3.1	3.7	4.3	4.4	4.5	4.8	5.3	6.5	6.5	8.1
60～80	3.2	3.8	4.4	4.5	4.6	5.0	5.5	6.8	6.8	8.4
80～100	3.3	3.9	4.5	4.6	4.6	5.2	5.5	7.0	7.0	8.6
100～120	3.3	4.0	4.6	4.7	4.8	5.3	5.6	7.2	7.2	8.9
120～140	3.5	4.1	4.7	4.7	4.8	5.6	5.8	7.4	7.4	9.1
140～160	3.6	4.2	4.8	4.8	4.9	5.7	6.0	7.7	7.7	9.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(395)/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	387/353

Constants of dn/dt		
D_0	D_1	D_2
1.56E-06	9.55E-09	-1.73E-11
E_0	E_1	λ_{TK}
8.08E-07	1.02E-09	2.78E-01

H-ZLaF60A	850323	n_d = 1.85026	υ_d = 32.27	$n_F - n_C$ = 0.026349
		n_e = 1.85649	υ_e = 32.05	$n_{F'} - n_{C'}$ = 0.026727

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.82128
n_{1064}	1064.00	1.82287
n_t	1013.98	1.82426
n_s	852.11	1.83001
$n_{A'}$	768.19	1.83428
n_r	706.52	1.83837
n_C	656.27	1.84259
$n_{C'}$	643.85	1.84379
n_{He-Ne}	632.80	1.84491
n_D	589.29	1.85003
n_d	587.56	1.85026
n_e	546.07	1.85649
n_F	486.13	1.86893
$n_{F'}$	479.99	1.87052
n_g	435.84	1.88455
n_h	404.66	1.89826
n_i	365.01	1.92358

Relative Partial Dispersion	
$P_{d,C}$	0.2911
$P_{e,d}$	0.2364
$P_{g,F}$	0.5928
$P'_{d,c'}$	0.2421
$P'_{e,d}$	0.2331
$P'_{g,F'}$	0.5249

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0003
$\triangle P_{g,F}$	0.0028
$\triangle P_{C,t}$	-0.0008
$\triangle P_{C,s}$	-0.0004

Thermal Properties	
Tg (℃)	730
Ts (℃)	785
$T_{10}^{14.5}$ (℃)	682
T_{10}^{13} (℃)	704
$\alpha_{-50/80℃}$ (10^{-7}/K)	65
$\alpha_{100/300℃}$ (10^{-7}/K)	79
λ (W/(m·K))	0.87

Mechanical Properties	
HK (10^7Pa)	603
F_A	147
E (GPa)	111.4
G (GPa)	42.9
μ	0.299
σ_b (MPa)	
B (10^{-12}/Pa)	1.76

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	57
-40/-30	59
-30/-20	60
-20/-10	60
-10/0	64
0/10	64
10/20	65
20/30	65
30/40	65
40/50	66
50/60	66
60/70	68
70/80	69
80/90	69
90/100	71
100/110	71
110/120	72
120/130	75
130/140	76
140/150	76
150/160	79

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.969	0.939
2200	0.987	0.974
2000	0.995	0.989
1800	0.997	0.993
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.998	0.996
550	0.996	0.993
500	0.990	0.980
480	0.986	0.972
460	0.980	0.961
440	0.971	0.944
420	0.954	0.910
400	0.913	0.833
390	0.872	0.761
380	0.797	0.635
370	0.640	0.410
360	0.355	0.126
350		
340		
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	3.30037670E+00
A_1	-1.19927180E-02
A_2	3.94905653E-02
A_3	1.56664097E-03
A_4	-4.50656039E-05
A_5	1.12714689E-05

Density	
ρ (g/cm^3)	4.43

Solarization	
△λ (%)	-0.3

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	2.5	2.8	3.1	3.2	3.4	3.8	4.3	4.9	5.2	6.3
-40 ~ -20	2.5	2.8	3.2	3.3	3.4	3.9	4.5	5.1	5.3	6.6
-20 ~ 0	2.7	3.0	3.3	3.4	3.6	4.2	4.7	5.3	5.6	6.8
0 ~ 20	2.7	3.0	3.4	3.5	3.6	4.2	4.8	5.5	5.7	7.1
20 ~ 40	2.8	3.2	3.6	3.7	3.8	4.4	5.0	5.7	5.9	7.3
40 ~ 60	2.8	3.3	3.7	3.7	3.8	4.5	5.2	5.9	6.1	7.6
60 ~ 80	2.9	3.5	3.8	4.0	4.1	4.7	5.3	6.1	6.3	7.9
80 ~ 100	2.9	3.7	4.1	4.2	4.3	5.0	5.6	6.2	6.4	8.2
100 ~ 120	3.0	3.8	4.2	4.3	4.5	5.2	5.7	6.5	6.7	8.4
120 ~ 140	3.1	4.0	4.4	4.5	4.6	5.3	5.9	6.7	7.0	8.6
140 ~ 160	3.1	4.2	4.6	4.7	4.8	5.5	6.1	6.9	7.1	8.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(400)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	395/357

Constants of dn/dt		
D_0	D_1	D_2
6.73E-07	1.31E-08	-2.05E-11
E_0	E_1	λ_{TK}
8.31E-07	7.05E-10	2.74E-01

H-ZLaF64	871407	n_d = 1.87070	υ_d = 40.73	$n_F - n_C$ = 0.021378
		n_e = 1.87578	υ_e = 40.48	$n_{F'} - n_{C'}$ = 0.021636

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	
n_{1064}	1064.00	
n_t	1013.98	1.84858
n_s	852.11	1.85367
$n_{A'}$	768.19	1.85735
n_r	706.52	1.86082
n_C	656.27	1.86436
$n_{C'}$	643.85	1.86536
n_{He-Ne}	632.80	1.86629
n_D	589.29	1.87052
n_d	587.56	1.87070
n_e	546.07	1.87578
n_F	486.13	1.88573
$n_{F'}$	479.99	1.88699
n_g	435.84	1.89788
n_h	404.66	1.90822
n_i	365.01	1.92642

Constants of Dispersion Formula	
A_0	3.39546999E+00
A_1	-1.28894532E-02
A_2	3.53964334E-02
A_3	5.98603397E-04
A_4	3.77588400E-05
A_5	6.23039754E-07

Density	
ρ (g/cm^3)	4.84

Solarization	
△λ (%)	-0.8

Relative Partial Dispersion	
$P_{d,C}$	0.2966
$P_{e,d}$	0.2376
$P_{g,F}$	0.5683
$P'_{d,c'}$	0.2468
$P'_{e,d}$	0.2348
$P'_{g,F'}$	0.5033

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0023
$\triangle P_{g,F}$	-0.0076
$\triangle P_{C,t}$	0.0007
$\triangle P_{C,s}$	0.0019

Thermal Properties	
Tg (℃)	719
Ts (℃)	746
$T_{10}^{14.5}$ (℃)	689
T_{10}^{13} (℃)	706
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	84
λ (W/(m·K))	0.88

Mechanical Properties	
HK (10^7Pa)	671
F_A	91
E (GPa)	123.4
G (GPa)	46.9
μ	0.316
σ_b (MPa)	116
B (10^{-12}/Pa)	0.90

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	62
-40/-30	62
-30/-20	63
-20/-10	66
-10/0	67
0/10	67
10/20	69
20/30	70
30/40	71
40/50	72
50/60	72
60/70	72
70/80	73
80/90	75
90/100	76
100/110	76
110/120	77
120/130	77
130/140	80
140/150	81
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.900	0.810
2200	0.973	0.947
2000	0.988	0.976
1800	0.996	0.993
1600	0.998	0.997
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.998	0.997
500	0.996	0.992
480	0.993	0.986
460	0.989	0.979
440	0.985	0.970
420	0.978	0.957
400	0.966	0.933
390	0.954	0.911
380	0.934	0.873
370	0.902	0.814
360	0.853	0.727
350	0.773	0.598
340	0.645	0.416
330	0.427	0.182
320	0.164	0.027
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.5	1.7	1.8	1.9	2.0	2.1	2.3	2.5	2.6	3.2
-40～-20	1.5	1.8	1.9	2.0	2.2	2.3	2.5	2.8	2.9	3.6
-20～0	1.7	2.0	2.2	2.3	2.5	2.6	2.9	3.2	3.4	4.1
0～20	1.9	2.3	2.5	2.6	2.7	2.9	3.3	3.6	3.7	4.6
20～40	2.1	2.6	2.8	2.9	3.0	3.3	3.6	3.9	4.0	5.1
40～60	2.3	2.8	3.1	3.2	3.3	3.5	4.0	4.2	4.3	5.5
60～80	2.4	3.0	3.4	3.4	3.5	3.8	4.3	4.4	4.5	5.8
80～100	2.5	3.2	3.4	3.5	3.6	4.0	4.5	4.7	4.8	6.0
100～120	2.5	3.3	3.6	3.6	3.7	4.1	4.7	4.9	5.0	6.1
120～140	2.7	3.3	3.7	3.8	3.9	4.3	4.9	5.2	5.3	6.4
140～160	2.9	3.5	3.8	3.9	4.0	4.5	5.1	5.4	5.5	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(375)/325
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	368/322

Constants of dn/dt		
D_0	D_1	D_2
-2.08E-07	1.66E-08	-3.59E-11
E_0	E_1	λ_{TK}
6.54E-07	1.08E-09	1.91E-01

H-ZLaF65	874306	n_d = 1.87408	υ_d = 30.55	$n_F - n_C$ = 0.028610
		n_e = 1.88085	υ_e = 30.34	$n_{F'} - n_{C'}$ = 0.029035

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.82063
n_{1970}	1970.09	1.82703
n_{1530}	1529.58	1.83463
n_{1129}	1128.64	1.84284
n_{1064}	1064.00	1.84457
n_t	1013.98	1.84606
n_s	852.11	1.85226
$n_{A'}$	768.19	1.85685
n_r	706.52	1.86126
n_C	656.27	1.86580
$n_{C'}$	643.85	1.86710
n_{He-Ne}	632.80	1.86830
n_D	589.29	1.87384
n_d	587.56	1.87408
n_e	546.07	1.88085
n_F	486.13	1.89441
$n_{F'}$	479.99	1.89614
n_g	435.84	1.91161
n_h	404.66	1.92693
n_i	365.01	1.95549

Constants of Dispersion Formula	
A_0	3.37787954E+00
A_1	-1.31762604E-02
A_2	4.34183952E-02
A_3	1.40530101E-03
A_4	2.38841484E-05
A_5	1.02947705E-05

Density		Solarization	
ρ (g/cm^3)	4.55	△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2894
$P_{e,d}$	0.2366
$P_{g,F}$	0.6012
$P'_{d,c'}$	0.2404
$P'_{e,d}$	0.2332
$P'_{g,F'}$	0.5328

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0083
$\triangle P_{C,t}$	0.0018
$\triangle P_{C,s}$	-0.0005

Thermal Properties	
Tg (℃)	665
Ts (℃)	697
$T_{10}^{14.5}$ (℃)	625
T_{10}^{13} (℃)	651
$\alpha_{-50/80℃}$ (10^{-7}/K)	82
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	0.67

Mechanical Properties	
HK (10^7Pa)	545
F_A	136
E (GPa)	124.8
G (GPa)	47.6
μ	0.310
σ_b (MPa)	
B (10^{-12}/Pa)	1.28

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	73
-40/-30	76
-30/-20	78
-20/-10	80
-10/0	81
0/10	82
10/20	83
20/30	84
30/40	85
40/50	85
50/60	86
60/70	86
70/80	87
80/90	88
90/100	89
100/110	90
110/120	92
120/130	92
130/140	93
140/150	94
150/160	95

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.928	0.861
2200	0.982	0.964
2000	0.997	0.994
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.995	0.990
550	0.993	0.985
500	0.985	0.967
480	0.979	0.956
460	0.973	0.943
440	0.964	0.926
420	0.944	0.892
400	0.896	0.805
390	0.846	0.718
380	0.750	0.568
370	0.555	0.316
360	0.213	0.051
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.1	2.6	2.9	3.0	3.0	3.2	3.8	4.9	5.0	5.9
-40～-20	2.1	2.6	3.0	3.1	3.1	3.4	3.8	5.0	5.1	6.1
-20～0	2.1	2.6	3.0	3.1	3.2	3.4	3.9	5.1	5.2	6.4
0～20	2.2	2.7	3.1	3.2	3.2	3.5	4.1	5.3	5.4	6.8
20～40	2.2	2.8	3.1	3.2	3.3	3.8	4.2	5.5	5.6	7.0
40～60	2.4	3.0	3.3	3.4	3.5	4.0	4.5	5.8	5.9	7.5
60～80	2.5	3.1	3.5	3.6	3.7	4.3	4.8	6.1	6.1	7.7
80～100	2.6	3.2	3.7	3.8	3.9	4.5	4.9	6.3	6.3	8.0
100～120	2.7	3.4	4.0	4.0	4.1	4.6	5.3	6.5	6.5	8.3
120～140	2.9	3.6	4.2	4.2	4.3	4.9	5.5	6.8	6.8	8.6
140～160	3.0	3.7	4.3	4.4	4.4	5.1	5.7	7.0	7.1	8.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(410)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	399/360

Constants of dn/dt		
D_0	D_1	D_2
1.88E-08	1.25E-08	-1.43E-11
E_0	E_1	λ_{TK}
7.76E-07	7.48E-10	2.89E-01

H-ZLaF66A	801350	n_d = 1.80100	υ_d = 34.97	$n_F - n_C$ = 0.022907
		n_e = 1.80642	υ_e = 34.72	$n_{F'} - n_{C'}$ = 0.023227

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75440
n_{1970}	1970.09	1.76062
n_{1530}	1529.58	1.76782
n_{1129}	1128.64	1.77518
n_{1064}	1064.00	1.77667
n_t	1013.98	1.77795
n_s	852.11	1.78317
$n_{A'}$	768.19	1.78697
n_r	706.52	1.79058
n_C	656.27	1.79427
$n_{C'}$	643.85	1.79533
n_{He-Ne}	632.80	1.79632
n_D	589.29	1.80079
n_d	587.56	1.80100
n_e	546.07	1.80642
n_F	486.13	1.81718
$n_{F'}$	479.99	1.81855
n_g	435.84	1.83064
n_h	404.66	1.84242
n_i	365.01	1.86397

Constants of Dispersion Formula	
A_0	3.14021962E+00
A_1	-1.26812790E-02
A_2	3.37217299E-02
A_3	1.19133791E-03
A_4	-2.03909360E-05
A_5	7.64423823E-06

Density	
ρ (g/cm^3)	3.76

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.2938
$P_{e,d}$	0.2366
$P_{g,F}$	0.5876
$P'_{d,c'}$	0.2441
$P'_{e,d}$	0.2333
$P'_{g,F'}$	0.5205

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0012
$\triangle P_{g,F}$	0.0021
$\triangle P_{C,t}$	0.0029
$\triangle P_{C,s}$	0.0002

Thermal Properties	
Tg (℃)	677
Ts (℃)	719
$T_{10}^{14.5}$ (℃)	618
T_{10}^{13} (℃)	668
$\alpha_{-50/80℃}$ (10^{-7}/K)	76
$\alpha_{100/300℃}$ (10^{-7}/K)	93
λ (W/(m·K))	1.15

Mechanical Properties	
HK (10^7Pa)	640
F_A	128
E (GPa)	111.6
G (GPa)	42.1
μ	0.324
σ_b (MPa)	87
B (10^{-12}/Pa)	1.64

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	66
-40/-30	69
-30/-20	71
-20/-10	72
-10/0	74
0/10	74
10/20	75
20/30	76
30/40	77
40/50	78
50/60	78
60/70	79
70/80	79
80/90	80
90/100	81
100/110	82
110/120	83
120/130	85
130/140	86
140/150	87
150/160	88

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.936	0.876
2200	0.979	0.958
2000	0.991	0.983
1800	0.996	0.992
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.997	0.994
500	0.994	0.989
480	0.991	0.983
460	0.987	0.975
440	0.982	0.963
420	0.970	0.942
400	0.946	0.895
390	0.920	0.845
380	0.866	0.751
370	0.748	0.558
360	0.491	0.241
350	0.155	0.024
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.2	3.8	4.1	4.2	4.3	4.5	4.8	5.5	5.6	6.5
-40～-20	3.3	3.9	4.2	4.3	4.3	4.6	5.1	5.7	5.8	6.9
-20～0	3.3	3.8	4.3	4.4	4.4	4.8	5.4	5.9	6.0	7.0
0～20	3.4	4.0	4.4	4.5	4.6	5.0	5.7	6.1	6.1	7.4
20～40	3.6	4.1	4.6	4.6	4.7	5.0	5.8	6.3	6.3	7.6
40～60	3.7	4.3	4.8	4.8	4.8	5.3	5.9	6.4	6.5	8.0
60～80	3.8	4.5	4.8	4.9	4.9	5.4	6.1	6.6	6.6	8.1
80～100	3.8	4.5	4.9	5.0	5.1	5.5	6.1	6.8	6.9	8.4
100～120	4.0	4.7	5.0	5.1	5.2	5.6	6.3	7.1	7.1	8.6
120～140	4.1	4.8	5.2	5.3	5.3	5.8	6.4	7.2	7.2	8.8
140～160	4.3	4.9	5.4	5.5	5.5	6.0	6.6	7.3	7.4	9.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	425/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	387/354

Constants of dn/dt		
D_0	D_1	D_2
2.52E-06	1.35E-08	-2.56E-11
E_0	E_1	λ_{TK}
7.53E-07	7.09E-10	2.67E-01

H-ZLaF67	881401	n_d = 1.88100	υ_d = 40.13	$n_F - n_C$ = 0.021952
		n_e = 1.88622	υ_e = 39.90	$n_{F'} - n_{C'}$ = 0.022209

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.83527
n_{1970}	1970.09	1.84141
n_{1530}	1529.58	1.84851
n_{1129}	1128.64	1.85576
n_{1064}	1064.00	1.85723
n_t	1013.98	1.85849
n_s	852.11	1.86362
$n_{A'}$	768.19	1.86735
n_r	706.52	1.87088
n_C	656.27	1.87450
$n_{C'}$	643.85	1.87552
n_{He-Ne}	632.80	1.87648
n_D	589.29	1.88081
n_d	587.56	1.88100
n_e	546.07	1.88622
n_F	486.13	1.89645
$n_{F'}$	479.99	1.89773
n_g	435.84	1.90896
n_h	404.66	1.91961
n_i	365.01	1.93853

Constants of Dispersion Formula	
A_0	3.43263393E+00
A_1	-1.31007856E-02
A_2	3.45483476E-02
A_3	1.34177704E-03
A_4	-7.37786129E-05
A_5	7.34356017E-06

Density		Solarization	
ρ (g/cm^3)	5.20	△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.2961
$P_{e,d}$	0.2378
$P_{g,F}$	0.5699
$P'_{d,c'}$	0.2467
$P'_{e,d}$	0.2350
$P'_{g,F'}$	0.5057

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0020
$\triangle P_{g,F}$	-0.0071
$\triangle P_{C,t}$	-0.0053
$\triangle P_{C,s}$	-0.0011

Thermal Properties	
Tg (℃)	715
Ts (℃)	754
$T_{10}^{14.5}$ (℃)	647
T_{10}^{13} (℃)	677
$\alpha_{-50/80℃}$ (10^{-7}/K)	71
$\alpha_{100/300℃}$ (10^{-7}/K)	86
λ (W/(m·K))	0.84

Mechanical Properties	
HK (10^7Pa)	710
F_A	71
E (GPa)	122.0
G (GPa)	46.9
μ	0.300
σ_b (MPa)	92
B (10^{-12}/Pa)	1.09

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	64
-40/-30	66
-30/-20	68
-20/-10	69
-10/0	70
0/10	71
10/20	73
20/30	74
30/40	74
40/50	75
50/60	75
60/70	76
70/80	76
80/90	77
90/100	78
100/110	79
110/120	80
120/130	81
130/140	82
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.945	0.893
2200	0.980	0.972
2000	0.994	0.989
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.994	0.989
480	0.990	0.981
460	0.985	0.969
440	0.977	0.956
420	0.970	0.940
400	0.950	0.903
390	0.928	0.862
380	0.891	0.794
370	0.839	0.704
360	0.753	0.567
350	0.604	0.364
340	0.361	0.130
330	0.102	0.010
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.1	4.7	5.0	5.1	5.2	5.4	5.7	6.5	6.6	7.5
-40～-20	4.1	4.7	5.0	5.1	5.2	5.5	5.8	6.6	6.7	7.6
-20～0	4.0	4.7	5.1	5.1	5.2	5.5	5.8	6.7	6.8	7.7
0～20	4.0	4.7	5.1	5.1	5.2	5.5	5.9	6.8	6.9	7.7
20～40	4.0	4.8	5.1	5.2	5.2	5.6	5.8	6.9	6.9	7.9
40～60	4.1	4.9	5.2	5.3	5.3	5.7	6.0	7.0	7.0	8.0
60～80	4.3	5.0	5.4	5.4	5.5	5.8	6.2	7.1	7.1	8.3
80～100	4.4	5.1	5.5	5.5	5.6	6.0	6.2	7.3	7.3	8.4
100～120	4.5	5.2	5.6	5.7	5.8	6.2	6.5	7.3	7.4	8.6
120～140	4.5	5.3	5.7	5.8	5.9	6.2	6.6	7.4	7.5	8.7
140～160	4.7	5.4	5.8	5.9	6.0	6.4	6.7	7.6	7.7	8.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(390)/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	380/336

Constants of dn/dt		
D_0	D_1	D_2
3.08E-06	1.15E-08	-1.54E-11
E_0	E_1	λ_{TK}
7.31E-07	3.03E-10	2.44E-01

H-ZLaF68A	883408	n_d = 1.88300	υ_d = 40.79	$n_F - n_C$ = 0.021645
		n_e = 1.88815	υ_e = 40.56	$n_{F'} - n_{C'}$ = 0.021897

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.83774
n_{1970}	1970.09	1.84375
n_{1530}	1529.58	1.85077
n_{1129}	1128.64	1.85799
n_{1064}	1064.00	1.85944
n_t	1013.98	1.86069
n_s	852.11	1.86579
$n_{A'}$	768.19	1.86950
n_r	706.52	1.87299
n_C	656.27	1.87657
$n_{C'}$	643.85	1.87758
n_{He-Ne}	632.80	1.87853
n_D	589.29	1.88281
n_d	587.56	1.88300
n_e	546.07	1.88815
n_F	486.13	1.89821
$n_{F'}$	479.99	1.89948
n_g	435.84	1.91053
n_h	404.66	1.92097
n_i	365.01	1.93924

Constants of Dispersion Formula	
A_0	3.43996305E+00
A_1	-1.28171243E-02
A_2	3.56469712E-02
A_3	7.18879378E-04
A_4	3.46401317E-05
A_5	-9.50101800E-08

Density	
ρ (g/cm^3)	5.47

Solarization	
△λ (%)	-2.1

Relative Partial Dispersion	
$P_{d,C}$	0.2971
$P_{e,d}$	0.2379
$P_{g,F}$	0.5692
$P'_{d,c'}$	0.2475
$P'_{e,d}$	0.2352
$P'_{g,F'}$	0.5046

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0029
$\triangle P_{g,F}$	-0.0067
$\triangle P_{C,t}$	-0.0041
$\triangle P_{C,s}$	-0.0003

Thermal Properties	
Tg (℃)	695
Ts (℃)	742
$T_{10}^{14.5}$ (℃)	629
T_{10}^{13} (℃)	667
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	0.98

Mechanical Properties	
HK (10^7Pa)	682
F_A	58
E (GPa)	120.9
G (GPa)	46.5
μ	0.301
σ_b (MPa)	95
B (10^{-12}/Pa)	1.32

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	61
-40/-30	62
-30/-20	64
-20/-10	65
-10/0	66
0/10	67
10/20	68
20/30	69
30/40	70
40/50	70
50/60	71
60/70	71
70/80	72
80/90	73
90/100	74
100/110	75
110/120	76
120/130	77
130/140	78
140/150	79
150/160	80

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.949	0.900
2200	0.993	0.985
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.997	0.995
500	0.994	0.992
480	0.991	0.989
460	0.988	0.985
440	0.984	0.981
420	0.980	0.960
400	0.970	0.937
390	0.956	0.909
380	0.937	0.873
370	0.903	0.815
360	0.857	0.730
350	0.785	0.607
340	0.695	0.476
330	0.572	0.318
320	0.401	0.155
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.7	5.2	5.5	5.6	5.7	6.0	6.5	7.1	7.2	7.9
-40～-20	4.7	5.2	5.5	5.6	5.7	6.0	6.4	7.2	7.3	8.0
-20～0	4.7	5.2	5.5	5.6	5.7	6.0	6.5	7.3	7.4	8.1
0～20	4.7	5.2	5.5	5.6	5.7	6.0	6.4	7.3	7.4	8.2
20～40	4.7	5.2	5.5	5.6	5.7	6.0	6.5	7.4	7.4	8.3
40～60	4.8	5.3	5.6	5.7	5.8	6.1	6.6	7.5	7.5	8.4
60～80	4.9	5.6	5.8	6.0	6.1	6.4	6.9	7.7	7.8	8.7
80～100	4.9	5.9	6.0	6.2	6.3	6.6	7.0	8.0	8.1	9.0
100～120	5.0	6.1	6.3	6.5	6.5	6.8	7.4	8.1	8.2	9.2
120～140	5.1	6.3	6.5	6.6	6.7	6.9	7.6	8.3	8.4	9.4
140～160	5.3	6.5	6.7	6.8	6.9	7.1	7.8	8.5	8.6	9.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(370)/315
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	368/313

Constants of dn/dt		
D_0	D_1	D_2
3.73E-06	1.16E-08	-5.36E-12
E_0	E_1	λ_{TK}
8.04E-07	3.83E-10	2.13E-01

H-ZLaF68L	883392	n_d = 1.88300	υ_d = 39.22	$n_F - n_C$ = 0.022515
		n_e = 1.88835	υ_e = 38.97	$n_{F'} - n_{C'}$ = 0.022798

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	1.84942
n_{1129}	1128.64	1.85707
n_{1064}	1064.00	1.85859
n_t	1013.98	1.85990
n_s	852.11	1.86519
$n_{A'}$	768.19	1.86902
n_r	706.52	1.87265
n_C	656.27	1.87635
$n_{C'}$	643.85	1.87740
n_{He-Ne}	632.80	1.87837
n_D	589.29	1.88281
n_d	587.56	1.88300
n_e	546.07	1.88835
n_F	486.13	1.89887
$n_{F'}$	479.99	1.90019
n_g	435.84	1.91170
n_h	404.66	1.92270
n_i	365.01	1.94220

Constants of Dispersion Formula	
A_0	3.43867274E+00
A_1	-1.43248055E-02
A_2	3.49115425E-02
A_3	1.45301670E-03
A_4	-7.62581625E-05
A_5	7.47668790E-06

Density	
ρ (g/cm^3)	5.12

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.2954
$P_{e,d}$	0.2376
$P_{g,F}$	0.5698
$P'_{d,c'}$	0.2456
$P'_{e,d}$	0.2347
$P'_{g,F'}$	0.5049

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0013
$\triangle P_{g,F}$	-0.0086
$\triangle P_{C,t}$	0.0005
$\triangle P_{C,s}$	0.0011

Thermal Properties	
Tg (℃)	720
Ts (℃)	748
$T_{10}^{14.5}$ (℃)	673
T_{10}^{13} (℃)	703
$\alpha_{-50/80℃}$ (10^{-7}/K)	71
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	0.78

Mechanical Properties	
HK (10^7Pa)	700
F_A	74
E (GPa)	124.4
G (GPa)	46.7
μ	0.333
σ_b (MPa)	125
B (10^{-12}/Pa)	0.93

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	63
-40/-30	65
-30/-20	67
-20/-10	68
-10/0	69
0/10	70
10/20	71
20/30	72
30/40	73
40/50	73
50/60	74
60/70	75
70/80	76
80/90	77
90/100	78
100/110	79
110/120	80
120/130	81
130/140	82
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.898	0.807
2200	0.970	0.940
2000	0.988	0.976
1800	0.995	0.991
1600	0.998	0.996
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.998	0.996
500	0.995	0.990
480	0.991	0.983
460	0.987	0.975
440	0.982	0.964
420	0.974	0.949
400	0.957	0.915
390	0.939	0.881
380	0.910	0.828
370	0.861	0.741
360	0.771	0.594
350	0.605	0.366
340	0.333	0.111
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.9	1.4	1.9	2.0	2.2	2.5	3.2	3.4	3.7	4.9
-40～-20	0.9	1.6	2.0	2.0	2.3	2.7	3.3	3.6	3.9	5.0
-20～0	1.0	1.6	2.1	2.2	2.5	2.7	3.5	3.6	4.0	5.1
0～20	1.2	1.7	2.3	2.4	2.6	2.8	3.7	3.8	4.2	5.3
20～40	1.3	1.7	2.4	2.4	2.6	2.9	3.8	4.1	4.3	5.4
40～60	1.5	1.9	2.4	2.6	2.8	3.0	3.9	4.1	4.4	5.5
60～80	1.6	2.1	2.6	2.8	2.9	3.3	4.1	4.3	4.5	5.6
80～100	1.6	2.3	2.8	2.9	3.0	3.5	4.2	4.5	4.6	5.7
100～120	1.8	2.3	2.9	3.0	3.2	3.5	4.4	4.6	4.7	5.9
120～140	1.9	2.4	3.0	3.1	3.3	3.7	4.4	4.7	4.8	6.1
140～160	1.9	2.6	3.1	3.2	3.4	3.9	4.6	4.9	5.1	6.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(380)/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	377/338

Constants of dn/dt		
D_0	D_1	D_2
-1.77E-06	1.42E-08	-2.29E-11
E_0	E_1	λ_{TK}
1.13E-06	1.17E-10	1.38E-01

H-ZLaF70	904313	n_d = 1.90366	υ_d = 31.32	$n_F - n_C$ = 0.028857
		n_e = 1.91048	υ_e = 31.08	$n_{F'} - n_{C'}$ = 0.029295

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.84663
n_{1970}	1970.09	1.85408
n_{1530}	1529.58	1.86274
n_{1129}	1128.64	1.87166
n_{1064}	1064.00	1.87348
n_t	1013.98	1.87504
n_s	852.11	1.88144
$n_{A'}$	768.19	1.88615
n_r	706.52	1.89065
n_C	656.27	1.89526
$n_{C'}$	643.85	1.89657
n_{He-Ne}	632.80	1.89781
n_D	589.29	1.90341
n_d	587.56	1.90366
n_e	546.07	1.91048
n_F	486.13	1.92412
$n_{F'}$	479.99	1.92587
n_g	435.84	1.94128
n_h	404.66	1.95645
n_i	365.01	1.98472

Constants of Dispersion Formula	
A_0	3.48854243E+00
A_1	-1.59982726E-02
A_2	4.28443509E-02
A_3	2.18903241E-03
A_4	-1.15672643E-04
A_5	1.78697063E-05

Density	
ρ (g/cm^3)	4.54

Solarization	
△λ (%)	-0.8

Relative Partial Dispersion	
$P_{d,C}$	0.2911
$P_{e,d}$	0.2363
$P_{g,F}$	0.5947
$P'_{d,c'}$	0.2420
$P'_{e,d}$	0.2328
$P'_{g,F'}$	0.5260

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	0.0031
$\triangle P_{C,t}$	0.0088
$\triangle P_{C,s}$	0.0033

Thermal Properties	
Tg (℃)	679
Ts (℃)	707
$T_{10}^{14.5}$ (℃)	595
T_{10}^{13} (℃)	643
$\alpha_{-50/80℃}$ (10^{-7}/K)	66
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	1.04

Mechanical Properties	
HK (10^7Pa)	640
F_A	80
E (GPa)	117.6
G (GPa)	45.6
μ	0.288
σ_b (MPa)	63
B (10^{-12}/Pa)	2.01

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	59
-40/-30	61
-30/-20	62
-20/-10	64
-10/0	65
0/10	66
10/20	66
20/30	67
30/40	68
40/50	68
50/60	69
60/70	70
70/80	70
80/90	71
90/100	71
100/110	73
110/120	74
120/130	75
130/140	76
140/150	77
150/160	77

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.904	0.817
2200	0.979	0.958
2000	0.998	0.996
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.996	0.994
500	0.990	0.984
480	0.984	0.977
460	0.977	0.969
440	0.968	0.954
420	0.950	0.927
400	0.914	0.859
390	0.874	0.784
380	0.790	0.635
370	0.591	0.348
360	0.229	0.053
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.4	2.8	3.3	3.4	3.4	3.6	4.0	5.1	5.1	6.4
-40～-20	2.4	2.9	3.4	3.4	3.5	3.8	4.3	5.2	5.3	6.5
-20～0	2.4	3.1	3.5	3.5	3.6	4.0	4.5	5.4	5.5	6.8
0～20	2.5	3.3	3.6	3.6	3.7	4.1	4.6	5.6	5.7	7.1
20～40	2.6	3.4	3.7	3.7	3.8	4.2	4.7	5.9	6.0	7.5
40～60	2.7	3.4	3.8	3.9	3.9	4.3	4.9	6.2	6.2	7.7
60～80	2.7	3.5	4.0	4.0	4.1	4.6	5.1	6.5	6.5	8.0
80～100	2.9	3.5	4.1	4.1	4.2	4.8	5.2	6.8	6.8	8.2
100～120	3.1	3.7	4.2	4.2	4.4	4.9	5.2	7.0	7.0	8.3
120～140	3.3	3.9	4.3	4.4	4.6	5.1	5.4	7.1	7.2	8.4
140～160	3.5	4.0	4.4	4.4	4.6	5.3	5.6	7.2	7.3	8.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(405)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	392/360

Constants of dn/dt		
D_0	D_1	D_2
6.13E-07	1.29E-08	-2.38E-11
E_0	E_1	λ_{TK}
7.62E-07	6.31E-10	2.84E-01

H-ZLaF70GT	904313	n_d = 1.90366	υ_d = 31.32	$n_F - n_C$ = 0.028857
		n_e = 1.91048	υ_e = 31.08	$n_{F'} - n_{C'}$ = 0.029295

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.84663
n_{1970}	1970.09	1.85408
n_{1530}	1529.58	1.86274
n_{1129}	1128.64	1.87166
n_{1064}	1064.00	1.87348
n_t	1013.98	1.87504
n_s	852.11	1.88144
$n_{A'}$	768.19	1.88615
n_r	706.52	1.89065
n_C	656.27	1.89526
$n_{C'}$	643.85	1.89657
n_{He-Ne}	632.80	1.89781
n_D	589.29	1.90341
n_d	587.56	1.90366
n_e	546.07	1.91048
n_F	486.13	1.92412
$n_{F'}$	479.99	1.92587
n_g	435.84	1.94128
n_h	404.66	1.95645
n_i	365.01	1.98472

Constants of Dispersion Formula	
A_0	3.48854243E+00
A_1	-1.59982726E-02
A_2	4.28443509E-02
A_3	2.18903241E-03
A_4	-1.15672643E-04
A_5	1.78697063E-05

Density	
ρ (g/cm^3)	4.54

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2911
$P_{e,d}$	0.2363
$P_{g,F}$	0.5947
$P'_{d,c'}$	0.2420
$P'_{e,d}$	0.2328
$P'_{g,F'}$	0.5260

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	0.0031
$\triangle P_{C,t}$	0.0088
$\triangle P_{C,s}$	0.0033

Thermal Properties	
Tg (℃)	679
Ts (℃)	707
$T_{10}^{14.5}$ (℃)	595
T_{10}^{13} (℃)	643
$\alpha_{-50/80℃}$ (10^{-7}/K)	66
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	1.04

Mechanical Properties	
HK (10^7Pa)	640
F_A	80
E (GPa)	117.6
G (GPa)	45.6
μ	0.288
σ_b (MPa)	63
B (10^{-12}/Pa)	2.01

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	59
-40/-30	61
-30/-20	62
-20/-10	64
-10/0	65
0/10	66
10/20	66
20/30	67
30/40	68
40/50	68
50/60	69
60/70	70
70/80	70
80/90	71
90/100	71
100/110	73
110/120	74
120/130	75
130/140	76
140/150	77
150/160	77

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.867	0.751
2200	0.947	0.897
2000	0.982	0.964
1800	0.992	0.984
1600	0.997	0.995
1400	0.998	0.996
1200	0.999	0.997
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.998	0.997
550	0.997	0.995
500	0.994	0.988
480	0.991	0.983
460	0.987	0.975
440	0.982	0.964
420	0.971	0.942
400	0.941	0.886
390	0.904	0.817
380	0.817	0.668
370	0.611	0.348
360	0.268	0.053
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.4	2.8	3.3	3.4	3.4	3.6	4.0	5.1	5.1	6.4
-40～-20	2.4	2.9	3.4	3.4	3.5	3.8	4.3	5.2	5.3	6.5
-20～0	2.4	3.1	3.5	3.5	3.6	4.0	4.5	5.4	5.5	6.8
0～20	2.5	3.3	3.6	3.6	3.7	4.1	4.6	5.6	5.7	7.1
20～40	2.6	3.4	3.7	3.7	3.8	4.2	4.7	5.9	6.0	7.5
40～60	2.7	3.4	3.8	3.9	3.9	4.3	4.9	6.2	6.2	7.7
60～80	2.7	3.5	4.0	4.0	4.1	4.6	5.1	6.5	6.5	8.0
80～100	2.9	3.5	4.1	4.1	4.2	4.8	5.2	6.8	6.8	8.2
100～120	3.1	3.7	4.2	4.2	4.4	4.9	5.2	7.0	7.0	8.3
120～140	3.3	3.9	4.3	4.4	4.6	5.1	5.4	7.1	7.2	8.4
140～160	3.5	4.0	4.4	4.4	4.6	5.3	5.6	7.2	7.3	8.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(395)/361
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/360

Constants of dn/dt		
D_0	D_1	D_2
6.13E-07	1.29E-08	-2.38E-11
E_0	E_1	λ_{TK}
7.62E-07	6.31E-10	2.84E-01

H-ZLaF70B	904313	n_d = 1.90366	υ_d = 31.32	$n_F - n_C$ = 0.028857
		n_e = 1.91048	υ_e = 31.08	$n_{F'} - n_{C'}$ = 0.029295

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.87171
n_{1064}	1064.00	1.87351
n_t	1013.98	1.87507
n_s	852.11	1.88146
$n_{A'}$	768.19	1.88615
n_r	706.52	1.89064
n_C	656.27	1.89526
$n_{C'}$	643.85	1.89657
n_{He-Ne}	632.80	1.89779
n_D	589.29	1.90340
n_d	587.56	1.90366
n_e	546.07	1.91048
n_F	486.13	1.92412
$n_{F'}$	479.99	1.92587
n_g	435.84	1.94134
n_h	404.66	1.95653
n_i	365.01	1.98473

Constants of Dispersion Formula	
A_0	3.48732094E+00
A_1	-1.53300569E-02
A_2	4.38552114E-02
A_3	1.76295737E-03
A_4	-3.48293322E-05
A_5	1.26414315E-05

Density	
ρ (g/cm^3)	4.53

Solarization	
△λ (%)	-0.9

Relative Partial Dispersion	
$P_{d,C}$	0.2911
$P_{e,d}$	0.2363
$P_{g,F}$	0.5967
$P'_{d,c'}$	0.2420
$P'_{e,d}$	0.2328
$P'_{g,F'}$	0.5281

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	0.0052
$\triangle P_{C,t}$	0.0078
$\triangle P_{C,s}$	0.0027

Thermal Properties	
Tg (℃)	684
Ts (℃)	708
$T_{10}^{14.5}$ (℃)	560
T_{10}^{13} (℃)	648
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	85
λ (W/(m·K))	0.91

Mechanical Properties	
HK (10^7Pa)	690
F_A	131
E (GPa)	121.8
G (GPa)	46.7
μ	0.302
σ_b (MPa)	99
B (10^{-12}/Pa)	1.20

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	62
-40/-30	63
-30/-20	64
-20/-10	65
-10/0	67
0/10	68
10/20	68
20/30	70
30/40	70
40/50	71
50/60	73
60/70	73
70/80	74
80/90	75
90/100	76
100/110	76
110/120	79
120/130	79
130/140	80
140/150	81
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.871	0.758
2200	0.959	0.919
2000	0.983	0.966
1800	0.994	0.988
1600	0.998	0.996
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.997
550	0.998	0.995
500	0.993	0.986
480	0.990	0.980
460	0.984	0.969
440	0.974	0.949
420	0.954	0.910
400	0.901	0.812
390	0.839	0.704
380	0.713	0.508
370	0.471	0.222
360	0.160	0.026
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.0	1.2	1.6	1.7	1.8	1.9	2.3	2.5	2.6	5.2
-40～-20	1.0	1.3	1.7	1.8	1.9	2.2	2.6	2.9	2.9	5.4
-20～0	1.2	1.4	1.8	1.9	2.0	2.4	2.7	3.0	3.1	5.5
0～20	1.2	1.6	2.0	2.1	2.2	2.5	2.9	3.1	3.2	5.8
20～40	1.2	1.7	2.1	2.2	2.3	2.7	3.1	3.3	3.4	6.0
40～60	1.3	1.8	2.1	2.2	2.4	2.8	3.3	3.5	3.6	6.1
60～80	1.5	2.0	2.4	2.5	2.6	3.0	3.5	3.8	3.9	6.5
80～100	1.6	2.1	2.4	2.6	2.7	3.2	3.6	3.9	4.0	6.7
100～120	1.7	2.2	2.5	2.6	2.7	3.4	3.7	4.0	4.1	6.9
120～140	1.8	2.4	2.7	2.7	2.9	3.4	3.8	4.1	4.2	7.1
140～160	1.9	2.6	2.9	3.0	3.2	3.6	4.0	4.3	4.4	7.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(405)/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	398/361

Constants of dn/dt		
D_0	D_1	D_2
-5.63E-07	1.42E-08	-2.54E-11
E_0	E_1	λ_{TK}
2.54E-07	1.45E-10	3.85E-01

H-ZLaF72	911353	n_d = 1.91082	υ_d = 35.25	$n_F - n_C$ = 0.025839
		n_e = 1.91695	υ_e = 35.01	$n_{F'} - n_{C'}$ = 0.026194

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.85959
n_{1970}	1970.09	1.86612
n_{1530}	1529.58	1.87377
n_{1129}	1128.64	1.88177
n_{1064}	1064.00	1.88343
n_t	1013.98	1.88484
n_s	852.11	1.89068
$n_{A'}$	768.19	1.89497
n_r	706.52	1.89905
n_C	656.27	1.90323
$n_{C'}$	643.85	1.90443
n_{He-Ne}	632.80	1.90554
n_D	589.29	1.91060
n_d	587.56	1.91082
n_e	546.07	1.91695
n_F	486.13	1.92907
$n_{F'}$	479.99	1.93062
n_g	435.84	1.94415
n_h	404.66	1.95720
n_i	365.01	1.98078

Constants of Dispersion Formula	
A_0	3.52587871E+00
A_1	-1.39436897E-02
A_2	4.09037520E-02
A_3	1.38553859E-03
A_4	-1.74895373E-05
A_5	6.86910964E-06

Density	
ρ (g/cm^3)	4.88

Solarization	
△λ (%)	-0.9

Relative Partial Dispersion	
$P_{d,C}$	0.2937
$P_{e,d}$	0.2372
$P_{g,F}$	0.5836
$P'_{d,c'}$	0.2439
$P'_{e,d}$	0.2340
$P'_{g,F'}$	0.5165

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0017
$\triangle P_{g,F}$	-0.0014
$\triangle P_{C,t}$	0.0008
$\triangle P_{C,s}$	0.0007

Thermal Properties	
Tg (℃)	712
Ts (℃)	752
$T_{10}^{14.5}$ (℃)	655
T_{10}^{13} (℃)	680
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	1.14

Mechanical Properties	
HK (10^7Pa)	663
F_A	74
E (GPa)	127.8
G (GPa)	48.0
μ	0.333
σ_b (MPa)	77
B (10^{-12}/Pa)	1.41

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	61
-30/-20	63
-20/-10	64
-10/0	65
0/10	66
10/20	67
20/30	68
30/40	69
40/50	69
50/60	70
60/70	70
70/80	71
80/90	71
90/100	72
100/110	73
110/120	74
120/130	75
130/140	76
140/150	78
150/160	79

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.931	0.867
2200	0.987	0.974
2000	0.997	0.994
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.997	0.994
550	0.992	0.987
500	0.983	0.969
480	0.980	0.960
460	0.974	0.948
440	0.966	0.931
420	0.955	0.904
400	0.921	0.837
390	0.886	0.773
380	0.828	0.673
370	0.721	0.510
360	0.517	0.261
350	0.205	0.041
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.5	4.9	5.3	5.3	5.4	5.7	6.3	7.3	7.4	8.4
-40～-20	4.5	4.9	5.4	5.5	5.6	5.9	6.5	7.5	7.5	8.5
-20～0	4.6	4.9	5.6	5.7	5.8	6.1	6.6	7.6	7.7	8.8
0～20	4.6	5.1	5.7	5.8	6.1	6.1	6.6	7.7	7.8	8.9
20～40	4.7	5.3	5.9	6.0	6.2	6.3	6.7	7.8	7.9	9.1
40～60	4.7	5.3	6.1	6.1	6.2	6.5	7.0	7.9	8.0	9.3
60～80	4.7	5.4	6.1	6.1	6.2	6.6	7.1	8.1	8.3	9.5
80～100	4.7	5.4	6.1	6.1	6.2	6.7	7.2	8.2	8.4	9.6
100～120	4.8	5.5	6.1	6.1	6.2	6.6	7.2	8.3	8.4	9.7
120～140	4.8	5.6	6.2	6.2	6.2	6.6	7.3	8.4	8.4	9.7
140～160	4.8	5.7	6.2	6.2	6.2	6.7	7.4	8.4	8.4	9.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(400)/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	393/350

Constants of dn/dt		
D_0	D_1	D_2
3.50E-06	1.24E-08	-3.24E-11
E_0	E_1	λ_{TK}
8.61E-07	4.14E-10	2.43E-01

H-ZLaF72A	911353	n_d = 1.91082	υ_d = 35.25	$n_F - n_C$ = 0.025839
		n_e = 1.91695	υ_e = 35.01	$n_{F'} - n_{C'}$ = 0.026194

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.88174
n_{1064}	1064.00	1.88340
n_t	1013.98	1.88483
n_s	852.11	1.89070
$n_{A'}$	768.19	1.89498
n_r	706.52	1.89906
n_C	656.27	1.90323
$n_{C'}$	643.85	1.90443
n_{He-Ne}	632.80	1.90554
n_D	589.29	1.91060
n_d	587.56	1.91082
n_e	546.07	1.91695
n_F	486.13	1.92907
$n_{F'}$	479.99	1.93062
n_g	435.84	1.94415
n_h	404.66	1.95722
n_i	365.01	1.98087

Constants of Dispersion Formula	
A_0	3.52696534E+00
A_1	-1.46159641E-02
A_2	4.03353950E-02
A_3	1.52005930E-03
A_4	-3.40993875E-05
A_5	7.83574753E-06

Density	
ρ (g/cm^3)	4.82

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.2937
$P_{e,d}$	0.2372
$P_{g,F}$	0.5836
$P'_{d,c'}$	0.2439
$P'_{e,d}$	0.2340
$P'_{g,F'}$	0.5165

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0017
$\triangle P_{g,F}$	-0.0014
$\triangle P_{C,t}$	0.0012
$\triangle P_{C,s}$	-0.0001

Thermal Properties	
Tg (℃)	714
Ts (℃)	756
$T_{10}^{14.5}$ (℃)	657
T_{10}^{13} (℃)	682
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	0.96

Mechanical Properties	
HK (10^7Pa)	676
F_A	67
E (GPa)	125.6
G (GPa)	48.0
μ	0.304
σ_b (MPa)	125
B (10^{-12}/Pa)	1.02

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	60
-40/-30	62
-30/-20	64
-20/-10	65
-10/0	67
0/10	68
10/20	68
20/30	69
30/40	70
40/50	71
50/60	72
60/70	73
70/80	73
80/90	74
90/100	75
100/110	75
110/120	76
120/130	77
130/140	78
140/150	79
150/160	79

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.709	0.502
2200	0.908	0.824
2000	0.959	0.919
1800	0.988	0.977
1600	0.995	0.990
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.998	0.996
500	0.993	0.986
480	0.989	0.979
460	0.984	0.968
440	0.976	0.952
420	0.960	0.922
400	0.925	0.856
390	0.890	0.792
380	0.827	0.684
370	0.711	0.506
360	0.495	0.245
350	0.195	0.038
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.7	3.1	3.6	3.7	3.8	4.0	4.4	4.8	5.1	6.2
-40～-20	2.8	3.2	3.8	3.9	4.0	4.2	4.6	5.0	5.2	6.4
-20～0	2.8	3.4	3.8	4.0	4.2	4.4	4.8	5.2	5.3	6.6
0～20	2.8	3.5	3.8	4.0	4.2	4.6	5.1	5.3	5.5	6.9
20～40	2.9	3.7	3.9	4.1	4.3	4.7	5.2	5.4	5.6	7.2
40～60	3.0	3.9	4.1	4.3	4.5	4.9	5.4	5.7	5.9	7.4
60～80	3.1	4.1	4.2	4.4	4.6	5.1	5.5	5.9	6.1	7.7
80～100	3.1	6.0	4.4	4.6	4.8	5.3	5.6	5.9	6.3	7.8
100～120	3.2	4.0	4.6	4.9	5.1	5.4	5.6	6.1	6.4	8.1
120～140	3.3	4.1	4.7	5.1	5.4	5.6	5.8	6.3	6.5	8.3
140～160	3.4	4.3	4.8	5.2	5.5	5.8	5.9	6.5	6.6	8.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(400)/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	392/351

Constants of dn/dt		
D_0	D_1	D_2
1.20E-06	1.30E-08	-2.28E-11
E_0	E_1	λ_{TK}
7.80E-07	5.81E-10	2.31E-01

H-ZLaF75	950294	n_d = 1.95000	υ_d = 29.37	$n_F - n_C$ = 0.032350
		n_e = 1.95764	υ_e = 29.15	$n_{F'} - n_{C'}$ = 0.032852

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.88995
n_{1970}	1970.09	1.89709
n_{1530}	1529.58	1.90559
n_{1129}	1128.64	1.91477
n_{1064}	1064.00	1.91670
n_t	1013.98	1.91837
n_s	852.11	1.92534
$n_{A'}$	768.19	1.93052
n_r	706.52	1.93550
n_C	656.27	1.94063
$n_{C'}$	643.85	1.94209
n_{He-Ne}	632.80	1.94347
n_D	589.29	1.94973
n_d	587.56	1.95000
n_e	546.07	1.95764
n_F	486.13	1.97298
$n_{F'}$	479.99	1.97494
n_g	435.84	1.99236
n_h	404.66	2.00958
n_i	365.01	2.04179

Constants of Dispersion Formula	
A_0	3.64549592E+00
A_1	-1.53200140E-02
A_2	4.96183427E-02
A_3	2.32042227E-03
A_4	-9.17626876E-05
A_5	1.92554151E-05

Density	
ρ (g/cm^3)	4.77

Solarization	
△λ (%)	-2.4

Relative Partial Dispersion	
$P_{d,C}$	0.2896
$P_{e,d}$	0.2362
$P_{g,F}$	0.5991
$P'_{d,c'}$	0.2408
$P'_{e,d}$	0.2326
$P'_{g,F'}$	0.5303

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0002
$\triangle P_{g,F}$	0.0043
$\triangle P_{C,t}$	0.0057
$\triangle P_{C,s}$	0.0018

Thermal Properties	
Tg (℃)	677
Ts (℃)	714
$T_{10}^{14.5}$ (℃)	617
T_{10}^{13} (℃)	653
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	1.05

Mechanical Properties	
HK (10^7Pa)	625
F_A	66
E (GPa)	120.0
G (GPa)	45.7
μ	0.314
σ_b (MPa)	61
B (10^{-12}/Pa)	1.25

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	61
-40/-30	64
-30/-20	65
-20/-10	66
-10/0	67
0/10	68
10/20	69
20/30	69
30/40	70
40/50	71
50/60	71
60/70	72
70/80	72
80/90	73
90/100	74
100/110	75
110/120	76
120/130	77
130/140	78
140/150	79
150/160	80

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.926	0.857
2200	0.976	0.953
2000	0.983	0.966
1800	0.996	0.992
1600	0.996	0.992
1400	0.996	0.992
1200	0.996	0.992
1060	0.996	0.992
1000	0.996	0.992
950	0.996	0.992
900	0.996	0.992
850	0.996	0.992
800	0.996	0.992
750	0.996	0.992
700	0.996	0.992
650	0.996	0.992
600	0.996	0.992
550	0.991	0.982
500	0.981	0.962
480	0.968	0.937
460	0.953	0.908
440	0.929	0.863
420	0.870	0.757
400	0.730	0.533
390	0.604	0.365
380	0.426	0.181
370	0.212	0.045
360	0.165	0.027
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.6	5.2	5.6	5.6	5.7	6.0	6.6	7.7	7.8	9.1
-40～-20	4.6	5.2	5.6	5.7	5.8	6.1	6.7	7.9	8.0	9.2
-20～0	4.6	5.3	5.7	5.8	5.9	6.2	6.8	8.1	8.2	9.3
0～20	4.6	5.3	5.8	5.9	5.9	6.2	6.9	8.2	8.3	9.5
20～40	4.7	5.4	5.9	6.0	6.0	6.3	7.0	8.3	8.4	9.7
40～60	4.7	5.5	5.9	6.0	6.0	6.3	7.1	8.4	8.5	9.8
60～80	4.7	5.6	5.9	6.0	6.1	6.4	7.1	8.5	8.6	10.1
80～100	4.8	5.7	6.1	6.2	6.2	6.5	7.2	8.6	8.7	10.2
100～120	4.8	5.7	6.2	6.3	6.3	6.6	7.3	8.7	8.8	10.4
120～140	4.9	5.8	6.3	6.4	6.4	6.7	7.4	8.8	8.9	10.5
140～160	4.9	5.9	6.3	6.4	6.5	6.8	7.5	8.9	9.0	10.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(430)/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	426/370

Constants of dn/dt		
D_0	D_1	D_2
3.47E-06	1.08E-08	-2.35E-11
E_0	E_1	λ_{TK}
7.66E-07	4.26E-10	2.84E-01

H-ZLaF76	850301	n_d = 1.85013	υ_d = 30.06	$n_F - n_C$ = 0.028285
		n_e = 1.85681	υ_e = 29.84	$n_{F'} - n_{C'}$ = 0.028715

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.79436
n_{1970}	1970.09	1.80166
n_{1530}	1529.58	1.81015
n_{1129}	1128.64	1.81887
n_{1064}	1064.00	1.82064
n_t	1013.98	1.82215
n_s	852.11	1.82843
$n_{A'}$	768.19	1.83302
n_r	706.52	1.83741
n_C	656.27	1.84191
$n_{C'}$	643.85	1.84320
n_{He-Ne}	632.80	1.84441
n_D	589.29	1.84989
n_d	587.56	1.85013
n_e	546.07	1.85681
n_F	486.13	1.87020
$n_{F'}$	479.99	1.87191
n_g	435.84	1.88711
n_h	404.66	1.90212
n_i	365.01	1.93022

Constants of Dispersion Formula	
A_0	3.29452328E+00
A_1	-1.52382302E-02
A_2	4.07084470E-02
A_3	2.00555089E-03
A_4	-8.95622178E-05
A_5	1.65722537E-05

Density	
ρ (g/cm^3)	3.97

Solarization	
△λ (%)	-0.8

Relative Partial Dispersion	
$P_{d,C}$	0.2906
$P_{e,d}$	0.2362
$P_{g,F}$	0.5978
$P'_{d,c'}$	0.2413
$P'_{e,d}$	0.2326
$P'_{g,F'}$	0.5293

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	0.0042
$\triangle P_{C,t}$	0.0128
$\triangle P_{C,s}$	0.0040

Thermal Properties	
Tg (℃)	580
Ts (℃)	622
$T_{10}^{14.5}$ (℃)	519
T_{10}^{13} (℃)	556
$\alpha_{-50/80℃}$ (10^{-7}/K)	66
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	600
F_A	138
E (GPa)	114.4
G (GPa)	44.3
μ	0.290
σ_b (MPa)	70
B (10^{-12}/Pa)	2.34

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	61
-30/-20	63
-20/-10	64
-10/0	65
0/10	65
10/20	66
20/30	67
30/40	68
40/50	69
50/60	70
60/70	71
70/80	71
80/90	72
90/100	73
100/110	74
110/120	75
120/130	76
130/140	77
140/150	78
150/160	79

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.893	0.798
2200	0.954	0.910
2000	0.994	0.988
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.998	0.997
650	0.998	0.996
600	0.998	0.996
550	0.996	0.992
500	0.991	0.983
480	0.988	0.976
460	0.983	0.967
440	0.976	0.952
420	0.962	0.925
400	0.931	0.867
390	0.898	0.806
380	0.831	0.691
370	0.669	0.447
360	0.363	0.132
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.3	4.8	5.2	5.3	5.4	5.6	6.1	7.0	7.1	8.3
-40～-20	4.2	4.9	5.3	5.4	5.5	5.7	6.2	7.2	7.3	8.6
-20～0	4.3	4.9	5.3	5.4	5.5	5.9	6.3	7.4	7.5	8.9
0～20	4.3	4.9	5.3	5.4	5.5	5.9	6.4	7.5	7.6	9.1
20～40	4.4	5.0	5.4	5.5	5.6	6.0	6.5	7.7	7.8	9.3
40～60	4.5	5.1	5.5	5.6	5.7	6.1	6.7	8.0	8.1	9.6
60～80	4.5	5.2	5.6	5.7	5.8	6.4	7.0	8.3	8.4	10.0
80～100	4.7	5.3	5.7	5.8	5.9	6.6	7.2	8.5	8.6	10.3
100～120	4.7	5.4	5.7	5.8	5.9	6.9	7.5	8.8	8.9	10.6
120～140	4.8	5.5	5.9	6.0	6.1	7.1	7.7	9.0	9.1	10.8
140～160	4.9	5.6	6.0	6.1	6.2	7.3	7.9	9.2	9.3	11.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(405)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/358

Constants of dn/dt		
D_0	D_1	D_2
3.41E-06	1.03E-08	-1.74E-11
E_0	E_1	λ_{TK}
8.24E-07	1.10E-09	2.84E-01

H-ZLaF76A	850301	n_d = 1.85013	υ_d = 30.06	$n_F - n_C$ = 0.028285
		n_e = 1.85681	υ_e = 29.84	$n_{F'} - n_{C'}$ = 0.028715

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.81918
n_{1064}	1064.00	1.82091
n_t	1013.98	1.82239
n_s	852.11	1.82855
$n_{A'}$	768.19	1.83308
n_r	706.52	1.83743
n_C	656.27	1.84192
$n_{C'}$	643.85	1.84320
n_{He-Ne}	632.80	1.84441
n_D	589.29	1.84988
n_d	587.56	1.85013
n_e	546.07	1.85681
n_F	486.13	1.87021
$n_{F'}$	479.99	1.87192
n_g	435.84	1.88716
n_h	404.66	1.90224
n_i	365.01	1.93060

Constants of Dispersion Formula	
A_0	3.29574422E+00
A_1	-1.45780001E-02
A_2	3.91228442E-02
A_3	2.60140747E-03
A_4	-1.83898297E-04
A_5	2.23647491E-05

Density	
ρ (g/cm^3)	4.06

Solarization	
△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.2903
$P_{e,d}$	0.2362
$P_{g,F}$	0.5993
$P'_{d,c'}$	0.2413
$P'_{e,d}$	0.2326
$P'_{g,F'}$	0.5307

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0001
$\triangle P_{g,F}$	0.0056
$\triangle P_{C,t}$	0.0047
$\triangle P_{C,s}$	0.0001

Thermal Properties	
Tg (℃)	633
Ts (℃)	682
$T_{10}^{14.5}$ (℃)	570
T_{10}^{13} (℃)	606
$\alpha_{-50/80℃}$ (10^{-7}/K)	72
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	0.94

Mechanical Properties	
HK (10^7Pa)	558
F_A	188
E (GPa)	122.0
G (GPa)	47.0
μ	0.297
σ_b (MPa)	
B (10^{-12}/Pa)	1.93

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	65
-40/-30	67
-30/-20	67
-20/-10	68
-10/0	70
0/10	71
10/20	71
20/30	73
30/40	75
40/50	76
50/60	77
60/70	78
70/80	78
80/90	81
90/100	82
100/110	84
110/120	85
120/130	86
130/140	88
140/150	88
150/160	89

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.891	0.793
2200	0.956	0.914
2000	0.982	0.965
1800	0.991	0.983
1600	0.996	0.993
1400	0.997	0.994
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.997
600	0.997	0.995
550	0.996	0.992
500	0.991	0.982
480	0.987	0.974
460	0.982	0.964
440	0.974	0.948
420	0.957	0.916
400	0.919	0.844
390	0.876	0.768
380	0.789	0.622
370	0.577	0.333
360	0.252	0.063
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	1.6	1.9	2.4	2.5	2.7	2.9	3.5	3.7	3.9	5.8
-40 ~ -20	1.6	2.2	2.6	2.7	2.9	3.1	3.6	3.9	4.1	6.2
-20 ~ 0	1.8	2.4	2.6	2.8	3.0	3.2	3.8	4.0	4.3	6.5
0 ~ 20	1.8	2.5	2.8	2.9	3.1	3.3	3.9	4.1	4.5	6.8
20 ~ 40	1.9	2.6	2.9	3.0	3.3	3.5	4.1	4.2	4.6	7.1
40 ~ 60	2.1	2.7	2.9	3.1	3.4	3.7	4.2	4.4	4.7	7.3
60 ~ 80	2.2	2.8	3.0	3.3	3.6	4.0	4.4	4.7	5.0	7.6
80 ~ 100	2.3	2.9	3.2	3.5	3.8	4.2	4.5	4.9	5.1	7.8
100 ~ 120	2.5	3.1	3.4	3.6	4.0	4.3	4.8	5.1	5.3	8.0
120 ~ 140	2.6	3.3	3.6	3.8	4.2	4.5	5.0	5.3	5.6	8.2
140 ~ 160	2.7	3.5	3.8	4.1	4.4	4.6	5.1	5.5	5.8	8.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(405)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	394/361

Constants of dn/dt		
D_0	D_1	D_2
4.46E-07	1.46E-08	-2.16E-11
E_0	E_1	λ_{TK}
3.92E-07	2.47E-10	3.60E-01

H-ZLaF77A	954323	n_d = 1.95375	υ_d = 32.32	$n_F - n_C$ = 0.029506
		n_e = 1.96073	υ_e = 32.09	$n_{F'} - n_{C'}$ = 0.029940

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.89738
n_{1970}	1970.09	1.90433
n_{1530}	1529.58	1.91250
n_{1129}	1128.64	1.92116
n_{1064}	1064.00	1.92298
n_t	1013.98	1.92453
n_s	852.11	1.93102
$n_{A'}$	768.19	1.93582
n_r	706.52	1.94042
n_C	656.27	1.94514
$n_{C'}$	643.85	1.94649
n_{He-Ne}	632.80	1.94775
n_D	589.29	1.95349
n_d	587.56	1.95375
n_e	546.07	1.96073
n_F	486.13	1.97465
$n_{F'}$	479.99	1.97643
n_g	435.84	1.99207
n_h	404.66	2.00732
n_i	365.01	2.03539

Constants of Dispersion Formula	
A_0	3.67292754E+00
A_1	-1.50437161E-02
A_2	4.55746485E-02
A_3	2.28731957E-03
A_4	-1.21744297E-04
A_5	1.65263211E-05

Density	
ρ (g/cm^3)	4.94

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.2918
$P_{e,d}$	0.2366
$P_{g,F}$	0.5904
$P'_{d,c'}$	0.2425
$P'_{e,d}$	0.2331
$P'_{g,F'}$	0.5224

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0006
$\triangle P_{g,F}$	0.0005
$\triangle P_{C,t}$	0.0018
$\triangle P_{C,s}$	0.0006

Thermal Properties	
Tg (℃)	723
Ts (℃)	763
$T_{10}^{14.5}$ (℃)	680
T_{10}^{13} (℃)	716
$\alpha_{-50/80℃}$ (10^{-7}/K)	70
$\alpha_{100/300℃}$ (10^{-7}/K)	87
λ (W/(m·K))	1.01

Mechanical Properties	
HK (10^7Pa)	730
F_A	61
E (GPa)	128.5
G (GPa)	49.5
μ	0.297
σ_b (MPa)	61
B (10^{-12}/Pa)	0.79

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	61
-40/-30	64
-30/-20	65
-20/-10	67
-10/0	69
0/10	70
10/20	71
20/30	72
30/40	73
40/50	74
50/60	74
60/70	75
70/80	75
80/90	76
90/100	76
100/110	77
110/120	78
120/130	80
130/140	81
140/150	82
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.917	0.840
2200	0.976	0.952
2000	0.989	0.979
1800	0.996	0.993
1600	0.999	0.998
1400	0.999	0.999
1200	0.999	0.999
1060	0.999	0.999
1000	0.999	0.999
950	0.999	0.999
900	0.999	0.999
850	0.999	0.999
800	0.999	0.999
750	0.999	0.999
700	0.999	0.999
650	0.999	0.998
600	0.999	0.998
550	0.998	0.996
500	0.993	0.986
480	0.989	0.978
460	0.983	0.967
440	0.976	0.953
420	0.963	0.927
400	0.927	0.860
390	0.894	0.800
380	0.825	0.680
370	0.686	0.470
360	0.424	0.180
350	0.141	0.020
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.1	3.8	4.2	4.3	4.4	4.9	5.2	6.1	6.2	7.4
-40～-20	3.2	3.9	4.4	4.5	4.6	5.0	5.4	6.4	6.5	7.6
-20～0	3.4	3.9	4.4	4.5	4.7	5.1	5.6	6.7	6.8	7.9
0～20	3.4	3.9	4.5	4.6	4.7	5.2	5.7	6.8	6.9	8.2
20～40	3.4	4.0	4.6	4.7	4.8	5.3	5.9	7.0	7.1	8.6
40～60	3.5	4.1	4.7	4.8	4.9	5.4	6.1	7.2	7.3	8.8
60～80	3.6	4.3	4.9	5.0	5.1	5.6	6.3	7.5	7.6	9.2
80～100	3.7	4.4	5.0	5.1	5.2	5.7	6.6	7.7	7.8	9.5
100～120	3.7	4.5	5.1	5.2	5.3	5.9	6.8	7.9	8.0	9.7
120～140	3.9	4.6	5.2	5.3	5.4	6.1	7.0	8.1	8.2	9.9
140～160	4.0	4.7	5.3	5.4	5.5	6.3	7.2	8.3	8.4	10.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(405)/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	390/352

Constants of dn/dt		
D_0	D_1	D_2
1.46E-06	1.08E-08	-2.27E-11
E_0	E_1	λ_{TK}
9.17E-07	1.02E-09	2.53E-01

H-ZLaF78	901371	n_d = 1.90069	υ_d = 37.10	$n_F - n_C$ = 0.024280
		n_e = 1.90645	υ_e = 36.88	$n_{F'} - n_{C'}$ = 0.024580

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.85201
n_{1970}	1970.09	1.85828
n_{1530}	1529.58	1.86561
n_{1129}	1128.64	1.87323
n_{1064}	1064.00	1.87480
n_t	1013.98	1.87614
n_s	852.11	1.88167
$n_{A'}$	768.19	1.88573
n_r	706.52	1.88958
n_C	656.27	1.89352
$n_{C'}$	643.85	1.89465
n_{He-Ne}	632.80	1.89571
n_D	589.29	1.90048
n_d	587.56	1.90069
n_e	546.07	1.90645
n_F	486.13	1.91780
$n_{F'}$	479.99	1.91923
n_g	435.84	1.93177
n_h	404.66	1.94382
n_i	365.01	1.96535

Constants of Dispersion Formula	
A_0	3.49532543E+00
A_1	-1.33990335E-02
A_2	3.79713413E-02
A_3	1.56188624E-03
A_4	-7.42686015E-05
A_5	8.65884802E-06

Density	
ρ (g/cm^3)	5.05

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.2953
$P_{e,d}$	0.2372
$P_{g,F}$	0.5754
$P'_{d,c'}$	0.2457
$P'_{e,d}$	0.2343
$P'_{g,F'}$	0.5102

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0023
$\triangle P_{g,F}$	-0.0066
$\triangle P_{C,t}$	-0.0041
$\triangle P_{C,s}$	-0.0014

Thermal Properties	
Tg (℃)	690
Ts (℃)	732
$T_{10}^{14.5}$ (℃)	625
T_{10}^{13} (℃)	663
$\alpha_{-50/80℃}$ (10^{-7}/K)	65
$\alpha_{100/300℃}$ (10^{-7}/K)	84
λ (W/(m·K))	0.75

Mechanical Properties	
HK (10^7Pa)	670
F_A	72
E (GPa)	121.8
G (GPa)	46.7
μ	0.303
σ_b (MPa)	94
B (10^{-12}/Pa)	1.20

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	60
-30/-20	61
-20/-10	63
-10/0	64
0/10	65
10/20	66
20/30	67
30/40	68
40/50	68
50/60	69
60/70	69
70/80	70
80/90	71
90/100	72
100/110	73
110/120	74
120/130	75
130/140	76
140/150	77
150/160	78

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.943	0.890
2200	0.987	0.974
2000	0.998	0.996
1800	0.998	0.997
1600	0.998	0.997
1400	0.998	0.997
1200	0.998	0.997
1060	0.998	0.997
1000	0.998	0.997
950	0.998	0.997
900	0.998	0.997
850	0.998	0.997
800	0.998	0.997
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.995	0.992
500	0.991	0.984
480	0.987	0.975
460	0.980	0.962
440	0.970	0.948
420	0.958	0.917
400	0.927	0.860
390	0.898	0.806
380	0.845	0.723
370	0.775	0.611
360	0.652	0.439
350	0.429	0.194
340	0.133	0.030
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.8	5.0	5.2	5.3	5.5	5.7	6.2	6.9	7.0	8.2
-40～-20	4.9	5.1	5.4	5.5	5.8	6.0	6.3	7.1	7.3	8.4
-20～0	4.9	5.2	5.5	5.7	5.9	6.2	6.4	7.4	7.4	8.7
0～20	5.0	5.4	5.7	5.9	6.0	6.4	6.4	7.6	7.6	8.9
20～40	5.0	5.5	5.9	5.9	6.1	6.4	6.5	7.8	7.8	9.1
40～60	5.0	5.6	6.1	6.1	6.2	6.5	6.8	8.0	8.0	9.2
60～80	5.1	5.7	6.2	6.2	6.3	6.6	7.0	8.3	8.3	9.4
80～100	5.1	5.8	6.2	6.3	6.5	6.8	7.2	8.4	8.4	9.7
100～120	5.2	5.9	6.3	6.4	6.7	6.8	7.3	8.5	8.5	9.8
120～140	5.3	6.0	6.4	6.5	6.8	6.9	7.4	8.6	8.6	10.0
140～160	5.4	6.0	6.4	6.5	6.8	7.0	7.5	8.7	8.7	10.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(390)/345
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/343

Constants of dn/dt		
D_0	D_1	D_2
4.25E-06	1.31E-08	-2.92E-11
E_0	E_1	λ_{TK}
6.05E-07	4.73E-10	2.92E-01

H-ZLaF79	921240	n_d = 1.92119	υ_d = 23.96	$n_F - n_C$ = 0.038453
		n_e = 1.93024	υ_e = 23.77	$n_{F'} - n_{C'}$ = 0.039142

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.85550
n_{1970}	1970.09	1.86269
n_{1530}	1529.58	1.87136
n_{1129}	1128.64	1.88103
n_{1064}	1064.00	1.88312
n_t	1013.98	1.88494
n_s	852.11	1.89268
$n_{A'}$	768.19	1.89855
n_r	706.52	1.90425
n_C	656.27	1.91020
$n_{C'}$	643.85	1.91191
n_{He-Ne}	632.80	1.91351
n_D	589.29	1.92086
n_d	587.56	1.92119
n_e	546.07	1.93024
n_F	486.13	1.94865
$n_{F'}$	479.99	1.95105
n_g	435.84	1.97243
n_h	404.66	1.99406
n_i	365.01	2.03605

Constants of Dispersion Formula	
A_0	3.51411868E+00
A_1	-1.49702982E-02
A_2	5.16999690E-02
A_3	4.53482010E-03
A_4	-3.71738355E-04
A_5	4.63319189E-05

Density	
ρ (g/cm^3)	3.86

Solarization	
△λ (%)	-1.2

Relative Partial Dispersion	
$P_{d,C}$	0.2858
$P_{e,d}$	0.2354
$P_{g,F}$	0.6184
$P'_{d,c'}$	0.2371
$P'_{e,d}$	0.2312
$P'_{g,F'}$	0.5462

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0018
$\triangle P_{g,F}$	0.0146
$\triangle P_{C,t}$	0.0007
$\triangle P_{C,s}$	-0.0023

Thermal Properties	
Tg (℃)	661
Ts (℃)	701
$T_{10}^{14.5}$ (℃)	618
T_{10}^{13} (℃)	638
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	91
λ (W/(m·K))	1.02

Mechanical Properties	
HK (10^7Pa)	626
F_A	96
E (GPa)	114.7
G (GPa)	44.6
μ	0.285
σ_b (MPa)	102
B (10^{-12}/Pa)	2.25

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	68
-40/-30	71
-30/-20	72
-20/-10	73
-10/0	74
0/10	75
10/20	76
20/30	77
30/40	77
40/50	78
50/60	79
60/70	81
70/80	82
80/90	83
90/100	84
100/110	85
110/120	86
120/130	87
130/140	88
140/150	89
150/160	90

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.986	0.972
2200	0.989	0.978
2000	0.994	0.988
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.996	0.992
600	0.994	0.988
550	0.989	0.979
500	0.977	0.953
480	0.968	0.937
460	0.956	0.914
440	0.933	0.871
420	0.887	0.788
400	0.792	0.627
390	0.691	0.478
380	0.503	0.253
370	0.214	0.046
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.2	0.6	1.0	1.2	1.4	1.6	1.9	2.4	2.6	3.9
-40～-20	0.5	0.9	1.4	1.5	1.6	1.8	2.3	2.7	2.9	4.3
-20～0	0.7	1.2	1.5	1.6	1.7	2.2	2.7	3.0	3.1	4.6
0～20	1.0	1.5	1.8	1.9	2.0	2.4	3.0	3.2	3.3	4.8
20～40	1.2	1.8	2.1	2.2	2.3	2.6	3.3	3.5	3.6	5.3
40～60	1.3	2.0	2.2	2.3	2.5	2.7	3.5	3.8	3.8	5.7
60～80	1.4	2.2	2.5	2.6	2.8	3.1	3.7	3.9	4.0	5.9
80～100	1.5	2.4	2.6	2.8	3.0	3.2	3.8	4.3	4.4	6.1
100～120	1.6	2.5	2.9	3.1	3.2	3.4	4.2	4.6	4.7	6.3
120～140	1.8	2.7	3.1	3.2	3.3	3.8	4.4	4.8	4.9	6.7
140～160	2.1	3.1	3.5	3.6	3.7	4.1	4.7	5.1	5.2	7.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(435)/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	422/371

Constants of dn/dt		
D_0	D_1	D_2
-1.48E-06	1.72E-08	-2.62E-11
E_0	E_1	λ_{TK}
5.91E-07	3.18E-10	2.91E-01

H-ZLaF80	001255	n_d = 2.00069	υ_d = 25.46	$n_F - n_C$ = 0.039308
		n_e = 2.00996	υ_e = 25.26	$n_{F'} - n_{C'}$ = 0.039985

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.93290
n_{1970}	1970.09	1.94015
n_{1530}	1529.58	1.94903
n_{1129}	1128.64	1.95916
n_{1064}	1064.00	1.96137
n_t	1013.98	1.96328
n_s	852.11	1.97139
$n_{A'}$	768.19	1.97747
n_r	706.52	1.98335
n_C	656.27	1.98944
$n_{C'}$	643.85	1.99119
n_{He-Ne}	632.80	1.99284
n_D	589.29	2.00035
n_d	587.56	2.00069
n_e	546.07	2.00996
n_F	486.13	2.02875
$n_{F'}$	479.99	2.03118
n_g	435.84	2.05296
n_h	404.66	2.07475
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.80762148E+00
A_1	-1.53801657E-02
A_2	6.26758348E-02
A_3	1.57569502E-03
A_4	2.15980103E-04
A_5	6.30489693E-06

Density	
ρ (g/cm^3)	4.76

Solarization	
△λ (%)	-1.1

Relative Partial Dispersion	
$P_{d,C}$	0.2862
$P_{e,d}$	0.2358
$P_{g,F}$	0.6159
$P'_{d,c'}$	0.2376
$P'_{e,d}$	0.2318
$P'_{g,F'}$	0.5447

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0019
$\triangle P_{g,F}$	0.0146
$\triangle P_{C,t}$	0.0020
$\triangle P_{C,s}$	-0.0023

Thermal Properties	
Tg (℃)	700
Ts (℃)	740
$T_{10}^{14.5}$ (℃)	629
T_{10}^{13} (℃)	675
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	1.19

Mechanical Properties	
HK (10^7Pa)	630
F_A	78
E (GPa)	123.5
G (GPa)	46.3
μ	0.355
σ_b (MPa)	75
B (10^{-12}/Pa)	1.22

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	64
-40/-30	67
-30/-20	69
-20/-10	70
-10/0	71
0/10	72
10/20	73
20/30	74
30/40	75
40/50	76
50/60	76
60/70	77
70/80	78
80/90	78
90/100	79
100/110	79
110/120	80
120/130	81
130/140	82
140/150	83
150/160	84

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.955	0.912
2200	0.983	0.966
2000	0.990	0.980
1800	0.997	0.994
1600	0.997	0.994
1400	0.997	0.994
1200	0.997	0.994
1060	0.997	0.994
1000	0.997	0.994
950	0.997	0.994
900	0.997	0.994
850	0.997	0.994
800	0.997	0.994
750	0.997	0.994
700	0.997	0.994
650	0.997	0.994
600	0.995	0.991
550	0.994	0.989
500	0.967	0.941
480	0.953	0.912
460	0.931	0.870
440	0.893	0.798
420	0.816	0.662
400	0.669	0.441
390	0.559	0.312
380	0.373	0.135
370	0.144	0.024
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.6	2.4	2.9	3.1	3.2	3.3	4.0	5.6	5.9	7.4
-40～-20	1.7	2.7	3.1	3.2	3.3	3.7	4.3	5.8	6.1	7.9
-20～0	1.8	2.7	3.2	3.3	3.4	3.9	4.5	6.1	6.3	8.4
0～20	1.9	2.8	3.4	3.5	3.6	4.1	4.8	6.4	6.7	8.8
20～40	2.0	2.9	3.5	3.6	3.7	4.2	5.0	6.8	7.0	9.2
40～60	2.1	3.1	3.6	3.7	3.8	4.5	5.2	7.0	7.2	9.6
60～80	2.2	3.3	3.9	3.9	4.1	4.7	5.6	7.4	7.7	10.1
80～100	2.4	3.6	4.3	4.3	4.4	4.9	5.9	7.8	8.1	10.4
100～120	2.6	3.7	4.5	4.6	4.7	5.3	6.4	8.2	8.5	10.6
120～140	2.8	4.0	4.7	4.8	4.9	5.5	6.8	8.7	9.0	10.8
140～160	2.9	4.1	4.9	5.0	5.0	5.7	7.0	9.1	9.3	11.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(460)/375
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	440/373

Constants of dn/dt		
D_0	D_1	D_2
-7.65E-07	1.27E-08	-1.65E-11
E_0	E_1	λ_{TK}
1.04E-06	1.04E-09	2.85E-01

H-ZLaF80A	001255	n_d = 2.00069	υ_d = 25.46	$n_F - n_C$ = 0.039308
		n_e = 2.00996	υ_e = 25.26	$n_{F'} - n_{C'}$ = 0.039985

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.93290
n_{1970}	1970.09	1.94015
n_{1530}	1529.58	1.94903
n_{1129}	1128.64	1.95916
n_{1064}	1064.00	1.96137
n_t	1013.98	1.96328
n_s	852.11	1.97139
$n_{A'}$	768.19	1.97747
n_r	706.52	1.98335
n_C	656.27	1.98944
$n_{C'}$	643.85	1.99119
n_{He-Ne}	632.80	1.99284
n_D	589.29	2.00035
n_d	587.56	2.00069
n_e	546.07	2.00996
n_F	486.13	2.02875
$n_{F'}$	479.99	2.03118
n_g	435.84	2.05296
n_h	404.66	2.07475
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.80762148E+00
A_1	-1.53801657E-02
A_2	6.26758348E-02
A_3	1.57569502E-03
A_4	2.15980103E-04
A_5	6.30489693E-06

Density	
ρ (g/cm^3)	4.76

Solarization	
△λ (%)	

Relative Partial Dispersion	
$P_{d,C}$	0.2862
$P_{e,d}$	0.2358
$P_{g,F}$	0.6159
$P'_{d,c'}$	0.2376
$P'_{e,d}$	0.2318
$P'_{g,F'}$	0.5447

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0019
$\triangle P_{g,F}$	0.0146
$\triangle P_{C,t}$	0.0020
$\triangle P_{C,s}$	-0.0023

Thermal Properties	
Tg (℃)	700
Ts (℃)	740
$T_{10}^{14.5}$ (℃)	629
T_{10}^{13} (℃)	675
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	1.19

Mechanical Properties	
HK (10^7Pa)	630
F_A	78
E (GPa)	123.5
G (GPa)	46.3
μ	0.355
σ_b (MPa)	75
B (10^{-12}/Pa)	1.22

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	64
-40/-30	67
-30/-20	69
-20/-10	70
-10/0	71
0/10	72
10/20	73
20/30	74
30/40	75
40/50	76
50/60	76
60/70	77
70/80	78
80/90	78
90/100	79
100/110	79
110/120	80
120/130	81
130/140	82
140/150	83
150/160	84

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.945	0.892
2200	0.980	0.960
2000	0.991	0.982
1800	0.996	0.992
1600	0.998	0.996
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.997
700	0.998	0.996
650	0.997	0.994
600	0.995	0.991
550	0.990	0.981
500	0.974	0.948
480	0.962	0.926
460	0.945	0.894
440	0.916	0.838
420	0.857	0.735
400	0.736	0.542
390	0.625	0.391
380	0.450	0.202
370	0.202	0.041
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.6	2.4	2.9	3.1	3.2	3.3	4.0	5.6	5.9	7.4
-40～-20	1.7	2.7	3.1	3.2	3.3	3.7	4.3	5.8	6.1	7.9
-20～0	1.8	2.7	3.2	3.3	3.4	3.9	4.5	6.1	6.3	8.4
0～20	1.9	2.8	3.4	3.5	3.6	4.1	4.8	6.4	6.7	8.8
20～40	2.0	2.9	3.5	3.6	3.7	4.2	5.0	6.8	7.0	9.2
40～60	2.1	3.1	3.6	3.7	3.8	4.5	5.2	7.0	7.2	9.6
60～80	2.2	3.3	3.9	3.9	4.1	4.7	5.6	7.4	7.7	10.1
80～100	2.4	3.6	4.3	4.3	4.4	4.9	5.9	7.8	8.1	10.4
100～120	2.6	3.7	4.5	4.6	4.7	5.3	6.4	8.2	8.5	10.6
120～140	2.8	4.0	4.7	4.8	4.9	5.5	6.8	8.7	9.0	10.8
140～160	2.9	4.1	4.9	5.0	5.0	5.7	7.0	9.1	9.3	11.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(455)/375
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	430/371

Constants of dn/dt		
D_0	D_1	D_2
-7.65E-07	1.27E-08	-1.65E-11
E_0	E_1	λ_{TK}
1.04E-06	1.04E-09	2.85E-01

H-ZLaF82	001291	n_d = 2.00100	υ_d = 29.14	$n_F - n_C$ = 0.034352
		n_e = 2.00912	υ_e = 28.92	$n_{F'} - n_{C'}$ = 0.034895

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.93864
n_{1970}	1970.09	1.94582
n_{1530}	1529.58	1.95440
n_{1129}	1128.64	1.96381
n_{1064}	1064.00	1.96583
n_t	1013.98	1.96756
n_s	852.11	1.97488
$n_{A'}$	768.19	1.98035
n_r	706.52	1.98561
n_C	656.27	1.99105
$n_{C'}$	643.85	1.99260
n_{He-Ne}	632.80	1.99406
n_D	589.29	2.00070
n_d	587.56	2.00100
n_e	546.07	2.00912
n_F	486.13	2.02540
$n_{F'}$	479.99	2.02749
n_g	435.84	2.04600
n_h	404.66	2.06424
n_i	365.01	2.09830

Constants of Dispersion Formula	
A_0	3.83282270E+00
A_1	-1.56183327E-02
A_2	5.35172772E-02
A_3	2.75764007E-03
A_4	-1.28130130E-04
A_5	2.18199756E-05

Density		Solarization	
ρ (g/cm^3)	5.02	△λ (%)	-2.5

Relative Partial Dispersion	
$P_{d,C}$	0.2896
$P_{e,d}$	0.2364
$P_{g,F}$	0.5997
$P'_{d,c'}$	0.2407
$P'_{e,d}$	0.2327
$P'_{g,F'}$	0.5304

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	0.0045
$\triangle P_{C,t}$	0.0025
$\triangle P_{C,s}$	0.0004

Thermal Properties	
Tg (℃)	725
Ts (℃)	761
$T_{10}^{14.5}$ (℃)	682
T_{10}^{13} (℃)	718
$\alpha_{-50/80℃}$ (10^{-7}/K)	70
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	1.10

Mechanical Properties	
HK (10^7Pa)	720
F_A	61
E (GPa)	133.7
G (GPa)	50.0
μ	0.338
σ_b (MPa)	81
B (10^{-12}/Pa)	0.74

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	61
-40/-30	64
-30/-20	65
-20/-10	67
-10/0	68
0/10	70
10/20	71
20/30	72
30/40	74
40/50	75
50/60	75
60/70	76
70/80	76
80/90	77
90/100	78
100/110	79
110/120	80
120/130	82
130/140	83
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.935	0.875
2200	0.979	0.959
2000	0.990	0.981
1800	0.996	0.993
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.997	0.995
500	0.992	0.984
480	0.988	0.976
460	0.982	0.964
440	0.972	0.945
420	0.951	0.904
400	0.906	0.820
390	0.848	0.719
380	0.739	0.546
370	0.515	0.265
360	0.205	0.042
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.2	2.9	3.4	3.4	3.5	3.8	4.5	5.8	5.9	7.3
-40～-20	2.2	2.9	3.4	3.4	3.5	3.9	4.5	5.9	5.9	7.4
-20～0	2.3	3.0	3.5	3.5	3.6	4.0	4.6	6.1	6.1	7.7
0～20	2.2	3.0	3.6	3.7	3.7	4.2	4.8	6.3	6.4	8.1
20～40	2.3	3.0	3.7	3.7	3.8	4.3	4.9	6.6	6.6	8.3
40～60	2.3	3.1	3.8	3.8	3.9	4.5	5.0	6.8	6.8	8.6
60～80	2.4	3.2	4.0	4.1	4.2	4.7	5.4	7.0	7.1	9.0
80～100	2.5	3.3	4.3	4.3	4.4	4.9	5.7	7.2	7.3	9.3
100～120	2.6	3.5	4.5	4.5	4.6	5.1	5.9	7.4	7.5	9.5
120～140	2.6	3.6	4.6	4.6	4.7	5.2	6.0	7.6	7.7	9.7
140～160	2.7	3.7	4.7	4.8	4.8	5.3	6.1	7.7	7.8	9.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(415)/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	397/361

Constants of dn/dt		
D_0	D_1	D_2
-2.90E-07	1.09E-08	-1.93E-11
E_0	E_1	λ_{TK}
9.83E-07	8.75E-10	2.67E-01

H-ZLaF82GT	001291	n_d = 2.00100	υ_d = 29.14	$n_F - n_C$ = 0.034352
		n_e = 2.00912	υ_e = 28.92	$n_{F'} - n_{C'}$ = 0.034895

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.93864
n_{1970}	1970.09	1.94582
n_{1530}	1529.58	1.95440
n_{1129}	1128.64	1.96381
n_{1064}	1064.00	1.96583
n_t	1013.98	1.96756
n_s	852.11	1.97488
$n_{A'}$	768.19	1.98035
n_r	706.52	1.98561
n_C	656.27	1.99105
$n_{C'}$	643.85	1.99260
n_{He-Ne}	632.80	1.99406
n_D	589.29	2.00070
n_d	587.56	2.00100
n_e	546.07	2.00912
n_F	486.13	2.02540
$n_{F'}$	479.99	2.02749
n_g	435.84	2.04600
n_h	404.66	2.06424
n_i	365.01	2.09830

Constants of Dispersion Formula	
A_0	3.83282270E+00
A_1	-1.56183327E-02
A_2	5.35172772E-02
A_3	2.75764007E-03
A_4	-1.28130130E-04
A_5	2.18199756E-05

Density	
ρ (g/cm^3)	5.02

Solarization	
△λ (%)	-1.5

Relative Partial Dispersion	
$P_{d,C}$	0.2896
$P_{e,d}$	0.2364
$P_{g,F}$	0.5997
$P'_{d,c'}$	0.2407
$P'_{e,d}$	0.2327
$P'_{g,F'}$	0.5304

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0002
$\triangle P_{g,F}$	0.0045
$\triangle P_{C,t}$	0.0025
$\triangle P_{C,s}$	0.0004

Thermal Properties	
Tg (℃)	725
Ts (℃)	761
$T_{10}^{14.5}$ (℃)	682
T_{10}^{13} (℃)	718
$\alpha_{-50/80℃}$ (10^{-7}/K)	70
$\alpha_{100/300℃}$ (10^{-7}/K)	88
λ (W/(m·K))	1.10

Mechanical Properties	
HK (10^7Pa)	720
F_A	61
E (GPa)	133.7
G (GPa)	50.0
μ	0.338
σ_b (MPa)	
B (10^{-12}/Pa)	0.74

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	61
-40/-30	64
-30/-20	65
-20/-10	67
-10/0	68
0/10	70
10/20	71
20/30	72
30/40	74
40/50	75
50/60	75
60/70	76
70/80	76
80/90	77
90/100	78
100/110	79
110/120	80
120/130	82
130/140	83
140/150	84
150/160	85

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.916	0.840
2200	0.974	0.948
2000	0.988	0.975
1800	0.995	0.990
1600	0.999	0.997
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.998	0.996
500	0.993	0.987
480	0.989	0.979
460	0.984	0.969
440	0.977	0.954
420	0.959	0.919
400	0.922	0.850
390	0.872	0.761
380	0.769	0.591
370	0.547	0.299
360	0.226	0.051
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.2	2.9	3.4	3.4	3.5	3.8	4.5	5.8	5.9	7.3
-40～-20	2.2	2.9	3.4	3.4	3.5	3.9	4.5	5.9	5.9	7.4
-20～0	2.3	3.0	3.5	3.5	3.6	4.0	4.6	6.1	6.1	7.7
0～20	2.2	3.0	3.6	3.7	3.7	4.2	4.8	6.3	6.4	8.1
20～40	2.3	3.0	3.7	3.7	3.8	4.3	4.9	6.6	6.6	8.3
40～60	2.3	3.1	3.8	3.8	3.9	4.5	5.0	6.8	6.8	8.6
60～80	2.4	3.2	4.0	4.1	4.2	4.7	5.4	7.0	7.1	9.0
80～100	2.5	3.3	4.3	4.3	4.4	4.9	5.7	7.2	7.3	9.3
100～120	2.6	3.5	4.5	4.5	4.6	5.1	5.9	7.4	7.5	9.5
120～140	2.6	3.6	4.6	4.6	4.7	5.2	6.0	7.6	7.7	9.7
140～160	2.7	3.7	4.7	4.8	4.8	5.3	6.1	7.7	7.8	9.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(409)/363
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	381/360

Constants of dn/dt		
D_0	D_1	D_2
-2.90E-07	1.09E-08	-1.93E-11
E_0	E_1	λ_{TK}
9.83E-07	8.75E-10	2.67E-01

H-ZLaF86	883270	n_d = 1.88252	υ_d = 27.00	$n_F - n_C$ = 0.032686
		n_e = 1.89022	υ_e = 26.78	$n_{F'} - n_{C'}$ = 0.033246

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.82367
n_{1970}	1970.09	1.83046
n_{1530}	1529.58	1.83859
n_{1129}	1128.64	1.84749
n_{1064}	1064.00	1.84939
n_t	1013.98	1.85103
n_s	852.11	1.85790
$n_{A'}$	768.19	1.86304
n_r	706.52	1.86800
n_C	656.27	1.87312
$n_{C'}$	643.85	1.87457
n_{He-Ne}	632.80	1.87595
n_D	589.29	1.88223
n_d	587.56	1.88252
n_e	546.07	1.89022
n_F	486.13	1.90581
$n_{F'}$	479.99	1.90782
n_g	435.84	1.92583
n_h	404.66	1.94392
n_i	365.01	1.97855

Constants of Dispersion Formula	
A_0	3.39234287E+00
A_1	-1.39491556E-02
A_2	4.74887284E-02
A_3	2.28412158E-03
A_4	-8.32791862E-05
A_5	2.34034525E-05

Density	
ρ (g/cm^3)	4.05

Solarization	
△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2876
$P_{e,d}$	0.2356
$P_{g,F}$	0.6125
$P'_{d,c'}$	0.2391
$P'_{e,d}$	0.2316
$P'_{g,F'}$	0.5417

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0017
$\triangle P_{g,F}$	0.0137
$\triangle P_{C,t}$	0.0049
$\triangle P_{C,s}$	0.0004

Thermal Properties	
Tg (℃)	717
Ts (℃)	762
$T_{10}^{14.5}$ (℃)	678
T_{10}^{13} (℃)	709
$\alpha_{-50/80℃}$ (10^{-7}/K)	70
$\alpha_{100/300℃}$ (10^{-7}/K)	83
λ (W/(m·K))	1.13

Mechanical Properties	
HK (10^7Pa)	608
F_A	94
E (GPa)	112.2
G (GPa)	43.3
μ	0.294
σ_b (MPa)	97
B (10^{-12}/Pa)	1.66

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	60
-40/-30	63
-30/-20	63
-20/-10	65
-10/0	68
0/10	69
10/20	70
20/30	73
30/40	74
40/50	75
50/60	75
60/70	75
70/80	76
80/90	76
90/100	76
100/110	77
110/120	78
120/130	79
130/140	80
140/150	81
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.969	0.938
2200	0.987	0.975
2000	0.995	0.991
1800	0.998	0.997
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.998	0.997
650	0.998	0.997
600	0.997	0.995
550	0.993	0.987
500	0.982	0.965
480	0.975	0.950
460	0.964	0.929
440	0.944	0.891
420	0.902	0.813
400	0.804	0.647
390	0.701	0.491
380	0.512	0.262
370	0.230	0.053
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.2	1.8	2.1	2.1	2.2	2.4	3.2	4.3	4.5	6.4
-40～-20	1.3	1.9	2.2	2.3	2.4	2.6	3.4	4.5	4.7	6.6
-20～0	1.4	2.1	2.3	2.5	2.6	2.8	3.5	4.6	4.8	6.7
0～20	1.6	2.3	2.5	2.6	2.7	3.1	3.7	4.8	4.9	6.9
20～40	1.8	2.5	2.8	2.9	2.9	3.2	3.8	5.0	5.1	7.1
40～60	2.0	2.6	2.9	3.0	3.0	3.4	4.1	5.1	5.3	7.3
60～80	2.1	2.8	3.2	3.3	3.3	3.5	4.3	5.2	5.4	7.6
80～100	2.3	3.0	3.3	3.4	3.4	3.6	4.5	5.4	5.5	7.7
100～120	2.3	3.1	3.5	3.6	3.6	3.9	4.6	5.5	5.6	7.9
120～140	2.4	3.2	3.7	3.8	3.9	4.1	4.7	5.6	5.7	8.2
140～160	2.5	3.3	3.8	3.9	4.0	4.3	4.9	5.9	6.0	8.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(430)/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	418/370

Constants of dn/dt		
D_0	D_1	D_2
-4.29E-07	1.62E-08	-2.51E-11
E_0	E_1	λ_{TK}
5.81E-07	5.62E-12	3.40E-01

H-ZLaF95	051269	n_d = 2.05090	υ_d = 26.94	$n_F - n_C$ = 0.039005
		n_e = 2.06011	υ_e = 26.74	$n_{F'} - n_{C'}$ = 0.039645

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.98329
n_{1970}	1970.09	1.99055
n_{1530}	1529.58	1.99938
n_{1129}	1128.64	2.00940
n_{1064}	1064.00	2.01158
n_t	1013.98	2.01348
n_s	852.11	2.02155
$n_{A'}$	768.19	2.02764
n_r	706.52	2.03354
n_C	656.27	2.03965
$n_{C'}$	643.85	2.04140
n_{He-Ne}	632.80	2.04306
n_D	589.29	2.05057
n_d	587.56	2.05090
n_e	546.07	2.06011
n_F	486.13	2.07865
$n_{F'}$	479.99	2.08104
n_g	435.84	2.10221
n_h	404.66	2.12327
n_i	365.01	2.16304

Constants of Dispersion Formula	
A_0	4.00832073E+00
A_1	-1.59378407E-02
A_2	6.04102723E-02
A_3	3.81295608E-03
A_4	-2.46023955E-04
A_5	3.41387429E-05

Density	
ρ (g/cm^3)	5.27

Solarization	
△λ (%)	-1.5

Relative Partial Dispersion	
$P_{d,C}$	0.2884
$P_{e,d}$	0.2361
$P_{g,F}$	0.6040
$P'_{d,c'}$	0.2396
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5340

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	0.0052
$\triangle P_{C,t}$	0.0003
$\triangle P_{C,s}$	-0.0010

Thermal Properties	
Tg (℃)	749
Ts (℃)	784
$T_{10}^{14.5}$ (℃)	726
T_{10}^{13} (℃)	743
$\alpha_{-50/80℃}$ (10^{-7}/K)	74
$\alpha_{100/300℃}$ (10^{-7}/K)	90
λ (W/(m·K))	1.02

Mechanical Properties	
HK (10^7Pa)	699
F_A	63
E (GPa)	131.4
G (GPa)	50.2
μ	0.308
σ_b (MPa)	86
B (10^{-12}/Pa)	0.62

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	65
-40/-30	68
-30/-20	71
-20/-10	69
-10/0	71
0/10	74
10/20	73
20/30	76
30/40	78
40/50	75
50/60	80
60/70	82
70/80	78
80/90	82
90/100	81
100/110	81
110/120	85
120/130	83
130/140	86
140/150	86
150/160	88

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.953	0.907
2200	0.985	0.970
2000	0.994	0.988
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.996	0.994
550	0.992	0.986
500	0.976	0.953
480	0.963	0.928
460	0.944	0.892
440	0.914	0.835
420	0.854	0.729
400	0.727	0.529
390	0.618	0.382
380	0.459	0.211
370	0.245	0.062
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.4	2.1	2.6	2.6	2.7	2.9	3.6	4.9	5.1	6.2
-40～-20	1.6	2.2	2.7	2.7	2.8	3.2	3.8	5.3	5.4	6.4
-20～0	1.7	2.3	2.8	2.9	3.0	3.4	4.0	5.6	5.7	6.8
0～20	1.9	2.5	2.9	3.0	3.1	3.6	4.1	6.0	6.0	7.2
20～40	2.0	2.6	3.0	3.1	3.3	3.7	4.4	6.3	6.4	7.5
40～60	2.3	2.7	3.2	3.3	3.4	3.9	4.7	6.7	6.7	7.7
60～80	2.5	3.1	3.5	3.5	3.6	4.2	5.1	7.0	7.1	8.0
80～100	2.5	3.2	3.7	3.7	3.7	4.4	5.3	7.4	7.4	8.4
100～120	2.6	3.3	3.9	3.9	3.9	4.7	5.7	7.7	7.7	8.7
120～140	2.8	3.5	4.1	4.1	4.2	5.1	6.1	8.0	8.1	9.1
140～160	3.0	3.7	4.3	4.4	4.5	5.3	6.4	8.4	8.5	9.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(470)/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	432/369

Constants of dn/dt		
D_0	D_1	D_2
-1.09E-06	1.24E-08	-1.70E-11
E_0	E_1	λ_{TK}
9.96E-07	1.03E-09	2.51E-01

H-BiF200	003193	n_d = 2.00272	υ_d = 19.32	$n_F - n_C$ = 0.051908
		n_e = 2.01489	υ_e = 19.16	$n_{F'} - n_{C'}$ = 0.052967

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.95027
n_{1064}	1064.00	1.95293
n_t	1013.98	1.95525
n_s	852.11	1.96520
$n_{A'}$	768.19	1.97282
n_r	706.52	1.98028
n_C	656.27	1.98811
$n_{C'}$	643.85	1.99036
n_{He-Ne}	632.80	1.99250
n_D	589.29	2.00228
n_d	587.56	2.00272
n_e	546.07	2.01489
n_F	486.13	2.04002
$n_{F'}$	479.99	2.04333
n_g	435.84	2.07334
n_h	404.66	2.10453
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.77070363E+00
A_1	-1.89710141E-02
A_2	6.72915528E-02
A_3	7.22871114E-03
A_4	-6.15434682E-04
A_5	8.70566270E-05

Density	
ρ (g/cm^3)	5.10

Solarization	
△λ (%)	-3.5

Relative Partial Dispersion	
$P_{d,C}$	0.2815
$P_{e,d}$	0.2345
$P_{g,F}$	0.6419
$P'_{d,c'}$	0.2334
$P'_{e,d}$	0.2298
$P'_{g,F'}$	0.5666

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0046
$\triangle P_{g,F}$	0.0304
$\triangle P_{C,t}$	-0.0007
$\triangle P_{C,s}$	-0.0054

Thermal Properties	
Tg (℃)	519
Ts (℃)	558
$T_{10}^{14.5}$ (℃)	496
T_{10}^{13} (℃)	514
$\alpha_{-50/80℃}$ (10^{-7}/K)	75
$\alpha_{100/300℃}$ (10^{-7}/K)	91
λ (W/(m·K))	0.72

Mechanical Properties	
HK (10^7Pa)	403
F_A	251
E (GPa)	84.8
G (GPa)	33.6
μ	0.263
σ_b (MPa)	53
B (10^{-12}/Pa)	2.11

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	67
-40/-30	69
-30/-20	71
-20/-10	71
-10/0	71
0/10	73
10/20	73
20/30	74
30/40	74
40/50	74
50/60	75
60/70	77
70/80	79
80/90	79
90/100	81
100/110	81
110/120	81
120/130	82
130/140	82
140/150	86
150/160	86

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.967	0.936
2200	0.983	0.966
2000	0.993	0.987
1800	0.997	0.993
1600	0.998	0.996
1400	0.999	0.997
1200	0.999	0.998
1060	0.998	0.996
1000	0.998	0.995
950	0.997	0.995
900	0.998	0.995
850	0.997	0.994
800	0.997	0.993
750	0.996	0.992
700	0.996	0.991
650	0.994	0.989
600	0.993	0.986
550	0.985	0.970
500	0.961	0.924
480	0.943	0.889
460	0.915	0.838
440	0.857	0.734
420	0.675	0.456
400	0.195	0.038
390		
380		
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.9	5.5	5.6	5.8	6.1	6.4	7.2	10.2	10.6	14.6
-40～-20	5.0	5.5	5.8	6.1	6.2	6.8	7.6	10.6	10.9	15.0
-20～0	5.1	5.6	6.0	6.2	6.4	7.1	8.2	11.1	11.6	15.7
0～20	5.3	5.7	6.2	6.5	6.7	7.5	8.6	11.8	12.2	16.5
20～40	5.5	6.0	6.5	6.7	6.9	7.8	9.0	12.4	12.8	17.5
40～60	5.7	6.2	6.8	6.9	7.2	8.2	9.3	12.9	13.3	18.5
60～80	6.0	6.4	7.1	7.3	7.6	8.5	9.8	13.5	14.0	19.4
80～100	6.0	6.6	7.4	7.6	8.0	8.7	10.5	14.0	14.5	20.3
100～120	6.2	6.8	7.6	7.8	8.0	9.3	10.8	14.6	15.1	21.0
120～140	6.3	7.0	7.9	8.1	8.3	9.6	11.3	15.1	15.7	21.9
140～160	6.4	7.1	8.1	8.3	8.5	9.9	11.5	15.5	16.2	22.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(470)/400
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	446/399

Constants of dn/dt		
D_0	D_1	D_2
3.25E-06	1.38E-08	-2.30E-11
E_0	E_1	λ_{TK}
1.02E-06	1.47E-09	3.56E-01

D-FK61	497816	n_d = 1.49700	υ_d = 81.61	$n_F - n_C$ = 0.006090
		n_e = 1.49845	υ_e = 81.20	$n_{F'} - n_{C'}$ = 0.006139

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.47950
n_{1970}	1970.09	1.48263
n_{1530}	1529.58	1.48606
n_{1129}	1128.64	1.48910
n_{1064}	1064.00	1.48965
n_t	1013.98	1.49010
n_s	852.11	1.49183
$n_{A'}$	768.19	1.49301
n_r	706.52	1.49407
n_C	656.27	1.49514
$n_{C'}$	643.85	1.49543
n_{He-Ne}	632.80	1.49571
n_D	589.29	1.49694
n_d	587.56	1.49700
n_e	546.07	1.49845
n_F	486.13	1.50123
$n_{F'}$	479.99	1.50157
n_g	435.84	1.50451
n_h	404.66	1.50721
n_i	365.01	1.51173

Constants of Dispersion Formula	
A_0	2.21807952E+00
A_1	-5.67922113E-03
A_2	8.28756139E-03
A_3	9.66891434E-05
A_4	3.56668643E-06
A_5	-3.63065113E-07

Density	
ρ (g/cm^3)	3.67

Solarization	
△λ (%)	-2.4

Relative Partial Dispersion	
$P_{d,C}$	0.3054
$P_{e,d}$	0.2381
$P_{g,F}$	0.5386
$P'_{d,c'}$	0.2557
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4789

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0113
$\triangle P_{g,F}$	0.0305
$\triangle P_{C,t}$	-0.1080
$\triangle P_{C,s}$	-0.0528

Thermal Properties	
Tg (℃)	464
Ts (℃)	489
$T_{10}^{14.5}$ (℃)	421
T_{10}^{13} (℃)	442
$\alpha_{-50/80℃}$ (10^{-7}/K)	124
$\alpha_{100/300℃}$ (10^{-7}/K)	152
λ (W/(m·K))	0.74
β_d	58

Mechanical Properties	
HK (10^7Pa)	350
F_A	385
E (GPa)	71.6
G (GPa)	27.4
μ	0.307
σ_b (MPa)	33
B (10^{-12}/Pa)	0.69

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	115
-40/-30	118
-30/-20	121
-20/-10	123
-10/0	125
0/10	127
10/20	128
20/30	130
30/40	133
40/50	136
50/60	138
60/70	140
70/80	142
80/90	144
90/100	145
100/110	146
110/120	147
120/130	148
130/140	149
140/150	150
150/160	151

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.999	0.998
370	0.995	0.993
360	0.984	0.975
350	0.970	0.948
340	0.942	0.893
330	0.886	0.788
320	0.788	0.621
310	0.643	0.410
300	0.466	0.212
290	0.298	0.086
280	0.176	0.031

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-5.4	-5.3	-5.3	-5.2	-5.1	-5.0	-4.9	-4.6	-4.6	-4.5
-40～-20	-5.6	-5.4	-5.3	-5.3	-5.3	-5.3	-5.2	-5.1	-5.0	-4.8
-20～0	-5.8	-5.8	-5.7	-5.7	-5.7	-5.6	-5.5	-5.2	-5.2	-5.1
0～20	-6.1	-6.0	-5.9	-5.9	-5.9	-5.9	-5.8	-5.7	-5.6	-5.5
20～40	-6.4	-6.3	-6.2	-6.2	-6.2	-6.0	-6.0	-5.9	-5.8	-5.7
40～60	-6.6	-6.5	-6.4	-6.4	-6.5	-6.4	-6.3	-6.0	-6.0	-5.9
60～80	-6.8	-6.8	-6.7	-6.6	-6.6	-6.6	-6.5	-6.3	-6.2	-6.0
80～100	-7.0	-6.9	-6.9	-6.9	-6.9	-6.9	-6.8	-6.5	-6.4	-6.1
100～120	-7.2	-7.2	-7.1	-7.1	-7.1	-7.1	-6.9	-6.8	-6.7	-6.4
120～140	-7.5	-7.5	-7.4	-7.4	-7.4	-7.3	-7.1	-7.1	-7.0	-6.8
140～160	-7.9	-7.8	-7.7	-7.6	-7.6	-7.5	-7.4	-7.3	-7.2	-7.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/285
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	332/284

Constants of dn/dt		
D_0	D_1	D_2
-1.90E-05	-2.71E-09	-2.90E-11
E_0	E_1	λ_{TK}
3.52E-07	9.31E-11	2.28E-01

D-FK90	459902	n_d = 1.45860	υ_d = 90.19	$n_F - n_C$ = 0.005085
		n_e = 1.45981	υ_e = 89.77	$n_{F'} - n_{C'}$ = 0.005122

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.44358
n_{1970}	1970.09	1.44630
n_{1530}	1529.58	1.44928
n_{1129}	1128.64	1.45191
n_{1064}	1064.00	1.45238
n_t	1013.98	1.45277
n_s	852.11	1.45425
$n_{A'}$	768.19	1.45524
n_r	706.52	1.45615
n_C	656.27	1.45704
$n_{C'}$	643.85	1.45729
n_{He-Ne}	632.80	1.45752
n_D	589.29	1.45855
n_d	587.56	1.45860
n_e	546.07	1.45981
n_F	486.13	1.46212
$n_{F'}$	479.99	1.46241
n_g	435.84	1.46486
n_h	404.66	1.46710
n_i	365.01	1.47085

Constants of Dispersion Formula	
A_0	2.10866977E+00
A_1	-4.81589397E-03
A_2	7.02478609E-03
A_3	-2.48667024E-05
A_4	1.78185408E-05
A_5	-1.09874507E-06

Density	
ρ (g/cm^3)	3.64

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3068
$P_{e,d}$	0.2380
$P_{g,F}$	0.5388
$P'_{d,c'}$	0.2558
$P'_{e,d}$	0.2362
$P'_{g,F'}$	0.4783

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0139
$\triangle P_{g,F}$	0.0450
$\triangle P_{C,t}$	-0.1374
$\triangle P_{C,s}$	-0.0682

Thermal Properties	
Tg (℃)	442
Ts (℃)	467
$T_{10}^{14.5}$ (℃)	423
T_{10}^{13} (℃)	436
$\alpha_{-50/80℃}$ (10^{-7}/K)	134
$\alpha_{100/300℃}$ (10^{-7}/K)	164
λ (W/(m·K))	0.71
β_d	48

Mechanical Properties	
HK (10^7Pa)	354
F_A	459
E (GPa)	68.9
G (GPa)	26.2
μ	0.313
σ_b (MPa)	48
B (10^{-12}/Pa)	0.60

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	2
D_A	3
R_{OH} (S)	4
RP (S)	2

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	123
-40/-30	126
-30/-20	128
-20/-10	130
-10/0	132
0/10	133
10/20	135
20/30	138
30/40	140
40/50	143
50/60	144
60/70	145
70/80	146
80/90	147
90/100	149
100/110	150
110/120	151
120/130	153
130/140	155
140/150	157
150/160	160

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.999	0.998
370	0.999	0.998
360	0.998	0.996
350	0.997	0.994
340	0.993	0.986
330	0.984	0.968
320	0.967	0.935
310	0.935	0.874
300	0.883	0.779
290	0.809	0.654
280	0.721	0.520

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-7.0	-6.7	-6.5	-6.4	-6.2	-6.0	-5.9	-5.6	-5.6	-5.3
-40～-20	-7.2	-6.8	-6.5	-6.5	-6.4	-6.2	-6.0	-5.8	-5.8	-5.5
-20～0	-7.3	-6.9	-6.7	-6.7	-6.6	-6.4	-6.3	-6.0	-5.9	-5.7
0～20	-7.3	-7.0	-6.8	-6.8	-6.7	-6.5	-6.5	-6.1	-6.1	-6.0
20～40	-7.5	-7.1	-7.0	-6.9	-6.8	-6.5	-6.5	-6.2	-6.2	-6.2
40～60	-7.6	-7.3	-7.2	-7.2	-7.1	-6.7	-6.6	-6.5	-6.5	-6.3
60～80	-7.9	-7.6	-7.5	-7.5	-7.4	-7.0	-7.0	-6.8	-6.7	-6.6
80～100	-8.0	-7.8	-7.7	-7.6	-7.4	-7.2	-7.1	-6.9	-6.8	-6.7
100～120	-8.1	-8.1	-8.0	-7.9	-7.8	-7.6	-7.4	-7.2	-7.2	-7.0
120～140	-8.2	-8.0	-8.0	-8.0	-7.9	-7.8	-7.7	-7.5	-7.5	-7.3
140～160	-8.4	-8.3	-8.3	-8.2	-8.2	-8.0	-8.0	-7.9	-7.8	-7.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	310/260
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	300/260

Constants of dn/dt		
D_0	D_1	D_2
-2.37E-05	5.32E-09	-4.63E-11
E_0	E_1	λ_{TK}
9.51E-07	-1.08E-09	2.02E-08

D-FK95	437951	n_d = 1.43700	υ_d = 95.10	$n_F - n_C$ = 0.004595
		n_e = 1.43810	υ_e = 94.66	$n_F - n_{C'}$ = 0.004628

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.42310
n_{1970}	1970.09	1.42566
n_{1530}	1529.58	1.42846
n_{1129}	1128.64	1.43091
n_{1064}	1064.00	1.43134
n_t	1013.98	1.43170
n_s	852.11	1.43306
$n_{A'}$	768.19	1.43396
n_r	706.52	1.43478
n_C	656.27	1.43559
$n_{C'}$	643.85	1.43582
n_{He-Ne}	632.80	1.43603
n_D	589.29	1.43696
n_d	587.56	1.43700
n_e	546.07	1.43810
n_F	486.13	1.44019
$n_{F'}$	479.99	1.44044
n_g	435.84	1.44264
n_h	404.66	1.44466
n_i	365.01	1.44803

Constants of Dispersion Formula	
A_0	2.04831817E+00
A_1	-4.48612591E-03
A_2	6.22248873E-03
A_3	-7.98581030E-06
A_4	1.22118495E-05
A_5	-7.39464344E-07

Density	
ρ (g/cm^3)	3.56

Solarization	
△λ (%)	-3.2

Relative Partial Dispersion	
$P_{d,C}$	0.3069
$P_{e,d}$	0.2394
$P_{g,F}$	0.5332
$P'_{d,c'}$	0.2550
$P'_{e,d}$	0.2377
$P'_{g,F'}$	0.4754

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0171
$\triangle P_{g,F}$	0.0475
$\triangle P_{C,t}$	-0.1544
$\triangle P_{C,s}$	-0.0780

Thermal Properties	
Tg (℃)	409
Ts (℃)	433
$T_{10}^{14.5}$ (℃)	377
T_{10}^{13} (℃)	390
$\alpha_{-50/80℃}$ (10^{-7}/K)	143
$\alpha_{100/300℃}$ (10^{-7}/K)	170
λ (W/(m·K))	0.97

Mechanical Properties	
HK (10^7Pa)	358
F_A	449
E (GPa)	71.4
G (GPa)	26.8
μ	0.333
σ_b (MPa)	32
B (10^{-12}/Pa)	0.59

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	2
D_A	3
R_{OH} (S)	4
RP (S)	3

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	132
-40/-30	134
-30/-20	136
-20/-10	138
-10/0	140
0/10	142
10/20	143
20/30	145
30/40	147
40/50	149
50/60	151
60/70	153
70/80	154
80/90	155
90/100	156
100/110	157
110/120	158
120/130	159
130/140	161
140/150	163
150/160	164

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.999	0.998
2200	0.999	0.998
2000	0.999	0.998
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.997
440	0.998	0.997
420	0.998	0.997
400	0.998	0.997
390	0.998	0.997
380	0.998	0.997
370	0.997	0.995
360	0.994	0.988
350	0.986	0.973
340	0.965	0.932
330	0.925	0.856
320	0.845	0.714
310	0.716	0.513
300	0.535	0.286
290	0.367	0.135
280	0.205	0.042

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times10^{-6}$/℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	-5.5	-5.3	-5.2	-5.2	-5.1	-5.0	-4.9	-4.8	-4.8	-4.5
-40 ~ -20	-6.0	-5.8	-5.7	-5.7	-5.6	-5.5	-5.3	-5.1	-5.1	-4.9
-20 ~ 0	-6.4	-6.2	-6.0	-6.0	-5.9	-5.8	-5.7	-5.5	-5.5	-5.3
0 ~ 20	-6.7	-6.5	-6.4	-6.4	-6.3	-6.2	-6.1	-5.8	-5.8	-5.6
20 ~ 40	-7.0	-6.8	-6.7	-6.7	-6.6	-6.4	-6.4	-6.2	-6.1	-5.9
40 ~ 60	-7.2	-7.0	-6.9	-6.9	-6.8	-6.7	-6.6	-6.5	-6.4	-6.2
60 ~ 80	-7.3	-7.2	-7.1	-7.1	-7.0	-6.9	-6.8	-6.7	-6.6	-6.4
80 ~ 100	-7.3	-7.2	-7.1	-7.1	-7.0	-6.9	-6.8	-6.7	-6.7	-6.5
100 ~ 120	-7.3	-7.2	-7.1	-7.1	-7.1	-7.0	-6.9	-6.7	-6.7	-6.6
120 ~ 140	-7.4	-7.3	-7.2	-7.1	-7.1	-7.0	-6.8	-6.7	-6.7	-6.6
140 ~ 160	-7.5	-7.4	-7.2	-7.2	-7.1	-7.0	-6.9	-6.8	-6.7	-6.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	330/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	326/280

Constants of dn/dt		
D_0	D_1	D_2
-2.28E-05	-4.73E-09	3.04E-11
E_0	E_1	λ_{TK}
6.79E-07	-1.59E-10	1.98E-07

D-K9	516641	n_d = 1.51633	υ_d = 64.06	$n_F - n_C$ = 0.008060
		n_e = 1.51825	υ_e = 63.87	$n_{F'} - n_{C'}$ = 0.008114

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.48801
n_{1970}	1970.09	1.49383
n_{1530}	1529.58	1.50003
n_{1129}	1128.64	1.50516
n_{1064}	1064.00	1.50603
n_t	1013.98	1.50673
n_s	852.11	1.50929
$n_{A'}$	768.19	1.51094
n_r	706.52	1.51241
n_C	656.27	1.51384
$n_{C'}$	643.85	1.51424
n_{He-Ne}	632.80	1.51461
n_D	589.29	1.51625
n_d	587.56	1.51633
n_e	546.07	1.51825
n_F	486.13	1.52190
$n_{F'}$	479.99	1.52236
n_g	435.84	1.52621
n_h	404.66	1.52976
n_i	365.01	1.53574

Constants of Dispersion Formula	
A_0	2.27095299E+00
A_1	-1.08648469E-02
A_2	1.05786491E-02
A_3	1.54454636E-04
A_4	5.64088446E-06
A_5	-4.70999004E-07

Density	
ρ (g/cm^3)	2.39

Solarization	
△λ (%)	-1.4

Relative Partial Dispersion	
$P_{d,C}$	0.3089
$P_{e,d}$	0.2382
$P_{g,F}$	0.5347
$P'_{d,c'}$	0.2576
$P'_{e,d}$	0.2366
$P'_{g,F'}$	0.4745

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0020
$\triangle P_{g,F}$	-0.0025
$\triangle P_{C,t}$	0.0316
$\triangle P_{C,s}$	0.0104

Thermal Properties	
Tg (℃)	497
Ts (℃)	552
$T_{10}^{14.5}$ (℃)	450
T_{10}^{13} (℃)	465
$\alpha_{-50/80℃}$ (10^{-7}/K)	58
$\alpha_{100/300℃}$ (10^{-7}/K)	70
λ (W/(m·K))	1.31
β_d	55

Mechanical Properties	
HK (10^7Pa)	581
F_A	81
E (GPa)	79.0
G (GPa)	32.7
μ	0.208
σ_b (MPa)	92
B (10^{-12}/Pa)	2.73

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	54
-30/-20	55
-20/-10	56
-10/0	57
0/10	57
10/20	58
20/30	59
30/40	59
40/50	60
50/60	61
60/70	61
70/80	61
80/90	62
90/100	63
100/110	63
110/120	64
120/130	66
130/140	67
140/150	68
150/160	69

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.878	0.771
2200	0.939	0.882
2000	0.985	0.970
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.998	0.997
380	0.997	0.996
370	0.996	0.995
360	0.993	0.987
350	0.987	0.976
340	0.973	0.950
330	0.947	0.898
320	0.891	0.794
310	0.774	0.598
300	0.556	0.308
290	0.256	0.066
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.5	3.6	3.9
-40～-20	2.7	2.8	2.9	3.1	3.1	3.3	3.4	3.6	3.7	4.0
-20～0	2.7	2.9	3.1	3.2	3.3	3.3	3.4	3.7	3.7	4.1
0～20	2.8	3.0	3.2	3.3	3.3	3.3	3.5	3.7	3.8	4.2
20～40	2.9	3.1	3.2	3.4	3.5	3.5	3.6	3.7	3.9	4.2
40～60	2.9	3.2	3.2	3.4	3.5	3.6	3.6	3.8	4.0	4.3
60～80	2.9	3.3	3.4	3.5	3.6	3.6	3.7	3.8	4.0	4.4
80～100	3.0	3.3	3.5	3.6	3.6	3.7	3.7	3.9	4.0	4.6
100～120	3.0	3.3	3.5	3.7	3.7	3.8	3.9	4.0	4.0	4.8
120～140	3.1	3.4	3.5	3.7	3.8	3.9	4.0	4.1	4.2	4.9
140～160	3.1	3.4	3.7	3.9	3.9	4.0	4.2	4.2	4.3	5.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	330/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	320/280

Constants of dn/dt		
D_0	D_1	D_2
3.06E-06	1.56E-08	-3.00E-11
E_0	E_1	λ_{TK}
4.56E-07	3.40E-10	2.15E-01

D-PK60	592670	n_d = 1.59201	υ_d = 67.00	$n_F - n_C$ = 0.008833
		n_e = 1.59412	υ_e = 66.73	$n_{F'} - n_{C'}$ = 0.008899

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.56449
n_{1970}	1970.09	1.56973
n_{1530}	1529.58	1.57540
n_{1129}	1128.64	1.58027
n_{1064}	1064.00	1.58112
n_t	1013.98	1.58182
n_s	852.11	1.58444
$n_{A'}$	768.19	1.58618
n_r	706.52	1.58775
n_C	656.27	1.58931
$n_{C'}$	643.85	1.58974
n_{He-Ne}	632.80	1.59014
n_D	589.29	1.59193
n_d	587.56	1.59201
n_e	546.07	1.59412
n_F	486.13	1.59814
$n_{F'}$	479.99	1.59864
n_g	435.84	1.60291
n_h	404.66	1.60684
n_i	365.01	1.61349

Relative Partial Dispersion	
$P_{d,C}$	0.3057
$P_{e,d}$	0.2389
$P_{g,F}$	0.5400
$P'_{d,c'}$	0.2551
$P'_{e,d}$	0.2371
$P'_{g,F'}$	0.4798

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0019
$\triangle P_{g,F}$	0.0077
$\triangle P_{C,t}$	-0.0168
$\triangle P_{C,s}$	-0.0099

Thermal Properties	
Tg (℃)	509
Ts (℃)	538
$T_{10}^{14.5}$ (℃)	481
T_{10}^{13} (℃)	502
$\alpha_{-50/80℃}$ (10^{-7}/K)	87
$\alpha_{100/300℃}$ (10^{-7}/K)	113
λ (W/(m·K))	0.78
β_d	120

Mechanical Properties	
HK (10^7Pa)	426
F_A	299
E (GPa)	80.4
G (GPa)	31.0
μ	0.297
σ_b (MPa)	57
B (10^{-12}/Pa)	1.30

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	79
-40/-30	81
-30/-20	85
-20/-10	87
-10/0	89
0/10	90
10/20	91
20/30	93
30/40	93
40/50	95
50/60	96
60/70	96
70/80	98
80/90	100
90/100	102
100/110	102
110/120	103
120/130	104
130/140	106
140/150	106
150/160	108

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.915	0.837
2200	0.947	0.897
2000	0.977	0.955
1800	0.990	0.980
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.995
420	0.996	0.992
400	0.994	0.988
390	0.992	0.984
380	0.990	0.980
370	0.985	0.972
360	0.978	0.952
350	0.967	0.930
340	0.945	0.889
330	0.908	0.821
320	0.848	0.716
310	0.762	0.579
300	0.657	0.433
290	0.542	0.297
280	0.422	0.182

Constants of Dispersion Formula	
A_0	2.50030926E+00
A_1	-1.01689443E-02
A_2	1.24607241E-02
A_3	1.85952458E-04
A_4	2.05179854E-06
A_5	-1.49222817E-07

Density	
ρ (g/cm^3)	3.27

Solarization	
△λ (%)	-2.5

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-1.8	-1.7	-1.5	-1.5	-1.5	-1.4	-1.3	-1.1	-1.1	-0.9
-40～-20	-1.9	-1.8	-1.6	-1.6	-1.6	-1.5	-1.4	-1.2	-1.2	-1.0
-20～0	-2.0	-1.9	-1.8	-1.7	-1.7	-1.6	-1.4	-1.3	-1.3	-1.1
0～20	-2.1	-1.9	-1.8	-1.8	-1.8	-1.7	-1.6	-1.4	-1.4	-1.1
20～40	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.7	-1.4	-1.4	-1.2
40～60	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.6	-1.4	-1.4	-1.2
60～80	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.6	-1.4	-1.4	-1.1
80～100	-2.2	-2.0	-2.0	-2.0	-2.0	-1.9	-1.7	-1.5	-1.5	-1.2
100～120	-2.1	-2.0	-1.9	-1.9	-1.9	-1.8	-1.8	-1.4	-1.4	-1.1
120～140	-2.1	-2.0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.4	-1.4	-1.1
140～160	-2.1	-2.0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.4	-1.4	-1.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/265
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	328/264

Constants of dn/dt		
D_0	D_1	D_2
-7.71E-06	8.45E-09	-1.72E-11
E_0	E_1	λ_{TK}
2.67E-07	1.07E-10	2.75E-01

D-PK62	619639	n_d = 1.61881	υ_d = 63.85	$n_F - n_C$ = 0.009691
		n_e = 1.62112	υ_e = 63.55	$n_{F'} - n_{C'}$ = 0.009773

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.59157
n_{1970}	1970.09	1.59638
n_{1530}	1529.58	1.60165
n_{1129}	1128.64	1.60637
n_{1064}	1064.00	1.60722
n_t	1013.98	1.60793
n_s	852.11	1.61065
$n_{A'}$	768.19	1.61249
n_r	706.52	1.61418
n_C	656.27	1.61586
$n_{C'}$	643.85	1.61633
n_{He-Ne}	632.80	1.61676
n_D	589.29	1.61872
n_d	587.56	1.61881
n_e	546.07	1.62112
n_F	486.13	1.62555
$n_{F'}$	479.99	1.62610
n_g	435.84	1.63084
n_h	404.66	1.63522
n_i	365.01	1.64265

Constants of Dispersion Formula	
A_0	2.58101085E+00
A_1	-9.35112569E-03
A_2	1.43302338E-02
A_3	8.87867497E-05
A_4	2.39962149E-05
A_5	-1.31422303E-06

Density	
ρ (g/cm^3)	3.51

Solarization	
△λ (%)	-1.6

Relative Partial Dispersion	
$P_{d,C}$	0.3044
$P_{e,d}$	0.2384
$P_{g,F}$	0.5459
$P'_{d,c'}$	0.2538
$P'_{e,d}$	0.2364
$P'_{g,F'}$	0.4850

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0022
$\triangle P_{g,F}$	0.0083
$\triangle P_{C,t}$	-0.0312
$\triangle P_{C,s}$	-0.0160

Thermal Properties	
Tg (℃)	516
Ts (℃)	554
$T_{10}^{14.5}$ (℃)	488
T_{10}^{13} (℃)	510
$\alpha_{-50/80℃}$ (10^{-7}/K)	102
$\alpha_{100/300℃}$ (10^{-7}/K)	122
λ (W/(m·K))	0.63
β_d	95

Mechanical Properties	
HK (10^7Pa)	456
F_A	218
E (GPa)	78.4
G (GPa)	29.6
μ	0.326
σ_b (MPa)	45
B (10^{-12}/Pa)	1.12

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	94
-40/-30	95
-30/-20	98
-20/-10	98
-10/0	100
0/10	102
10/20	104
20/30	105
30/40	106
40/50	107
50/60	108
60/70	110
70/80	111
80/90	112
90/100	112
100/110	113
110/120	114
120/130	116
130/140	117
140/150	119
150/160	121

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.960	0.921
2200	0.977	0.954
2000	0.990	0.980
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.996
420	0.997	0.994
400	0.996	0.992
390	0.994	0.989
380	0.992	0.985
370	0.989	0.978
360	0.982	0.964
350	0.969	0.939
340	0.949	0.899
330	0.913	0.834
320	0.862	0.743
310	0.792	0.627
300	0.707	0.500
290	0.607	0.368
280	0.480	0.230

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-5.2	-5.1	-4.9	-4.8	-4.8	-4.7	-4.3	-4.1	-4.0	-3.6
-40～-20	-5.0	-4.8	-4.6	-4.6	-4.5	-4.4	-4.0	-3.8	-3.7	-3.3
-20～0	-4.8	-4.7	-4.4	-4.4	-4.4	-4.3	-3.8	-3.6	-3.5	-3.1
0～20	-4.7	-4.5	-4.4	-4.4	-4.3	-4.1	-3.8	-3.4	-3.4	-2.9
20～40	-4.6	-4.4	-4.3	-4.3	-4.2	-4.0	-3.6	-3.3	-3.3	-2.9
40～60	-4.5	-4.4	-4.2	-4.2	-4.1	-4.0	-3.5	-3.1	-3.1	-2.8
60～80	-4.3	-4.2	-4.1	-4.1	-4.0	-3.9	-3.4	-3.0	-3.0	-2.8
80～100	-4.1	-4.1	-4.0	-4.0	-3.9	-3.8	-3.3	-2.8	-2.8	-2.6
100～120	-4.0	-4.0	-3.9	-3.8	-3.7	-3.6	-3.0	-2.7	-2.6	-2.4
120～140	-3.9	-3.8	-3.7	-3.6	-3.5	-3.4	-2.9	-2.5	-2.4	-2.3
140～160	-3.8	-3.6	-3.5	-3.4	-3.4	-3.3	-2.7	-2.3	-2.2	-2.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	345/265
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	326/269

Constants of dn/dt		
D_0	D_1	D_2
-1.33E-05	1.77E-08	-2.79E-11
E_0	E_1	λ_{TK}
6.44E-07	1.51E-10	2.16E-01

D-PK70	525703	n_d = 1.52500	υ_d = 70.32	$n_F - n_C$ = 0.007470
		n_e = 1.52679	υ_e = 70.11	$n_{F'} - n_{C'}$ = 0.007510

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.49842
n_{1970}	1970.09	1.50393
n_{1530}	1529.58	1.50979
n_{1129}	1128.64	1.51461
n_{1064}	1064.00	1.51542
n_t	1013.98	1.51607
n_s	852.11	1.51845
$n_{A'}$	768.19	1.51999
n_r	706.52	1.52136
n_C	656.27	1.52269
$n_{C'}$	643.85	1.52306
n_{He-Ne}	632.80	1.52341
n_D	589.29	1.52493
n_d	587.56	1.52500
n_e	546.07	1.52679
n_F	486.13	1.53017
$n_{F'}$	479.99	1.53058
n_g	435.84	1.53413
n_h	404.66	1.53738
n_i	365.01	1.54287

Relative Partial Dispersion	
$P_{d,C}$	0.3092
$P_{e,d}$	0.2396
$P_{g,F}$	0.5301
$P'_{d,c'}$	0.2583
$P'_{e,d}$	0.2383
$P'_{g,F'}$	0.4727

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0011
$\triangle P_{g,F}$	0.0033
$\triangle P_{C,t}$	0.0053
$\triangle P_{C,s}$	-0.0016

Thermal Properties	
Tg (℃)	534
Ts (℃)	578
$T_{10}^{14.5}$ (℃)	505
T_{10}^{13} (℃)	528
$\alpha_{-50/80℃}$ (10^{-7}/K)	75
$\alpha_{100/300℃}$ (10^{-7}/K)	96
λ (W/(m·K))	0.97
β_d	175

Mechanical Properties	
HK (10^7Pa)	382
F_A	197
E (GPa)	74.3
G (GPa)	30.1
μ	0.233
σ_b (MPa)	67
B (10^{-12}/Pa)	2.13

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	3
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	68
-40/-30	70
-30/-20	71
-20/-10	73
-10/0	74
0/10	75
10/20	76
20/30	76
30/40	77
40/50	78
50/60	79
60/70	79
70/80	80
80/90	81
90/100	82
100/110	83
110/120	85
120/130	86
130/140	87
140/150	88
150/160	90

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.655	0.429
2200	0.743	0.552
2000	0.852	0.727
1800	0.918	0.843
1600	0.973	0.947
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.997	0.993
420	0.996	0.990
400	0.994	0.987
390	0.992	0.984
380	0.990	0.981
370	0.988	0.976
360	0.984	0.969
350	0.980	0.960
340	0.969	0.940
330	0.949	0.900
320	0.906	0.822
310	0.833	0.693
300	0.713	0.508
290	0.542	0.294
280	0.345	0.119

Constants of Dispersion Formula	
A_0	2.29965045E+00
A_1	-1.03835061E-02
A_2	9.47420898E-03
A_3	3.16683036E-04
A_4	-2.62425226E-05
A_5	1.36324904E-06

Density	
ρ (g/cm^3)	2.63

Solarization	
△λ (%)	-2.0

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.0	0.4	0.7	0.7	0.8	0.9	1.1	1.3	1.3	1.6
-40～-20	0.1	0.5	0.7	0.7	0.8	1.0	1.3	1.5	1.5	1.7
-20～0	0.2	0.5	0.7	0.7	0.9	1.1	1.3	1.6	1.7	1.9
0～20	0.2	0.6	0.8	0.8	0.9	1.1	1.4	1.7	1.8	2.1
20～40	0.3	0.8	0.9	0.9	1.0	1.2	1.6	1.8	2.0	2.3
40～60	0.4	0.8	1.0	1.0	1.1	1.3	1.7	2.0	2.1	2.5
60～80	0.5	0.9	1.1	1.1	1.2	1.5	1.8	2.1	2.3	2.6
80～100	0.5	0.9	1.2	1.3	1.3	1.6	1.9	2.3	2.4	2.8
100～120	0.6	1.0	1.3	1.4	1.5	1.9	2.1	2.4	2.6	2.9
120～140	0.8	1.1	1.4	1.5	1.6	2.1	2.2	2.6	2.8	3.2
140～160	0.9	1.2	1.5	1.6	1.7	2.2	2.4	2.7	2.8	3.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	330/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	318/274

Constants of dn/dt		
D_0	D_1	D_2
-3.43E-06	1.50E-08	-2.67E-11
E_0	E_1	λ_{TK}
9.78E-07	1.29E-09	1.49E-08

D-ZK2N	587596	n_d = 1.58700	υ_d = 59.59	$n_F - n_C$ = 0.009850
		n_e = 1.58935	υ_e = 59.35	$n_{F'} - n_{C'}$ = 0.009930

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.55732
n_{1970}	1970.09	1.56289
n_{1530}	1529.58	1.56892
n_{1129}	1128.64	1.57412
n_{1064}	1064.00	1.57504
n_t	1013.98	1.57579
n_s	852.11	1.57863
$n_{A'}$	768.19	1.58054
n_r	706.52	1.58228
n_C	656.27	1.58399
$n_{C'}$	643.85	1.58448
n_{He-Ne}	632.80	1.58492
n_D	589.29	1.58691
n_d	587.56	1.58700
n_e	546.07	1.58935
n_F	486.13	1.59384
$n_{F'}$	479.99	1.59441
n_g	435.84	1.59918
n_h	404.66	1.60364
n_i	365.01	1.61145

Constants of Dispersion Formula	
A_0	2.48098765E+00
A_1	-1.07611097E-02
A_2	1.30595297E-02
A_3	5.70453194E-04
A_4	-6.87445031E-05
A_5	5.08145529E-06

Density		Solarization	
ρ (g/cm^3)	2.98	△λ (%)	-6.5

Relative Partial Dispersion	
$P_{d,C}$	0.3056
$P_{e,d}$	0.2386
$P_{g,F}$	0.5421
$P'_{d,c'}$	0.2538
$P'_{e,d}$	0.2367
$P'_{g,F'}$	0.4804

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0015
$\triangle P_{g,F}$	-0.0025
$\triangle P_{C,t}$	0.0036
$\triangle P_{C,s}$	0.0007

Thermal Properties	
Tg (℃)	507
Ts (℃)	548
$T_{10}^{14.5}$ (℃)	448
T_{10}^{13} (℃)	485
$\alpha_{-50/80℃}$ (10^{-7}/K)	72
$\alpha_{100/300℃}$ (10^{-7}/K)	92
λ (W/(m·K))	1.09
β_d	90

Mechanical Properties	
HK (10^7Pa)	570
F_A	107
E (GPa)	91.6
G (GPa)	36.9
μ	0.242
σ_b (MPa)	82
B (10^{-12}/Pa)	2.11

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	64
-40/-30	67
-30/-20	70
-20/-10	71
-10/0	72
0/10	73
10/20	74
20/30	75
30/40	76
40/50	76
50/60	77
60/70	77
70/80	78
80/90	79
90/100	79
100/110	80
110/120	82
120/130	83
130/140	84
140/150	85
150/160	86

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.920	0.831
2200	0.962	0.909
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.999	0.998
380	0.999	0.998
370	0.994	0.990
360	0.988	0.979
350	0.974	0.949
340	0.955	0.913
330	0.919	0.851
320	0.859	0.734
310	0.753	0.567
300	0.597	0.358
290	0.411	0.173
280	0.231	0.059

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.7	4.0	4.0	4.0	4.1	4.2	4.3	4.6	4.7	5.1
-40～-20	3.7	4.0	4.1	4.1	4.1	4.3	4.4	4.7	4.7	5.1
-20～0	3.7	4.1	4.1	4.1	4.1	4.3	4.4	4.7	4.7	5.1
0～20	3.7	4.1	4.1	4.2	4.1	4.3	4.4	4.7	4.7	5.1
20～40	3.7	4.1	4.2	4.2	4.2	4.4	4.5	4.7	4.7	5.1
40～60	3.7	4.1	4.2	4.2	4.2	4.4	4.6	4.7	4.7	5.1
60～80	3.7	4.1	4.2	4.2	4.2	4.4	4.7	4.8	4.8	5.2
80～100	3.7	4.1	4.2	4.3	4.2	4.5	4.8	4.8	4.9	5.2
100～120	3.7	4.0	4.2	4.3	4.2	4.5	4.8	4.9	4.9	5.2
120～140	3.8	4.0	4.2	4.3	4.2	4.5	4.8	4.9	4.9	5.3
140～160	3.8	4.1	4.3	4.3	4.2	4.5	4.8	4.9	5.0	5.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	335/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	323/275

Constants of dn/dt		
D_0	D_1	D_2
4.43E-06	1.18E-08	-2.81E-11
E_0	E_1	λ_{TK}
4.55E-07	3.17E-10	1.75E-01

D-ZK3L	589613	n_d = 1.58913	υ_d = 61.25	$n_F - n_C$ = 0.009619
		n_e = 1.59142	υ_e = 61.03	$n_{F'} - n_{C'}$ = 0.009690

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.55682
n_{1970}	1970.09	1.56338
n_{1530}	1529.58	1.57035
n_{1129}	1128.64	1.57613
n_{1064}	1064.00	1.57711
n_t	1013.98	1.57790
n_s	852.11	1.58083
$n_{A'}$	768.19	1.58275
n_r	706.52	1.58448
n_C	656.27	1.58618
$n_{C'}$	643.85	1.58665
n_{He-Ne}	632.80	1.58709
n_D	589.29	1.58904
n_d	587.56	1.58913
n_e	546.07	1.59142
n_F	486.13	1.59580
$n_{F'}$	479.99	1.59634
n_g	435.84	1.60095
n_h	404.66	1.60520
n_i	365.01	1.61247

Constants of Dispersion Formula	
A_0	2.49074484E+00
A_1	-1.28107504E-02
A_2	1.19021712E-02
A_3	7.38866979E-04
A_4	-8.24332058E-05
A_5	4.70546661E-06

Density		Solarization	
ρ (g/cm^3)	2.79	△λ (%)	-2.5

Relative Partial Dispersion	
$P_{d,C}$	0.3067
$P_{e,d}$	0.2381
$P_{g,F}$	0.5354
$P'_{d,c'}$	0.2559
$P'_{e,d}$	0.2363
$P'_{g,F'}$	0.4757

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0010
$\triangle P_{g,F}$	-0.0065
$\triangle P_{C,t}$	0.0239
$\triangle P_{C,s}$	0.0088

Thermal Properties	
Tg (℃)	508
Ts (℃)	530
$T_{10}^{14.5}$ (℃)	444
T_{10}^{13} (℃)	465
$\alpha_{-50/80℃}$ (10^{-7}/K)	75
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	1.31
β_d	100

Mechanical Properties	
HK (10^7Pa)	628
F_A	85
E (GPa)	98.3
G (GPa)	39.3
μ	0.250
σ_b (MPa)	70
B (10^{-12}/Pa)	2.12

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	2
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	61
-30/-20	63
-20/-10	64
-10/0	65
0/10	66
10/20	67
20/30	68
30/40	69
40/50	70
50/60	71
60/70	72
70/80	73
80/90	74
90/100	75
100/110	76
110/120	78
120/130	79
130/140	81
140/150	82
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.805	0.648
2200	0.913	0.834
2000	0.988	0.976
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.999	0.998
390	0.995	0.989
380	0.993	0.984
370	0.989	0.977
360	0.980	0.962
350	0.965	0.933
340	0.937	0.880
330	0.892	0.794
320	0.815	0.664
310	0.705	0.498
300	0.566	0.322
290	0.417	0.176
280	0.281	0.082

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.7	3.8	4.0	4.0	4.1	4.1	4.3	4.8	4.8	5.0
-40～-20	3.7	3.8	4.0	4.0	4.1	4.2	4.4	4.8	4.8	5.0
-20～0	3.7	3.8	4.0	4.1	4.1	4.2	4.4	4.8	4.8	5.0
0～20	3.7	3.8	4.0	4.1	4.2	4.2	4.4	4.8	4.8	5.0
20～40	3.7	3.8	4.1	4.1	4.2	4.2	4.4	4.8	4.9	5.0
40～60	3.7	3.8	4.2	4.2	4.3	4.3	4.4	4.8	4.9	5.0
60～80	3.7	3.8	4.2	4.3	4.3	4.3	4.4	4.8	5.0	5.0
80～100	3.8	3.8	4.2	4.3	4.3	4.3	4.4	4.8	5.0	5.1
100～120	3.8	3.8	4.2	4.3	4.3	4.4	4.5	4.8	5.0	5.1
120～140	3.8	3.9	4.3	4.3	4.3	4.4	4.5	4.8	5.0	5.1
140～160	3.8	3.9	4.3	4.3	4.4	4.4	4.5	4.8	5.0	5.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	331/275

Constants of dn/dt		
D_0	D_1	D_2
4.03E-06	1.27E-08	-2.83E-11
E_0	E_1	λ_{TK}
6.09E-07	-8.90E-12	3.02E-08

D-ZK3L-M90	588610	n_d = 1.58831	υ_d = 61.02	$n_F - n_C$ = 0.009640
		n_e = 1.59061	υ_e = 60.81	$n_{F'} - n_{C'}$ = 0.009710

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.57541
n_{1064}	1064.00	1.57635
n_t	1013.98	1.57712
n_s	852.11	1.58001
$n_{A'}$	768.19	1.58193
n_r	706.52	1.58365
n_C	656.27	1.58535
$n_{C'}$	643.85	1.58582
n_{He-Ne}	632.80	1.58627
n_D	589.29	1.58823
n_d	587.56	1.58831
n_e	546.07	1.59061
n_F	486.13	1.59499
$n_{F'}$	479.99	1.59555
n_g	435.84	1.60018
n_h	404.66	1.60446
n_i	365.01	1.61171

Constants of Dispersion Formula	
A_0	2.48520640E+00
A_1	-1.11940698E-02
A_2	1.38766236E-02
A_3	1.12540137E-04
A_4	1.15205458E-05
A_5	-4.63440822E-07

Density	
ρ (g/cm^3)	2.80

Solarization	
△λ (%)	-2.2

Relative Partial Dispersion	
$P_{d,C}$	0.3071
$P_{e,d}$	0.2386
$P_{g,F}$	0.5384
$P'_{d,c'}$	0.2564
$P'_{e,d}$	0.2369
$P'_{g,F'}$	0.4768

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0022
$\triangle P_{g,F}$	-0.0039
$\triangle P_{C,t}$	0.0179
$\triangle P_{C,s}$	0.0071

Thermal Properties	
Tg (℃)	514
Ts (℃)	546
$T_{10}^{14.5}$ (℃)	474
T_{10}^{13} (℃)	502
$\alpha_{-50/80℃}$ (10^{-7}/K)	73
$\alpha_{100/300℃}$ (10^{-7}/K)	96
λ (W/(m·K))	1.19
β_d	100

Mechanical Properties	
HK (10^7Pa)	606
F_A	103
E (GPa)	99.1
G (GPa)	38.8
μ	0.278
σ_b (MPa)	141
B (10^{-12}/Pa)	2.14

Chemical Properties (grade)	
RC (S)	2
RA (S)	2
D_W	2
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	60
-40/-30	65
-30/-20	67
-20/-10	68
-10/0	72
0/10	73
10/20	73
20/30	75
30/40	77
40/50	79
50/60	79
60/70	81
70/80	82
80/90	84
90/100	84
100/110	86
110/120	86
120/130	89
130/140	89
140/150	91
150/160	94

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.884	0.781
2200	0.955	0.911
2000	0.987	0.974
1800	0.993	0.986
1600	0.997	0.995
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.999	0.998
400	0.998	0.996
390	0.997	0.994
380	0.995	0.991
370	0.994	0.988
360	0.986	0.973
350	0.975	0.951
340	0.953	0.908
330	0.914	0.836
320	0.847	0.717
310	0.738	0.545
300	0.597	0.356
290	0.438	0.192
280	0.293	0.086

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.8	2.2	2.2	2.3	2.4	2.6	2.7	2.9	2.9	3.1
-40～-20	1.8	2.2	2.2	2.3	2.5	2.7	2.7	3.0	3.1	3.2
-20～0	1.9	2.3	2.4	2.5	2.6	2.9	3.0	3.1	3.2	3.3
0～20	2.0	2.4	2.5	2.6	2.7	2.9	3.1	3.2	3.2	3.5
20～40	2.1	2.5	2.7	2.8	2.9	3.0	3.2	3.3	3.4	3.7
40～60	2.3	2.7	2.8	2.8	3.0	3.2	3.4	3.5	3.6	3.9
60～80	2.3	2.8	3.0	3.0	3.1	3.4	3.5	3.7	3.8	4.2
80～100	2.3	2.8	3.2	3.2	3.3	3.6	3.7	3.9	4.0	4.3
100～120	2.4	3.0	3.3	3.3	3.4	3.7	3.9	4.0	4.1	4.5
120～140	2.5	3.2	3.4	3.5	3.6	3.8	4.0	4.1	4.2	4.6
140～160	2.6	3.3	3.5	3.6	3.8	3.9	4.1	4.3	4.4	4.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/275
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	327/275

Constants of dn/dt		
D_0	D_1	D_2
8.95E-07	1.58E-08	-2.51E-11
E_0	E_1	λ_{TK}
6.76E-07	8.92E-10	8.04E-09

D-ZK50	609579	n_d = 1.60886	υ_d = 57.90	$n_F - n_C$ = 0.010516
		n_e = 1.61136	υ_e = 57.70	$n_{F'} - n_{C'}$ = 0.010595

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.57477
n_{1970}	1970.09	1.58152
n_{1530}	1529.58	1.58874
n_{1129}	1128.64	1.59482
n_{1064}	1064.00	1.59586
n_t	1013.98	1.59671
n_s	852.11	1.59986
$n_{A'}$	768.19	1.60194
n_r	706.52	1.60380
n_C	656.27	1.60565
$n_{C'}$	643.85	1.60616
n_{He-Ne}	632.80	1.60664
n_D	589.29	1.60876
n_d	587.56	1.60886
n_e	546.07	1.61136
n_F	486.13	1.61616
$n_{F'}$	479.99	1.61676
n_g	435.84	1.62184
n_h	404.66	1.62655
n_i	365.01	1.63460

Relative Partial Dispersion	
$P_{d,C}$	0.3052
$P_{e,d}$	0.2377
$P_{g,F}$	0.5401
$P'_{d,c'}$	0.2548
$P'_{e,d}$	0.2360
$P'_{g,F'}$	0.4795

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	2
D_A	3
R_{OH} (S)	2
RP (S)	2

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.780	0.608
2200	0.903	0.815
2000	0.987	0.974
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.999	0.998
420	0.998	0.996
400	0.997	0.994
390	0.996	0.992
380	0.994	0.988
370	0.989	0.978
360	0.974	0.952
350	0.955	0.915
340	0.919	0.848
330	0.855	0.733
320	0.740	0.548
310	0.535	0.287
300	0.230	0.054
290		
280		

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0018
$\triangle P_{g,F}$	-0.0073
$\triangle P_{C,t}$	0.0294
$\triangle P_{C,s}$	0.0112

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	58
-40/-30	61
-30/-20	64
-20/-10	65
-10/0	67
0/10	69
10/20	70
20/30	72
30/40	74
40/50	75
50/60	76
60/70	77
70/80	77
80/90	78
90/100	79
100/110	81
110/120	82
120/130	84
130/140	85
140/150	87
150/160	88

Thermal Properties	
Tg (℃)	505
Ts (℃)	541
$T_{10}^{14.5}$ (℃)	458
T_{10}^{13} (℃)	476
$\alpha_{-50/80℃}$ (10^{-7}/K)	70
$\alpha_{100/300℃}$ (10^{-7}/K)	87
λ (W/(m·K))	1.18
β_d	100

Mechanical Properties	
HK (10^7Pa)	669
F_A	106
E (GPa)	103.1
G (GPa)	40.6
μ	0.269
σ_b (MPa)	90
B (10^{-12}/Pa)	2.34

Constants of Dispersion Formula	
A_0	2.54913552E+00
A_1	-1.32831855E-02
A_2	1.39362205E-02
A_3	4.99307363E-04
A_4	-3.36145332E-05
A_5	1.90094032E-06

Density	
ρ (g/cm^3)	2.83

Solarization	
△λ (%)	0.0

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.9	1.1	1.2	1.2	1.3	1.6	1.7	1.9	1.9	2.1
-40～-20	1.2	1.4	1.5	1.5	1.6	1.9	2.1	2.2	2.2	2.4
-20～0	2.0	2.1	2.2	2.2	2.3	2.4	2.6	2.7	2.7	3.4
0～20	2.1	2.4	2.4	2.4	2.4	2.5	2.7	2.9	3.0	3.6
20～40	2.1	2.4	2.5	2.5	2.5	2.7	2.9	3.2	3.2	3.8
40～60	2.3	2.6	2.6	2.6	2.6	2.8	3.0	3.4	3.5	4.0
60～80	2.3	2.7	2.7	2.7	2.8	2.9	3.1	3.5	3.5	4.0
80～100	2.4	2.8	2.9	2.9	3.0	3.1	3.2	3.7	3.7	4.2
100～120	2.4	2.9	3.0	3.1	3.1	3.2	3.3	3.8	3.8	4.3
120～140	2.5	3.0	3.1	3.2	3.2	3.3	3.4	3.9	3.9	4.4
140～160	2.6	3.1	3.2	3.3	3.3	3.4	3.5	3.9	4.0	4.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/305
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	337/300

Constants of dn/dt		
D_0	D_1	D_2
7.83E-07	2.24E-08	-6.10E-11
E_0	E_1	λ_{TK}
3.51E-07	3.25E-10	2.79E-01

D-LaK6	694532	n_d = 1.69350	υ_d = 53.20	$n_F - n_C$ = 0.013036
		n_e = 1.69661	υ_e = 52.97	$n_{F'} - n_{C'}$ = 0.013152

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.65586
n_{1970}	1970.09	1.66278
n_{1530}	1529.58	1.67028
n_{1129}	1128.64	1.67683
n_{1064}	1064.00	1.67799
n_t	1013.98	1.67895
n_s	852.11	1.68259
$n_{A'}$	768.19	1.68506
n_r	706.52	1.68731
n_C	656.27	1.68955
$n_{C'}$	643.85	1.69017
n_{He-Ne}	632.80	1.69076
n_D	589.29	1.69338
n_d	587.56	1.69350
n_e	546.07	1.69661
n_F	486.13	1.70258
$n_{F'}$	479.99	1.70333
n_g	435.84	1.70973
n_h	404.66	1.71570
n_i	365.01	1.72593

Constants of Dispersion Formula	
A_0	2.81505089E+00
A_1	-1.41604226E-02
A_2	1.82673200E-02
A_3	6.74961616E-04
A_4	-4.03278304E-05
A_5	2.39186650E-06

Density	
ρ (g/cm^3)	3.50

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3030
$P_{e,d}$	0.2386
$P_{g,F}$	0.5485
$P'_{d,c'}$	0.2532
$P'_{e,d}$	0.2365
$P'_{g,F'}$	0.4866

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0029
$\triangle P_{g,F}$	-0.0068
$\triangle P_{C,t}$	0.0152
$\triangle P_{C,s}$	0.0058

Thermal Properties	
Tg (℃)	532
Ts (℃)	570
$T_{10}^{14.5}$ (℃)	481
T_{10}^{13} (℃)	516
$\alpha_{-50/80℃}$ (10^{-7}/K)	68
$\alpha_{100/300℃}$ (10^{-7}/K)	89
λ (W/(m·K))	1.08
β_d	130

Mechanical Properties	
HK (10^7Pa)	642
F_A	107
E (GPa)	113.9
G (GPa)	44.7
μ	0.273
σ_b (MPa)	75
B (10^{-12}/Pa)	1.98

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	60
-40/-30	61
-30/-20	63
-20/-10	65
-10/0	66
0/10	67
10/20	67
20/30	68
30/40	69
40/50	70
50/60	70
60/70	71
70/80	72
80/90	73
90/100	74
100/110	76
110/120	77
120/130	79
130/140	80
140/150	82
150/160	83

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.834	0.696
2200	0.962	0.926
2000	0.990	0.980
1800	0.997	0.994
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.996
420	0.997	0.994
400	0.996	0.992
390	0.995	0.990
380	0.993	0.985
370	0.990	0.973
360	0.976	0.943
350	0.958	0.907
340	0.927	0.847
330	0.879	0.758
320	0.810	0.640
310	0.707	0.482
300	0.557	0.296
290	0.298	0.082
280	0.058	0.013

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.9	4.4	4.4	4.5	4.6	4.7	4.9	5.2	5.3	5.8
-40～-20	4.0	4.5	4.5	4.6	4.6	4.7	5.0	5.3	5.4	5.8
-20～0	4.0	4.5	4.6	4.6	4.7	4.7	5.0	5.4	5.5	5.9
0～20	4.0	4.6	4.5	4.6	4.7	4.7	5.1	5.4	5.5	5.9
20～40	3.9	4.5	4.5	4.6	4.7	4.7	5.1	5.5	5.6	6.0
40～60	4.1	4.5	4.6	4.7	4.7	4.8	5.1	5.6	5.6	6.0
60～80	4.1	4.6	4.7	4.7	4.7	4.9	5.2	5.7	5.8	6.2
80～100	4.1	4.6	4.7	4.8	4.8	4.9	5.3	5.9	5.9	6.4
100～120	4.1	4.7	4.7	4.8	4.8	4.9	5.4	5.9	6.0	6.6
120～140	4.1	4.7	4.8	4.8	4.8	5.0	5.4	6.0	6.0	6.7
140～160	4.2	4.7	4.8	4.8	4.8	5.0	5.5	6.1	6.1	6.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	355/290
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	336/288

Constants of dn/dt		
D_0	D_1	D_2
4.28E-06	1.09E-08	-2.48E-11
E_0	E_1	λ_{TK}
4.38E-07	5.64E-10	2.59E-01

D-ZF10	689311	n_d = 1.68893	υ_d = 31.08	$n_F - n_C$ = 0.022169
		n_e = 1.69417	υ_e = 30.85	$n_{F'} - n_{C'}$ = 0.022498

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.64356
n_{1970}	1970.09	1.64994
n_{1530}	1529.58	1.65720
n_{1129}	1128.64	1.66435
n_{1064}	1064.00	1.66578
n_t	1013.98	1.66698
n_s	852.11	1.67192
$n_{A'}$	768.19	1.67552
n_r	706.52	1.67896
n_C	656.27	1.68249
$n_{C'}$	643.85	1.68350
n_{He-Ne}	632.80	1.68445
n_D	589.29	1.68875
n_d	587.56	1.68893
n_e	546.07	1.69417
n_F	486.13	1.70466
$n_{F'}$	479.99	1.70600
n_g	435.84	1.71785
n_h	404.66	1.72959
n_i	365.01	1.75178

Constants of Dispersion Formula	
A_0	2.76366083E+00
A_1	-1.24616807E-02
A_2	2.66401782E-02
A_3	2.38393825E-03
A_4	-2.27557760E-04
A_5	2.16448822E-05

Density	
ρ (g/cm^3)	2.86

Solarization	
△λ (%)	-1.3

Relative Partial Dispersion	
$P_{d,C}$	0.2905
$P_{e,d}$	0.2364
$P_{g,F}$	0.5950
$P'_{d,c'}$	0.2414
$P'_{e,d}$	0.2329
$P'_{g,F'}$	0.5267

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0001
$\triangle P_{g,F}$	0.0030
$\triangle P_{C,t}$	0.0089
$\triangle P_{C,s}$	0.0018

Thermal Properties	
Tg (℃)	490
Ts (℃)	527
$T_{10}^{14.5}$ (℃)	432
T_{10}^{13} (℃)	473
$\alpha_{-50/80℃}$ (10^{-7}/K)	93
$\alpha_{100/300℃}$ (10^{-7}/K)	121
λ (W/(m·K))	1.20
β_d	200

Mechanical Properties	
HK (10^7Pa)	539
F_A	146
E (GPa)	90.4
G (GPa)	35.4
μ	0.276
σ_b (MPa)	74
B (10^{-12}/Pa)	2.95

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	64
-40/-30	71
-30/-20	74
-20/-10	78
-10/0	81
0/10	84
10/20	86
20/30	89
30/40	92
40/50	94
50/60	96
60/70	97
70/80	98
80/90	99
90/100	101
100/110	104
110/120	106
120/130	109
130/140	112
140/150	115
150/160	117

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.927	0.841
2200	0.972	0.927
2000	0.992	0.977
1800	0.999	0.991
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.995
480	0.997	0.990
460	0.994	0.982
440	0.989	0.976
420	0.982	0.962
400	0.961	0.926
390	0.944	0.889
380	0.900	0.806
370	0.771	0.589
360	0.419	0.180
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.6	-0.3	0.0	0.0	0.1	0.4	0.8	1.0	1.1	1.8
-40～-20	-0.6	-0.2	0.1	0.2	0.3	0.6	1.2	1.3	1.4	2.3
-20～0	-0.4	-0.1	0.3	0.4	0.4	0.8	1.5	1.8	1.8	2.7
0～20	-0.3	0.1	0.5	0.6	0.6	0.9	1.6	2.2	2.2	3.1
20～40	-0.4	0.1	0.6	0.7	0.8	1.0	1.6	2.4	2.4	3.7
40～60	-0.5	0.3	0.6	0.7	0.8	1.1	1.5	2.6	2.7	3.9
60～80	-0.6	0.3	0.6	0.6	0.7	1.0	1.5	2.8	2.8	4.1
80～100	-0.6	0.3	0.6	0.6	0.8	1.1	1.6	2.8	2.9	4.2
100～120	-0.6	0.3	0.6	0.6	0.8	1.2	1.7	3.0	3.1	4.4
120～140	-0.5	0.3	0.7	0.7	0.9	1.4	1.9	3.2	3.2	4.7
140～160	-0.3	0.3	0.9	0.9	1.0	1.7	2.2	3.5	3.6	5.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	380/358

Constants of dn/dt		
D_0	D_1	D_2
-4.48E-06	1.06E-08	-3.94E-11
E_0	E_1	λ_{TK}
9.15E-07	1.82E-09	2.55E-01

D-ZF10A	689311	n_d = 1.68893	υ_d = 31.08	$n_F - n_C$ = 0.022169
		n_e = 1.69417	υ_e = 30.85	$n_{F'} - n_{C'}$ = 0.022498

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	
n_{1129}	1128.64	1.66447
n_{1064}	1064.00	1.66585
n_t	1013.98	1.66704
n_s	852.11	1.67193
$n_{A'}$	768.19	1.67553
n_r	706.52	1.67895
n_C	656.27	1.68249
$n_{C'}$	643.85	1.68350
n_{He-Ne}	632.80	1.68444
n_D	589.29	1.68874
n_d	587.56	1.68893
n_e	546.07	1.69417
n_F	486.13	1.70466
$n_{F'}$	479.99	1.70600
n_g	435.84	1.71795
n_h	404.66	1.72975
n_i	365.01	1.75193

Constants of Dispersion Formula	
A_0	2.76027780E+00
A_1	-1.06941385E-02
A_2	2.92240616E-02
A_3	1.44064372E-03
A_4	-7.09323241E-05
A_5	1.25693927E-05

Density		Solarization	
ρ (g/cm^3)	2.90	△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.2905
$P_{e,d}$	0.2364
$P_{g,F}$	0.5995
$P'_{d,c'}$	0.2414
$P'_{e,d}$	0.2329
$P'_{g,F'}$	0.5312

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0001
$\triangle P_{g,F}$	0.0075
$\triangle P_{C,t}$	0.0062
$\triangle P_{C,s}$	0.0013

Thermal Properties	
Tg (℃)	510
Ts (℃)	547
$T_{10}^{14.5}$ (℃)	462
T_{10}^{13} (℃)	490
$\alpha_{-50/80℃}$ (10^{-7}/K)	98
$\alpha_{100/300℃}$ (10^{-7}/K)	129
λ (W/(m·K))	1.14
β_d	195

Mechanical Properties	
HK (10^7Pa)	528
F_A	149
E (GPa)	88.3
G (GPa)	35.0
μ	0.260
σ_b (MPa)	101
B (10^{-12}/Pa)	2.92

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	88
-40/-30	90
-30/-20	94
-20/-10	93
-10/0	96
0/10	98
10/20	96
20/30	101
30/40	96
40/50	101
50/60	104
60/70	109
70/80	111
80/90	110
90/100	108
100/110	113
110/120	119
120/130	125
130/140	128
140/150	128
150/160	123

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.968	0.937
2200	0.976	0.952
2000	0.987	0.974
1800	0.992	0.984
1600	0.998	0.995
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.998	0.997
650	0.998	0.997
600	0.998	0.997
550	0.998	0.996
500	0.996	0.992
480	0.995	0.990
460	0.993	0.986
440	0.990	0.980
420	0.984	0.968
400	0.964	0.929
390	0.939	0.881
380	0.880	0.774
370	0.724	0.524
360	0.387	0.150
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.7	-0.5	-0.4	-0.3	-0.1	0.0	0.5	0.9	1.1	2.0
-40～-20	-0.6	-0.4	-0.3	-0.1	0.0	0.3	0.7	1.1	1.2	2.1
-20～0	-0.6	-0.3	-0.2	0.0	0.1	0.4	0.7	1.2	1.3	2.3
0～20	-0.5	-0.3	-0.1	0.1	0.3	0.6	0.9	1.3	1.5	2.5
20～40	-0.4	-0.2	-0.1	0.2	0.3	0.7	1.1	1.4	1.5	2.6
40～60	-0.3	0.0	0.2	0.3	0.5	0.8	1.2	1.6	1.7	2.9
60～80	-0.3	0.1	0.4	0.5	0.8	1.2	1.5	1.7	1.9	3.2
80～100	-0.3	0.2	0.5	0.6	0.9	1.5	1.8	1.9	2.0	3.4
100～120	-0.1	0.3	0.6	0.8	1.0	1.7	2.0	2.1	2.2	3.8
120～140	0.0	0.5	0.8	1.0	1.3	1.9	2.1	2.3	2.5	4.2
140～160	0.1	0.6	1.0	1.2	1.5	2.0	2.3	2.6	2.8	4.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	382/355

Constants of dn/dt		
D_0	D_1	D_2
-4.60E-06	1.48E-08	-1.77E-11
E_0	E_1	λ_{TK}
7.06E-07	6.24E-10	2.74E-01

D-ZF52N	847238	n_d = 1.84666	υ_d = 23.78	$n_F - n_C$ = 0.035608
		n_e = 1.85504	υ_e = 23.59	$n_{F'} - n_{C'}$ = 0.036247

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.78377
n_{1970}	1970.09	1.79100
n_{1530}	1529.58	1.79963
n_{1129}	1128.64	1.80906
n_{1064}	1064.00	1.81108
n_t	1013.98	1.81281
n_s	852.11	1.82015
$n_{A'}$	768.19	1.82565
n_r	706.52	1.83096
n_C	656.27	1.83648
$n_{C'}$	643.85	1.83806
n_{He-Ne}	632.80	1.83955
n_D	589.29	1.84635
n_d	587.56	1.84666
n_e	546.07	1.85504
n_F	486.13	1.87209
$n_{F'}$	479.99	1.87431
n_g	435.84	1.89430
n_h	404.66	1.91469
n_i	365.01	1.95467

Constants of Dispersion Formula	
A_0	3.25154745E+00
A_1	-1.45603806E-02
A_2	4.82406088E-02
A_3	3.12705995E-03
A_4	-2.06388870E-04
A_5	3.78595910E-05

Density		Solarization	
ρ (g/cm^3)	3.36	△λ (%)	-0.8

Relative Partial Dispersion	
$P_{d,C}$	0.2859
$P_{e,d}$	0.2353
$P_{g,F}$	0.6237
$P'_{d,c'}$	0.2373
$P'_{e,d}$	0.2312
$P'_{g,F'}$	0.5515

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0018
$\triangle P_{g,F}$	0.0196
$\triangle P_{C,t}$	0.0094
$\triangle P_{C,s}$	0.0011

Thermal Properties	
Tg (℃)	556
Ts (℃)	600
$T_{10}^{14.5}$ (℃)	520
T_{10}^{13} (℃)	546
$\alpha_{-50/80℃}$ (10^{-7}/K)	82
$\alpha_{100/300℃}$ (10^{-7}/K)	103
λ (W/(m·K))	1.31
β_d	260

Mechanical Properties	
HK (10^7Pa)	597
F_A	161
E (GPa)	109.2
G (GPa)	42.7
μ	0.278
σ_b (MPa)	119
B (10^{-12}/Pa)	2.64

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	72
-40/-30	75
-30/-20	76
-20/-10	78
-10/0	79
0/10	80
10/20	81
20/30	82
30/40	84
40/50	85
50/60	86
60/70	87
70/80	88
80/90	89
90/100	91
100/110	93
110/120	94
120/130	96
130/140	97
140/150	99
150/160	101

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.885	0.784
2200	0.942	0.887
2000	0.973	0.947
1800	0.985	0.971
1600	0.993	0.986
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.996	0.992
550	0.992	0.985
500	0.984	0.967
480	0.978	0.956
460	0.968	0.937
440	0.951	0.904
420	0.917	0.841
400	0.849	0.721
390	0.779	0.607
380	0.623	0.388
370	0.327	0.107
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	-0.4	-0.1	0.2	0.3	0.5	0.7	1.0	1.3	1.6	2.2
-40～-20	-0.1	0.2	0.5	0.6	0.7	1.1	1.2	1.6	1.8	2.6
-20～0	0.3	0.5	0.7	0.8	0.9	1.3	1.7	1.9	2.0	3.0
0～20	0.5	0.8	0.9	1.0	1.1	1.7	2.0	2.2	2.3	3.4
20～40	0.6	0.9	1.1	1.2	1.2	1.7	2.4	2.6	2.8	3.8
40～60	0.7	1.1	1.3	1.4	1.5	1.9	2.7	2.9	3.2	4.3
60～80	0.8	1.1	1.3	1.4	1.6	2.1	2.8	3.2	3.4	4.6
80～100	1.1	1.4	1.6	1.7	1.9	2.3	3.0	3.5	3.7	4.8
100～120	1.2	1.5	1.8	2.0	2.2	2.4	3.1	3.6	3.8	4.9
120～140	1.4	1.7	2.0	2.2	2.5	2.7	3.5	3.9	4.0	5.2
140～160	1.5	2.0	2.2	2.4	2.7	2.9	3.7	4.0	4.2	5.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(420)/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	412/368

Constants of dn/dt		
D_0	D_1	D_2
-2.62E-06	1.68E-08	-3.23E-11
E_0	E_1	λ_{TK}
6.36E-07	7.31E-10	2.58E-01

D-ZF93	002207	n_d = 2.00170	υ_d = 20.70	$n_F - n_C$ = 0.048520
		n_e = 2.01305	υ_e = 20.52	$n_{F'} - n_{C'}$ = 0.049470

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	
n_{1970}	1970.09	
n_{1530}	1529.58	1.94163
n_{1129}	1128.64	1.95275
n_{1064}	1064.00	1.95521
n_t	1013.98	1.95737
n_s	852.11	1.96666
$n_{A'}$	768.19	1.97379
n_r	706.52	1.98077
n_C	656.27	1.98808
$n_{C'}$	643.85	1.99018
n_{He-Ne}	632.80	1.99217
n_D	589.29	2.00130
n_d	587.56	2.00170
n_e	546.07	2.01305
n_F	486.13	2.03647
$n_{F'}$	479.99	2.03954
n_g	435.84	2.06762
n_h	404.66	2.09696
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.77967272E+00
A_1	-1.64802433E-02
A_2	6.48019989E-02
A_3	6.34631200E-03
A_4	-5.86190193E-04
A_5	8.72524412E-05

Density	
ρ (g/cm^3)	6.02

Solarization	
△λ (%)	-1.8

Relative Partial Dispersion	
$P_{d,C}$	0.2807
$P_{e,d}$	0.2339
$P_{g,F}$	0.6420
$P'_{d,c'}$	0.2329
$P'_{e,d}$	0.2294
$P'_{g,F'}$	0.5676

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0039
$\triangle P_{g,F}$	0.0328
$\triangle P_{C,t}$	-0.0075
$\triangle P_{C,s}$	-0.0086

Thermal Properties	
Tg (℃)	445
Ts (℃)	471
$T_{10}^{14.5}$ (℃)	415
T_{10}^{13} (℃)	433
$\alpha_{-50/80℃}$ (10^{-7}/K)	80
$\alpha_{100/300℃}$ (10^{-7}/K)	98
λ (W/(m·K))	0.64
β_d	155

Mechanical Properties	
HK (10^7Pa)	418
F_A	267
E (GPa)	82.0
G (GPa)	32.0
μ	0.282
σ_b (MPa)	69
B (10^{-12}/Pa)	1.16

Chemical Properties (grade)	
RC (S)	2
RA (S)	2
D_W	1
D_A	4
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	71
-40/-30	74
-30/-20	77
-20/-10	78
-10/0	80
0/10	80
10/20	82
20/30	83
30/40	83
40/50	84
50/60	84
60/70	85
70/80	85
80/90	86
90/100	87
100/110	88
110/120	89
120/130	90
130/140	91
140/150	93
150/160	97

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.880	0.774
2200	0.957	0.915
2000	0.984	0.968
1800	0.993	0.985
1600	0.996	0.991
1400	0.997	0.995
1200	0.996	0.993
1060	0.996	0.993
1000	0.995	0.990
950	0.998	0.995
900	0.996	0.992
850	0.994	0.987
800	0.993	0.987
750	0.996	0.992
700	0.997	0.994
650	0.996	0.993
600	0.996	0.992
550	0.995	0.990
500	0.961	0.923
480	0.927	0.859
460	0.873	0.762
440	0.772	0.596
420	0.523	0.274
400	0.141	0.020
390		
380		
370		
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	7.8	8.5	10.4	10.6	10.9	11.9	13.2	15.3	15.7	20.6
-40～-20	8.5	9.4	11.2	11.6	12.2	13.1	14.6	17.1	17.6	23.1
-20～0	9.1	10.1	12.2	12.5	12.9	14.1	15.8	19.0	19.5	25.4
0～20	9.9	10.8	13.4	13.7	14.0	15.2	16.9	20.8	21.3	27.2
20～40	10.8	11.8	14.5	14.8	15.3	16.6	18.2	22.5	23.1	29.7
40～60	11.4	12.6	16.1	16.4	16.8	18.3	20.4	24.6	25.5	32.2
60～80	12.4	13.9	17.1	17.5	17.8	19.5	21.6	26.4	27.1	34.3
80～100	13.0	14.2	17.9	18.3	18.7	20.2	22.5	27.9	28.6	36.4
100～120	13.3	14.6	18.4	18.9	19.6	20.6	23.2	28.9	29.2	37.4
120～140	13.9	15.0	19.4	19.8	20.3	21.3	23.9	30.2	30.7	39.3
140～160	14.3	15.4	19.9	20.4	20.9	22.2	25.3	31.0	31.9	40.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(490)/410
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	466/402

Constants of dn/dt		
D_0	D_1	D_2
9.63E-06	3.16E-08	-6.53E-11
E_0	E_1	λ_{TK}
2.42E-06	4.81E-09	2.98E-01

D-LaF050	768492	n_d = 1.76802	υ_d = 49.24	$n_F - n_C$ = 0.015597
		n_e = 1.77173	υ_e = 49.00	$n_{F'} - n_{C'}$ = 0.015749

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.72707
n_{1970}	1970.09	1.73403
n_{1530}	1529.58	1.74170
n_{1129}	1128.64	1.74866
n_{1064}	1064.00	1.74994
n_t	1013.98	1.75101
n_s	852.11	1.75515
$n_{A'}$	768.19	1.75802
n_r	706.52	1.76066
n_C	656.27	1.76331
$n_{C'}$	643.85	1.76406
n_{He-Ne}	632.80	1.76475
n_D	589.29	1.76787
n_d	587.56	1.76802
n_e	546.07	1.77173
n_F	486.13	1.77891
$n_{F'}$	479.99	1.77980
n_g	435.84	1.78753
n_h	404.66	1.79475
n_i	365.01	1.80718

Constants of Dispersion Formula	
A_0	3.05764396E+00
A_1	-1.46517743E-02
A_2	2.34463123E-02
A_3	7.01742420E-04
A_4	-2.73402326E-05
A_5	1.97166425E-06

Density	
ρ (g/cm^3)	4.56

Solarization	
△λ (%)	-2.8

Relative Partial Dispersion	
$P_{d,C}$	0.3020
$P_{e,d}$	0.2379
$P_{g,F}$	0.5527
$P'_{d,c'}$	0.2514
$P'_{e,d}$	0.2356
$P'_{g,F'}$	0.4908

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0027
$\triangle P_{g,F}$	-0.0091
$\triangle P_{C,t}$	0.0099
$\triangle P_{C,s}$	0.0046

Thermal Properties	
Tg (℃)	615
Ts (℃)	640
$T_{10}^{14.5}$ (℃)	512
T_{10}^{13} (℃)	549
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	0.79
β_d	147

Mechanical Properties	
HK (10^7Pa)	578
F_A	72
E (GPa)	112.7
G (GPa)	43.1
μ	0.306
σ_b (MPa)	92
B (10^{-12}/Pa)	1.81

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	59
-30/-20	60
-20/-10	61
-10/0	62
0/10	62
10/20	62
20/30	63
30/40	63
40/50	63
50/60	64
60/70	64
70/80	65
80/90	66
90/100	66
100/110	67
110/120	68
120/130	69
130/140	71
140/150	72
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.820	0.672
2200	0.952	0.906
2000	0.978	0.956
1800	0.989	0.978
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.997	0.994
440	0.996	0.992
420	0.994	0.989
400	0.992	0.984
390	0.989	0.978
380	0.984	0.968
370	0.975	0.951
360	0.960	0.922
350	0.938	0.879
340	0.904	0.818
330	0.858	0.736
320	0.796	0.634
310	0.629	0.396
300	0.632	0.400
290	0.552	0.305
280	0.381	0.145

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.9	3.2	3.3	3.4	3.5	3.7	4.0	4.3	4.3	4.5
-40～-20	3.0	3.2	3.3	3.4	3.5	3.8	4.1	4.4	4.4	4.8
-20～0	3.0	3.2	3.4	3.5	3.6	3.9	4.3	4.5	4.6	4.8
0～20	3.0	3.3	3.5	3.6	3.7	4.1	4.4	4.6	4.7	4.9
20～40	3.0	3.3	3.5	3.7	3.8	4.2	4.5	4.7	4.8	5.1
40～60	3.1	3.4	3.6	3.8	4.0	4.3	4.7	4.9	5.0	5.3
60～80	3.2	3.6	3.7	3.8	4.0	4.4	4.8	5.2	5.2	5.6
80～100	3.2	3.7	3.8	3.9	4.1	4.6	4.9	5.4	5.4	5.8
100～120	3.2	3.8	3.9	4.0	4.2	4.7	5.1	5.6	5.6	6.0
120～140	3.2	3.9	4.0	4.0	4.3	4.8	5.3	5.7	5.7	6.2
140～160	3.2	4.0	4.1	4.1	4.5	4.9	5.4	5.8	5.8	6.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	340/277

Constants of dn/dt		
D_0	D_1	D_2
1.61E-06	1.06E-08	-2.28E-11
E_0	E_1	λ_{TK}
7.75E-07	1.44E-09	3.04E-08

D-LaF50	773495	n_d = 1.77250	υ_d = 49.50	$n_F - n_C$ = 0.015605
		n_e = 1.77622	υ_e = 49.26	$n_{F'} - n_{C'}$ = 0.015757

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.73130
n_{1970}	1970.09	1.73834
n_{1530}	1529.58	1.74608
n_{1129}	1128.64	1.75309
n_{1064}	1064.00	1.75438
n_t	1013.98	1.75545
n_s	852.11	1.75961
$n_{A'}$	768.19	1.76248
n_r	706.52	1.76513
n_C	656.27	1.76779
$n_{C'}$	643.85	1.76854
n_{He-Ne}	632.80	1.76923
n_D	589.29	1.77236
n_d	587.56	1.77250
n_e	546.07	1.77622
n_F	486.13	1.78340
$n_{F'}$	479.99	1.78430
n_g	435.84	1.79204
n_h	404.66	1.79927
n_i	365.01	1.81174

Constants of Dispersion Formula	
A_0	3.07337625E+00
A_1	-1.48574785E-02
A_2	2.34948451E-02
A_3	7.16989975E-04
A_4	-3.03961557E-05
A_5	2.24464169E-06

Density	
ρ (g/cm^3)	4.62

Solarization	
△λ (%)	-1.8

Relative Partial Dispersion	
$P_{d,C}$	0.3018
$P_{e,d}$	0.2384
$P_{g,F}$	0.5537
$P'_{d,c'}$	0.2513
$P'_{e,d}$	0.2361
$P'_{g,F'}$	0.4912

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0028
$\triangle P_{g,F}$	-0.0077
$\triangle P_{C,t}$	0.0108
$\triangle P_{C,s}$	0.0050

Thermal Properties	
Tg (℃)	633
Ts (℃)	659
$T_{10}^{14.5}$ (℃)	583
T_{10}^{13} (℃)	617
$\alpha_{-50/80℃}$ (10^{-7}/K)	65
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	0.75
β_d	138

Mechanical Properties	
HK (10^7Pa)	643
F_A	81
E (GPa)	114.8
G (GPa)	43.4
μ	0.323
σ_b (MPa)	88
B (10^{-12}/Pa)	1.70

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	58
-40/-30	60
-30/-20	61
-20/-10	62
-10/0	63
0/10	63
10/20	64
20/30	64
30/40	64
40/50	65
50/60	65
60/70	66
70/80	66
80/90	67
90/100	67
100/110	68
110/120	69
120/130	70
130/140	71
140/150	72
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.820	0.674
2200	0.955	0.914
2000	0.989	0.978
1800	0.997	0.994
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.996
460	0.997	0.994
440	0.996	0.992
420	0.995	0.990
400	0.991	0.982
390	0.987	0.976
380	0.982	0.966
370	0.973	0.950
360	0.952	0.920
350	0.931	0.870
340	0.898	0.809
330	0.853	0.731
320	0.797	0.639
310	0.679	0.465
300	0.649	0.423
290	0.572	0.329
280	0.336	0.122

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.7	4.0	4.1	4.1	4.2	4.4	4.7	5.0	5.1	5.5
-40～-20	3.8	4.0	4.2	4.2	4.3	4.5	4.9	5.2	5.3	5.7
-20～0	3.8	4.1	4.2	4.2	4.3	4.8	5.0	5.5	5.6	6.0
0～20	3.9	4.1	4.3	4.4	4.4	4.8	5.2	5.6	5.6	6.1
20～40	4.0	4.2	4.4	4.4	4.4	4.8	5.2	5.8	5.8	6.3
40～60	4.0	4.3	4.6	4.6	4.6	4.9	5.6	6.0	6.0	6.4
60～80	4.1	4.4	4.6	4.7	4.7	5.1	5.7	6.0	6.1	6.5
80～100	4.2	4.5	4.7	4.8	4.9	5.3	5.9	6.1	6.2	6.6
100～120	4.3	4.6	4.8	4.9	5.0	5.5	6.0	6.3	6.4	6.9
120～140	4.5	4.7	5.0	5.1	5.2	5.6	6.2	6.6	6.7	7.3
140～160	4.6	4.8	5.2	5.2	5.3	5.7	6.3	6.7	6.8	7.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	338/277

Constants of dn/dt		
D_0	D_1	D_2
3.11E-06	1.25E-08	-2.12E-11
E_0	E_1	λ_{TK}
6.29E-07	7.94E-10	1.96E-01

D-LaF50-170	774494	n_d = 1.77420	υ_d = 49.41	$n_F - n_C$ = 0.015670
		n_e = 1.77793	υ_e = 49.17	$n_{F'} - n_{C'}$ = 0.015820

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.73298
n_{1970}	1970.09	1.74004
n_{1530}	1529.58	1.74780
n_{1129}	1128.64	1.75479
n_{1064}	1064.00	1.75608
n_t	1013.98	1.75714
n_s	852.11	1.76129
$n_{A'}$	768.19	1.76416
n_r	706.52	1.76681
n_C	656.27	1.76947
$n_{C'}$	643.85	1.77022
n_{He-Ne}	632.80	1.77092
n_D	589.29	1.77406
n_d	587.56	1.77420
n_e	546.07	1.77793
n_F	486.13	1.78514
$n_{F'}$	479.99	1.78604
n_g	435.84	1.79377
n_h	404.66	1.80098
n_i	365.01	1.81346

Constants of Dispersion Formula	
A_0	3.07996867E+00
A_1	-1.49730363E-02
A_2	2.26125445E-02
A_3	1.12810004E-03
A_4	-9.99130408E-05
A_5	6.18705456E-06

Density	
ρ (g/cm^3)	4.62

Solarization	
△λ (%)	-2.4

Relative Partial Dispersion	
$P_{d,C}$	0.3019
$P_{e,d}$	0.2380
$P_{g,F}$	0.5507
$P'_{d,c'}$	0.2516
$P'_{e,d}$	0.2358
$P'_{g,F'}$	0.4886

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0028
$\triangle P_{g,F}$	-0.0108
$\triangle P_{C,t}$	0.0073
$\triangle P_{C,s}$	0.0030

Thermal Properties	
Tg (℃)	628
Ts (℃)	662
$T_{10}^{14.5}$ (℃)	578
T_{10}^{13} (℃)	612
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	76
λ (W/(m·K))	0.80
β_d	138

Mechanical Properties	
HK (10^7Pa)	597
F_A	82
E (GPa)	114.8
G (GPa)	43.4
μ	0.323
σ_b (MPa)	100
B (10^{-12}/Pa)	1.52

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	53
-40/-30	54
-30/-20	56
-20/-10	57
-10/0	58
0/10	58
10/20	59
20/30	60
30/40	61
40/50	62
50/60	63
60/70	64
70/80	65
80/90	66
90/100	66
100/110	67
110/120	67
120/130	68
130/140	68
140/150	70
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.814	0.663
2200	0.949	0.900
2000	0.980	0.960
1800	0.993	0.985
1600	0.996	0.992
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.997	0.994
550	0.996	0.993
500	0.995	0.990
480	0.994	0.989
460	0.993	0.986
440	0.992	0.983
420	0.990	0.980
400	0.987	0.974
390	0.984	0.969
380	0.979	0.959
370	0.966	0.933
360	0.942	0.887
350	0.920	0.847
340	0.890	0.792
330	0.849	0.720
320	0.791	0.626
310	0.632	0.400
300	0.539	0.290
290	0.469	0.220
280	0.362	0.131

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.4	2.8	2.9	2.9	3.0	3.2	3.5	3.9	4.0	4.7
-40～-20	2.4	2.8	2.9	3.0	3.1	3.3	3.7	4.2	4.3	5.0
-20～0	2.5	2.9	3.0	3.0	3.2	3.6	4.0	4.5	4.6	5.3
0～20	2.7	2.9	3.2	3.2	3.3	3.8	4.2	4.9	5.0	5.7
20～40	2.8	3.0	3.4	3.4	3.5	3.9	4.5	5.3	5.4	6.1
40～60	2.9	3.1	3.4	3.5	3.6	4.0	4.7	5.6	5.6	6.5
60～80	3.0	3.2	3.4	3.5	3.6	4.3	4.9	5.8	5.9	7.0
80～100	3.0	3.4	3.6	3.6	3.8	4.4	5.1	6.0	6.1	7.3
100～120	3.0	3.6	3.8	3.8	4.0	4.6	5.3	6.1	6.2	7.5
120～140	3.1	3.6	3.9	3.9	4.1	4.8	5.4	6.2	6.3	7.6
140～160	3.2	3.7	4.1	4.2	4.3	5.0	5.6	6.3	6.4	7.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	370/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	336/276

Constants of dn/dt		
D_0	D_1	D_2
9.91E-07	1.25E-08	-3.05E-11
E_0	E_1	λ_{TK}
6.90E-07	1.39E-09	2.72E-01

D-LaF731	731405	n_d = 1.73077	υ_d = 40.50	$n_F - n_C$ = 0.018043
		n_e = 1.73505	υ_e = 40.25	$n_{F'} - n_{C'}$ = 0.018263

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68874
n_{1970}	1970.09	1.69525
n_{1530}	1529.58	1.70254
n_{1129}	1128.64	1.70947
n_{1064}	1064.00	1.71080
n_t	1013.98	1.71191
n_s	852.11	1.71635
$n_{A'}$	768.19	1.71949
n_r	706.52	1.72243
n_C	656.27	1.72541
$n_{C'}$	643.85	1.72625
n_{He-Ne}	632.80	1.72705
n_D	589.29	1.73061
n_d	587.56	1.73077
n_e	546.07	1.73505
n_F	486.13	1.74345
$n_{F'}$	479.99	1.74452
n_g	435.84	1.75376
n_h	404.66	1.76260
n_i	365.01	1.77835

Constants of Dispersion Formula	
A_0	2.91839395E+00
A_1	-1.31881796E-02
A_2	2.56126448E-02
A_3	9.59611523E-04
A_4	-3.53323234E-05
A_5	4.57862484E-06

Density	
ρ (g/cm^3)	3.21

Solarization	
△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.2971
$P_{e,d}$	0.2372
$P_{g,F}$	0.5714
$P'_{d,c'}$	0.2475
$P'_{e,d}$	0.2344
$P'_{g,F'}$	0.5059

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0023
$\triangle P_{g,F}$	-0.0049
$\triangle P_{C,t}$	0.0118
$\triangle P_{C,s}$	0.0045

Thermal Properties	
Tg (℃)	498
Ts (℃)	533
$T_{10}^{14.5}$ (℃)	460
T_{10}^{13} (℃)	492
$\alpha_{-50/80℃}$ (10^{-7}/K)	95
$\alpha_{100/300℃}$ (10^{-7}/K)	112
λ (W/(m·K))	1.29
β_d	105

Mechanical Properties	
HK (10^7Pa)	611
F_A	127
E (GPa)	111.9
G (GPa)	43.2
μ	0.296
σ_b (MPa)	64
B (10^{-12}/Pa)	1.96

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	87
-40/-30	90
-30/-20	91
-20/-10	93
-10/0	94
0/10	95
10/20	96
20/30	97
30/40	97
40/50	98
50/60	98
60/70	99
70/80	100
80/90	101
90/100	102
100/110	103
110/120	104
120/130	105
130/140	106
140/150	108
150/160	109

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.900	0.810
2200	0.982	0.964
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.997	0.995
500	0.995	0.992
480	0.992	0.988
460	0.989	0.982
440	0.985	0.974
420	0.975	0.953
400	0.967	0.937
390	0.951	0.908
380	0.923	0.856
370	0.863	0.752
360	0.728	0.535
350	0.410	0.171
340	0.057	0.008
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.1	1.4	1.7	1.8	2.2	2.3	2.5	2.8	2.9	3.6
-40～-20	1.3	1.6	1.9	2.0	2.4	2.7	2.7	3.1	3.3	4.1
-20～0	1.5	1.8	2.1	2.2	2.7	2.9	3.0	3.4	3.5	4.3
0～20	1.6	2.0	2.4	2.5	2.9	3.1	3.3	3.6	3.8	4.5
20～40	1.8	2.2	2.6	2.7	2.9	3.2	3.5	3.8	4.0	4.8
40～60	1.9	2.2	2.6	2.8	2.9	3.3	3.7	4.0	4.1	5.0
60～80	2.2	2.3	2.7	2.9	3.0	3.5	3.8	4.2	4.3	5.2
80～100	2.3	2.5	2.8	2.9	3.1	3.6	4.0	4.4	4.5	5.4
100～120	2.4	2.7	2.9	3.0	3.2	3.7	4.1	4.5	4.6	5.7
120～140	2.4	2.7	2.9	3.0	3.3	3.8	4.3	4.6	4.7	6.0
140～160	2.6	2.8	3.0	3.1	3.4	3.9	4.4	4.8	4.8	6.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	364/335

Constants of dn/dt		
D_0	D_1	D_2
-4.06E-07	1.61E-08	-3.91E-11
E_0	E_1	λ_{TK}
7.84E-07	7.44E-10	2.13E-01

D-LaF743	743493	n_d = 1.74330	υ_d = 49.33	$n_F - n_C$ = 0.015069
		n_e = 1.74689	υ_e = 49.07	$n_{F'} - n_{C'}$ = 0.015221

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70399
n_{1970}	1970.09	1.71066
n_{1530}	1529.58	1.71800
n_{1129}	1128.64	1.72467
n_{1064}	1064.00	1.72590
n_t	1013.98	1.72692
n_s	852.11	1.73091
$n_{A'}$	768.19	1.73366
n_r	706.52	1.73621
n_C	656.27	1.73876
$n_{C'}$	643.85	1.73948
n_{He-Ne}	632.80	1.74016
n_D	589.29	1.74317
n_d	587.56	1.74330
n_e	546.07	1.74689
n_F	486.13	1.75383
$n_{F'}$	479.99	1.75470
n_g	435.84	1.76215
n_h	404.66	1.76911
n_i	365.01	1.78110

Constants of Dispersion Formula	
A_0	2.97441605E+00
A_1	-1.38572738E-02
A_2	2.19649180E-02
A_3	8.10197466E-04
A_4	-4.79702937E-05
A_5	3.00170973E-06

Density	
ρ (g/cm^3)	4.23

Solarization	
△λ (%)	-3.5

Relative Partial Dispersion	
$P_{d,C}$	0.3013
$P_{e,d}$	0.2382
$P_{g,F}$	0.5521
$P'_{d,c'}$	0.2510
$P'_{e,d}$	0.2359
$P'_{g,F'}$	0.4895

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0024
$\triangle P_{g,F}$	-0.0095
$\triangle P_{C,t}$	0.0066
$\triangle P_{C,s}$	0.0021

Thermal Properties	
Tg (℃)	571
Ts (℃)	603
$T_{10}^{14.5}$ (℃)	531
T_{10}^{13} (℃)	555
$\alpha_{-50/80℃}$ (10^{-7}/K)	57
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	0.88
β_d	135

Mechanical Properties	
HK (10^7Pa)	679
F_A	113
E (GPa)	111.3
G (GPa)	42.6
μ	0.308
σ_b (MPa)	87
B (10^{-12}/Pa)	2.17

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	50
-40/-30	53
-30/-20	54
-20/-10	55
-10/0	56
0/10	57
10/20	58
20/30	58
30/40	59
40/50	59
50/60	60
60/70	60
70/80	61
80/90	61
90/100	62
100/110	63
110/120	64
120/130	65
130/140	66
140/150	68
150/160	68

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.830	0.689
2200	0.955	0.912
2000	0.982	0.965
1800	0.994	0.989
1600	0.998	0.996
1400	0.998	0.996
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.998	0.997
460	0.997	0.995
440	0.997	0.994
420	0.996	0.992
400	0.994	0.988
390	0.992	0.984
380	0.988	0.977
370	0.982	0.965
360	0.973	0.946
350	0.954	0.911
340	0.930	0.865
330	0.892	0.795
320	0.843	0.710
310	0.723	0.523
300	0.701	0.492
290	0.628	0.394
280	0.490	0.240

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	7.3	7.6	8.0	8.0	8.1	8.1	8.3	8.9	9.0	9.4
-40～-20	7.3	7.6	8.1	8.1	8.2	8.2	8.5	9.1	9.2	9.5
-20～0	7.4	7.7	8.1	8.1	8.2	8.3	8.5	9.2	9.3	9.7
0～20	7.5	7.8	8.1	8.1	8.2	8.4	8.5	9.3	9.4	9.8
20～40	7.6	7.8	8.1	8.2	8.2	8.5	8.7	9.3	9.5	9.9
40～60	7.6	7.9	8.2	8.2	8.3	8.6	8.7	9.4	9.6	10.0
60～80	7.7	7.9	8.3	8.4	8.4	8.8	8.9	9.6	9.7	10.2
80～100	7.8	8.1	8.4	8.5	8.5	8.9	9.1	9.7	9.8	10.4
100～120	7.9	8.2	8.4	8.5	8.6	9.1	9.3	9.9	10.0	10.6
120～140	8.0	8.4	8.5	8.6	8.7	9.3	9.5	10.0	10.1	10.8
140～160	8.1	8.5	8.6	8.7	8.8	9.4	9.6	10.2	10.2	10.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	365/280
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	331/262

Constants of dn/dt		
D_0	D_1	D_2
9.72E-06	1.25E-08	-2.05E-11
E_0	E_1	λ_{TK}
5.62E-07	5.06E-10	2.24E-01

D-ZLaF50	801455	n_d = 1.80139	υ_d = 45.45	$n_F - n_C$ = 0.017632
		n_e = 1.80558	υ_e = 45.21	$n_{F'} - n_{C'}$ = 0.017820

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75922
n_{1970}	1970.09	1.76581
n_{1530}	1529.58	1.77320
n_{1129}	1128.64	1.78019
n_{1064}	1064.00	1.78152
n_t	1013.98	1.78264
n_s	852.11	1.78708
$n_{A'}$	768.19	1.79022
n_r	706.52	1.79314
n_C	656.27	1.79610
$n_{C'}$	643.85	1.79694
n_{He-Ne}	632.80	1.79771
n_D	589.29	1.80122
n_d	587.56	1.80139
n_e	546.07	1.80558
n_F	486.13	1.81373
$n_{F'}$	479.99	1.81476
n_g	435.84	1.82361
n_h	404.66	1.83193
n_i	365.01	1.84640

Constants of Dispersion Formula	
A_0	3.16516554E+00
A_1	-1.39269813E-02
A_2	2.68932250E-02
A_3	8.75538542E-04
A_4	-3.52600431E-05
A_5	3.03103679E-06

Density	
ρ (g/cm^3)	4.81

Solarization	
△λ (%)	-0.5

Relative Partial Dispersion	
$P_{d,C}$	0.3000
$P_{e,d}$	0.2376
$P_{g,F}$	0.5603
$P'_{d,c'}$	0.2497
$P'_{e,d}$	0.2351
$P'_{g,F'}$	0.4966

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0029
$\triangle P_{g,F}$	-0.0078
$\triangle P_{C,t}$	0.0030
$\triangle P_{C,s}$	0.0021

Thermal Properties	
Tg (℃)	599
Ts (℃)	642
$T_{10}^{14.5}$ (℃)	579
T_{10}^{13} (℃)	595
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	77
λ (W/(m·K))	0.79
β_d	140

Mechanical Properties	
HK (10^7Pa)	651
F_A	71
E (GPa)	121.1
G (GPa)	46.1
μ	0.314
σ_b (MPa)	106
B (10^{-12}/Pa)	1.74

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	53
-40/-30	56
-30/-20	56
-20/-10	58
-10/0	61
0/10	61
10/20	62
20/30	63
30/40	65
40/50	66
50/60	66
60/70	67
70/80	69
80/90	69
90/100	69
100/110	69
110/120	70
120/130	70
130/140	72
140/150	73
150/160	75

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.510	0.260
2200	0.866	0.750
2000	0.940	0.884
1800	0.983	0.966
1600	0.996	0.992
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.997
480	0.997	0.995
460	0.996	0.992
440	0.995	0.990
420	0.993	0.986
400	0.989	0.978
390	0.985	0.971
380	0.978	0.957
370	0.967	0.935
360	0.945	0.893
350	0.904	0.817
340	0.816	0.666
330	0.630	0.397
320	0.318	0.101
310	0.095	0.009
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.0	4.4	4.7	4.8	4.9	5.0	5.2	5.3	5.5	5.8
-40～-20	4.2	4.6	4.8	4.9	5.0	5.2	5.4	5.5	5.6	6.0
-20～0	4.4	4.7	4.9	5.0	5.1	5.3	5.6	5.7	5.8	6.4
0～20	4.4	4.8	5.2	5.3	5.4	5.5	5.9	5.9	6.0	6.5
20～40	4.5	5.0	5.4	5.5	5.6	5.7	6.1	6.1	6.1	6.9
40～60	4.5	5.1	5.5	5.6	5.6	5.7	6.1	6.3	6.4	7.2
60～80	4.6	5.3	5.6	5.7	5.8	6.0	6.3	6.5	6.6	7.3
80～100	4.6	5.4	5.8	5.9	6.0	6.2	6.4	6.7	6.8	7.4
100～120	4.8	5.7	6.0	6.1	6.2	6.3	6.5	6.9	7.0	7.6
120～140	5.0	5.8	6.2	6.2	6.3	6.4	6.7	7.1	7.2	7.9
140～160	5.2	5.8	6.2	6.3	6.4	6.5	6.9	7.3	7.4	8.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	375/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	349/316

Constants of dn/dt		
D_0	D_1	D_2
4.18E-06	1.42E-08	-2.67E-11
E_0	E_1	λ_{TK}
6.65E-07	9.25E-10	1.82E-08

D-ZLaF52L	806407	n_d = 1.80610	υ_d = 40.73	$n_F - n_C$ = 0.019791
		n_e = 1.81080	υ_e = 40.48	$n_{F'} - n_{C'}$ = 0.020031

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.76065
n_{1970}	1970.09	1.76756
n_{1530}	1529.58	1.77534
n_{1129}	1128.64	1.78278
n_{1064}	1064.00	1.78422
n_t	1013.98	1.78543
n_s	852.11	1.79027
$n_{A'}$	768.19	1.79371
n_r	706.52	1.79694
n_C	656.27	1.80022
$n_{C'}$	643.85	1.80114
n_{He-Ne}	632.80	1.80201
n_D	589.29	1.80592
n_d	587.56	1.80610
n_e	546.07	1.81080
n_F	486.13	1.82002
$n_{F'}$	479.99	1.82117
n_g	435.84	1.83126
n_h	404.66	1.84085
n_i	365.01	1.85784

Constants of Dispersion Formula	
A_0	3.17316178E+00
A_1	-1.45588429E-02
A_2	2.92758988E-02
A_3	1.20865059E-03
A_4	-6.18358136E-05
A_5	5.88185791E-06

Density		Solarization	
ρ (g/cm^3)	4.43	△λ (%)	0.0

Relative Partial Dispersion	
$P_{d,C}$	0.2971
$P_{e,d}$	0.2375
$P_{g,F}$	0.5679
$P'_{d,c'}$	0.2476
$P'_{e,d}$	0.2346
$P'_{g,F'}$	0.5037

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0018
$\triangle P_{g,F}$	-0.0080
$\triangle P_{C,t}$	0.0098
$\triangle P_{C,s}$	0.0046

Thermal Properties	
Tg (℃)	546
Ts (℃)	580
$T_{10}^{14.5}$ (℃)	519
T_{10}^{13} (℃)	538
$\alpha_{-50/80℃}$ (10^{-7}/K)	59
$\alpha_{100/300℃}$ (10^{-7}/K)	75
λ (W/(m·K))	0.87
β_d	140

Mechanical Properties	
HK (10^7Pa)	645
F_A	106
E (GPa)	112.8
G (GPa)	42.0
μ	0.342
σ_b (MPa)	73
B (10^{-12}/Pa)	2.23

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	3

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	55
-30/-20	56
-20/-10	57
-10/0	58
0/10	59
10/20	59
20/30	60
30/40	61
40/50	61
50/60	62
60/70	63
70/80	64
80/90	66
90/100	67
100/110	68
110/120	68
120/130	69
130/140	71
140/150	72
150/160	72

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.848	0.719
2200	0.962	0.925
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.995
480	0.996	0.992
460	0.994	0.988
440	0.992	0.983
420	0.988	0.976
400	0.982	0.963
390	0.975	0.949
380	0.963	0.928
370	0.942	0.888
360	0.902	0.818
350	0.822	0.683
340	0.658	0.433
330	0.342	0.118
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	5.4	6.3	6.5	6.6	6.7	7.3	7.6	8.0	8.2	9.6
-40～-20	5.6	6.3	6.6	6.7	6.9	7.4	7.8	8.3	8.4	9.8
-20～0	5.8	6.3	6.8	6.8	6.9	7.5	7.9	8.4	8.5	9.9
0～20	6.0	6.4	6.8	6.9	6.9	7.5	8.0	8.5	8.6	9.9
20～40	6.2	6.5	6.9	6.9	7.0	7.7	8.1	8.5	8.6	9.9
40～60	6.4	6.6	6.9	7.0	7.1	7.9	8.1	8.7	8.8	10.0
60～80	6.5	6.7	7.0	7.1	7.3	7.9	8.1	8.6	8.8	10.2
80～100	6.6	6.8	7.1	7.3	7.4	8.1	8.4	9.0	9.1	10.4
100～120	6.7	7.0	7.3	7.4	7.5	8.2	8.6	9.0	9.2	10.5
120～140	6.8	7.1	7.4	7.5	7.7	8.4	8.7	9.1	9.3	10.7
140～160	6.9	7.1	7.6	7.7	7.9	8.5	8.8	9.3	9.5	10.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	395/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	357/327

Constants of dn/dt		
D_0	D_1	D_2
6.51E-06	1.42E-08	-2.06E-11
E_0	E_1	λ_{TK}
6.70E-07	3.07E-11	2.84E-01

D-ZLaF52N	810410	n_d = 1.81000	υ_d = 41.00	$n_F - n_C$ = 0.019758
		n_e = 1.81469	υ_e = 40.80	$n_{F'} - n_{C'}$ = 0.019970

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.76475
n_{1970}	1970.09	1.77159
n_{1530}	1529.58	1.77930
n_{1129}	1128.64	1.78671
n_{1064}	1064.00	1.78814
n_t	1013.98	1.78935
n_s	852.11	1.79418
$n_{A'}$	768.19	1.79762
n_r	706.52	1.80084
n_C	656.27	1.80411
$n_{C'}$	643.85	1.80505
n_{He-Ne}	632.80	1.80591
n_D	589.29	1.80982
n_d	587.56	1.81000
n_e	546.07	1.81469
n_F	486.13	1.82387
$n_{F'}$	479.99	1.82502
n_g	435.84	1.83508
n_h	404.66	1.84465
n_i	365.01	1.86160

Constants of Dispersion Formula	
A_0	3.18681101E+00
A_1	-1.44191920E-02
A_2	2.95460135E-02
A_3	1.15252022E-03
A_4	-5.90862778E-05
A_5	5.97442323E-06

Density	
ρ (g/cm^3)	4.47

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2981
$P_{e,d}$	0.2374
$P_{g,F}$	0.5674
$P'_{d,c'}$	0.2479
$P'_{e,d}$	0.2349
$P'_{g,F'}$	0.5038

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0029
$\triangle P_{g,F}$	-0.0081
$\triangle P_{C,t}$	0.0083
$\triangle P_{C,s}$	0.0038

Thermal Properties	
Tg (℃)	548
Ts (℃)	578
$T_{10}^{14.5}$ (℃)	510
T_{10}^{13} (℃)	529
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	79
λ (W/(m·K))	0.98
β_d	140

Mechanical Properties	
HK (10^7Pa)	625
F_A	91
E (GPa)	114.4
G (GPa)	42.6
μ	0.343
σ_b (MPa)	81
B (10^{-12}/Pa)	2.17

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	51
-40/-30	54
-30/-20	56
-20/-10	58
-10/0	59
0/10	60
10/20	61
20/30	62
30/40	63
40/50	64
50/60	64
60/70	64
70/80	65
80/90	66
90/100	67
100/110	68
110/120	69
120/130	70
130/140	71
140/150	72
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.850	0.723
2200	0.956	0.914
2000	0.975	0.951
1800	0.988	0.976
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.997
550	0.999	0.997
500	0.998	0.996
480	0.996	0.996
460	0.994	0.993
440	0.992	0.988
420	0.990	0.974
400	0.982	0.959
390	0.975	0.944
380	0.963	0.919
370	0.940	0.876
360	0.894	0.795
350	0.816	0.662
340	0.646	0.415
330	0.320	0.103
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	5.1	5.6	6.7	6.9	7.0	7.2	7.9	9.7	9.8	11.2
-40～-20	5.6	6.2	7.1	7.2	7.3	7.6	8.3	10.1	10.1	11.6
-20～0	6.0	6.7	7.4	7.6	7.8	8.0	8.6	10.4	10.6	12.0
0～20	6.5	7.2	7.6	7.9	8.2	8.3	8.8	10.6	10.8	12.3
20～40	6.7	7.5	7.8	8.1	8.2	8.6	8.9	10.8	11.0	12.5
40～60	7.0	7.8	8.0	8.2	8.4	8.8	9.0	11.0	11.2	12.7
60～80	7.2	8.0	8.2	8.3	8.4	9.0	9.2	11.2	11.4	12.9
80～100	7.4	8.2	8.4	8.4	8.6	9.2	9.4	11.4	11.5	12.9
100～120	7.7	8.3	8.5	8.5	8.7	9.3	9.6	11.5	11.6	13.0
120～140	8.0	8.4	8.6	8.6	8.9	9.3	9.7	11.6	11.7	13.1
140～160	8.3	8.6	8.6	8.6	9.2	9.4	9.8	11.7	11.9	13.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	395/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	360/327

Constants of dn/dt		
D_0	D_1	D_2
6.96E-06	2.21E-08	-4.66E-11
E_0	E_1	λ_{TK}
9.87E-07	-3.77E-10	2.98E-01

D-ZLaF52N-M170	808409	n_d = 1.80834	υ_d = 40.92	$n_F - n_C$ = 0.019753
		n_e = 1.81303	υ_e = 40.67	$n_{F'} - n_{C'}$ = 0.019992

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.76315
n_{1970}	1970.09	1.77000
n_{1530}	1529.58	1.77771
n_{1129}	1128.64	1.78511
n_{1064}	1064.00	1.78654
n_t	1013.98	1.78774
n_s	852.11	1.79256
$n_{A'}$	768.19	1.79599
n_r	706.52	1.79921
n_C	656.27	1.80247
$n_{C'}$	643.85	1.80340
n_{He-Ne}	632.80	1.80427
n_D	589.29	1.80817
n_d	587.56	1.80834
n_e	546.07	1.81303
n_F	486.13	1.82223
$n_{F'}$	479.99	1.82339
n_g	435.84	1.83343
n_h	404.66	1.84298
n_i	365.01	1.85982

Constants of Dispersion Formula	
A_0	3.18131839E+00
A_1	-1.44359617E-02
A_2	2.92512247E-02
A_3	1.19876602E-03
A_4	-5.70803235E-05
A_5	5.23040290E-06

Density	
ρ (g/cm^3)	4.47

Solarization	
△λ (%)	-0.6

Relative Partial Dispersion	
$P_{d,C}$	0.2972
$P_{e,d}$	0.2374
$P_{g,F}$	0.5670
$P'_{d,c'}$	0.2471
$P'_{e,d}$	0.2346
$P'_{g,F'}$	0.5022

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0019
$\triangle P_{g,F}$	-0.0086
$\triangle P_{C,t}$	0.0073
$\triangle P_{C,s}$	0.0031

Thermal Properties	
Tg (℃)	548
Ts (℃)	578
$T_{10}^{14.5}$ (℃)	510
T_{10}^{13} (℃)	529
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	79
λ (W/(m·K))	1.00
β_d	140

Mechanical Properties	
HK (10^7Pa)	625
F_A	91
E (GPa)	115.4
G (GPa)	42.9
μ	0.344
σ_b (MPa)	71
B (10^{-12}/Pa)	2.17

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	51
-40/-30	54
-30/-20	56
-20/-10	58
-10/0	59
0/10	60
10/20	61
20/30	62
30/40	63
40/50	64
50/60	64
60/70	64
70/80	65
80/90	66
90/100	67
100/110	68
110/120	69
120/130	70
130/140	71
140/150	72
150/160	73

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.855	0.731
2200	0.968	0.937
2000	0.990	0.980
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.998	0.996
480	0.996	0.993
460	0.994	0.990
440	0.992	0.986
420	0.990	0.980
400	0.982	0.967
390	0.976	0.955
380	0.963	0.934
370	0.942	0.898
360	0.911	0.831
350	0.834	0.701
340	0.671	0.454
330	0.372	0.136
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	5.9	6.9	6.7	6.9	7.0	7.2	7.9	9.7	9.8	10.3
-40～-20	5.9	7.0	7.1	7.2	7.3	7.6	8.3	10.1	10.1	10.5
-20～0	5.9	7.2	7.4	7.6	7.8	8.0	8.6	10.4	10.6	10.8
0～20	6.0	7.2	7.6	7.9	8.2	8.3	8.8	10.6	10.8	11.1
20～40	6.0	7.3	7.8	8.1	8.2	8.6	8.9	10.8	11.0	11.2
40～60	6.2	7.5	8.0	8.2	8.4	8.8	9.0	11.0	11.2	11.4
60～80	6.3	7.6	8.2	8.3	8.4	9.0	9.2	11.2	11.4	11.7
80～100	6.5	7.8	8.4	8.4	8.6	9.2	9.4	11.4	11.5	12.0
100～120	6.5	7.9	8.5	8.5	8.7	9.3	9.6	11.5	11.6	12.3
120～140	6.7	8.1	8.6	8.6	8.9	9.3	9.7	11.6	11.7	12.6
140～160	6.7	8.2	8.6	8.6	9.2	9.4	9.8	11.7	11.9	12.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	357/327

Constants of dn/dt		
D_0	D_1	D_2
6.23E-06	1.24E-08	-1.88E-11
E_0	E_1	λ_{TK}
1.67E-06	1.27E-09	4.39E-07

D-ZLaF53	834373	n_d = 1.83441	υ_d = 37.28	$n_F - n_C$ = 0.022380
		n_e = 1.83972	υ_e = 37.04	$n_{F'} - n_{C'}$ = 0.022672

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.78506
n_{1970}	1970.09	1.79228
n_{1530}	1529.58	1.80047
n_{1129}	1128.64	1.80847
n_{1064}	1064.00	1.81004
n_t	1013.98	1.81137
n_s	852.11	1.81671
$n_{A'}$	768.19	1.82054
n_r	706.52	1.82414
n_C	656.27	1.82781
$n_{C'}$	643.85	1.82884
n_{He-Ne}	632.80	1.82981
n_D	589.29	1.83421
n_d	587.56	1.83441
n_e	546.07	1.83972
n_F	486.13	1.85019
$n_{F'}$	479.99	1.85152
n_g	435.84	1.86316
n_h	404.66	1.87437
n_i	365.01	1.89451

Constants of Dispersion Formula	
A_0	3.26258096E+00
A_1	-1.52499377E-02
A_2	3.41466836E-02
A_3	9.84000388E-04
A_4	1.27478564E-05
A_5	3.62442642E-06

Density	
ρ (g/cm^3)	4.46

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2949
$P_{e,d}$	0.2373
$P_{g,F}$	0.5795
$P'_{d,c'}$	0.2457
$P'_{e,d}$	0.2342
$P'_{g,F'}$	0.5134

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0018
$\triangle P_{g,F}$	-0.0021
$\triangle P_{C,t}$	0.0138
$\triangle P_{C,s}$	0.0061

Thermal Properties	
Tg (℃)	571
Ts (℃)	606
$T_{10}^{14.5}$ (℃)	529
T_{10}^{13} (℃)	548
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	77
λ (W/(m·K))	0.95
β_d	175

Mechanical Properties	
HK (10^7Pa)	671
F_A	83
E (GPa)	117.2
G (GPa)	44.5
μ	0.319
σ_b (MPa)	63
B (10^{-12}/Pa)	2.01

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	51
-40/-30	54
-30/-20	55
-20/-10	58
-10/0	59
0/10	60
10/20	60
20/30	61
30/40	62
40/50	63
50/60	63
60/70	64
70/80	64
80/90	65
90/100	66
100/110	67
110/120	68
120/130	69
130/140	70
140/150	71
150/160	71

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.860	0.740
2200	0.970	0.941
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.997	0.995
480	0.994	0.990
460	0.989	0.983
440	0.983	0.972
420	0.971	0.950
400	0.947	0.905
390	0.923	0.860
380	0.882	0.784
370	0.805	0.651
360	0.641	0.412
350	0.346	0.116
340	0.051	0.004
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	6.1	6.5	6.7	6.8	6.9	7.3	7.8	8.5	8.7	9.5
-40～-20	6.2	6.6	7.0	7.0	7.1	7.5	8.0	8.7	8.9	9.7
-20～0	6.4	6.9	7.1	7.2	7.2	7.7	8.1	9.1	9.2	9.9
0～20	6.5	6.9	7.1	7.2	7.4	7.7	8.2	9.1	9.5	10.1
20～40	6.5	7.0	7.3	7.3	7.4	7.8	8.3	9.2	9.5	10.1
40～60	6.5	7.1	7.3	7.4	7.5	7.8	8.4	9.2	9.6	10.4
60～80	6.5	7.3	7.5	7.5	7.6	7.9	8.4	9.5	9.8	10.6
80～100	6.6	7.4	7.7	7.7	7.8	8.1	8.5	9.9	9.8	10.9
100～120	6.7	7.5	7.9	8.0	8.0	8.2	8.7	10.2	10.0	11.3
120～140	6.7	7.6	8.0	8.1	8.1	8.3	8.9	10.5	10.1	11.6
140～160	6.8	7.8	8.0	8.1	8.2	8.4	9.1	10.8	10.2	11.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	430/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	382/347

Constants of dn/dt		
D_0	D_1	D_2
6.76E-06	1.23E-08	-2.21E-11
E_0	E_1	λ_{TK}
7.14E-07	6.99E-10	2.68E-01

D-ZLaF814	815370	n_d = 1.81474	υ_d = 37.03	$n_F - n_C$ = 0.022004
		n_e = 1.81995	υ_e = 36.78	$n_{F'} - n_{C'}$ = 0.022294

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.76516
n_{1970}	1970.09	1.77267
n_{1530}	1529.58	1.78111
n_{1129}	1128.64	1.78919
n_{1064}	1064.00	1.79076
n_t	1013.98	1.79207
n_s	852.11	1.79734
$n_{A'}$	768.19	1.80110
n_r	706.52	1.80465
n_C	656.27	1.80825
$n_{C'}$	643.85	1.80927
n_{He-Ne}	632.80	1.81023
n_D	589.29	1.81455
n_d	587.56	1.81474
n_e	546.07	1.81995
n_F	486.13	1.83025
$n_{F'}$	479.99	1.83156
n_g	435.84	1.84293
n_h	404.66	1.85388
n_i	365.01	1.87363

Relative Partial Dispersion	
$P_{d,C}$	0.2949
$P_{e,d}$	0.2368
$P_{g,F}$	0.5763
$P'_{d,c'}$	0.2454
$P'_{e,d}$	0.2337
$P'_{g,F'}$	0.5100

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0017
$\triangle P_{g,F}$	-0.0058
$\triangle P_{C,t}$	0.0158
$\triangle P_{C,s}$	0.0065

Thermal Properties	
Tg (℃)	544
Ts (℃)	580
$T_{10}^{14.5}$ (℃)	502
T_{10}^{13} (℃)	525
$\alpha_{-50/80℃}$ (10^{-7}/K)	60
$\alpha_{100/300℃}$ (10^{-7}/K)	74
λ (W/(m·K))	0.93
β_d	183

Mechanical Properties	
HK (10^7Pa)	620
F_A	
E (GPa)	115.3
G (GPa)	44.7
μ	0.290
σ_b (MPa)	
B (10^{-12}/Pa)	2.17

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	4
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	52
-40/-30	55
-30/-20	56
-20/-10	58
-10/0	59
0/10	60
10/20	61
20/30	62
30/40	63
40/50	64
50/60	64
60/70	65
70/80	65
80/90	66
90/100	67
100/110	68
110/120	70
120/130	71
130/140	73
140/150	74
150/160	76

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.846	0.715
2200	0.962	0.925
2000	0.986	0.972
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.998	0.997
600	0.997	0.995
550	0.993	0.986
500	0.989	0.979
480	0.985	0.970
460	0.979	0.957
440	0.968	0.938
420	0.946	0.895
400	0.925	0.856
390	0.892	0.796
380	0.834	0.695
370	0.719	0.516
360	0.498	0.248
350	0.193	0.037
340		
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	3.19574140E+00
A_1	-1.58738035E-02
A_2	3.15329222E-02
A_3	1.57767624E-03
A_4	-9.05739467E-05
A_5	9.32711709E-06

Density	
ρ (g/cm^3)	4.20

Solarization	
△λ (%)	-2.1

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.8	5.4	5.9	5.9	6.0	6.1	6.6	7.2	7.3	8.0
-40～-20	4.6	5.1	5.5	5.6	5.6	5.8	6.3	6.8	6.9	7.6
-20～0	4.4	4.9	5.2	5.2	5.3	5.5	6.0	6.5	6.6	7.4
0～20	4.1	4.7	4.9	5.0	5.1	5.2	5.7	6.4	6.4	7.2
20～40	4.0	4.6	4.9	5.0	5.1	5.3	5.8	6.4	6.4	7.3
40～60	4.0	4.6	5.0	5.0	5.1	5.3	5.8	6.4	6.5	7.4
60～80	4.0	4.6	5.0	5.0	5.1	5.4	5.9	6.5	6.6	7.5
80～100	4.0	4.7	5.2	5.2	5.3	5.5	6.1	6.6	6.6	7.7
100～120	4.0	4.7	5.2	5.2	5.3	5.6	6.2	6.7	6.7	7.8
120～140	4.1	4.8	5.3	5.3	5.4	5.6	6.2	6.7	6.8	7.9
140～160	4.2	4.9	5.3	5.4	5.5	5.8	6.3	6.9	6.9	8.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	430/345
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	380/342

Constants of dn/dt		
D_0	D_1	D_2
3.28E-06	4.57E-09	8.29E-12
E_0	E_1	λ_{TK}
8.13E-07	5.49E-10	1.92E-01

D-ZLaF851	851401	n_d = 1.85135	υ_d = 40.10	$n_F - n_C$ = 0.021229
		n_e = 1.85639	υ_e = 39.85	$n_{F'} - n_{C'}$ = 0.021488

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.80390
n_{1970}	1970.09	1.81087
n_{1530}	1529.58	1.81878
n_{1129}	1128.64	1.82650
n_{1064}	1064.00	1.82801
n_t	1013.98	1.82929
n_s	852.11	1.83442
$n_{A'}$	768.19	1.83808
n_r	706.52	1.84154
n_C	656.27	1.84505
$n_{C'}$	643.85	1.84604
n_{He-Ne}	632.80	1.84697
n_D	589.29	1.85116
n_d	587.56	1.85135
n_e	546.07	1.85639
n_F	486.13	1.86628
$n_{F'}$	479.99	1.86753
n_g	435.84	1.87838
n_h	404.66	1.88871
n_i	365.01	1.90699

Constants of Dispersion Formula	
A_0	3.32860198E+00
A_1	-1.49218815E-02
A_2	3.29458426E-02
A_3	1.05526131E-03
A_4	-2.14847086E-05
A_5	3.89175295E-06

Density	
ρ (g/cm^3)	4.81

Solarization	
△λ (%)	-0.8

Relative Partial Dispersion	
$P_{d,C}$	0.2968
$P_{e,d}$	0.2374
$P_{g,F}$	0.5700
$P'_{d,c'}$	0.2471
$P'_{e,d}$	0.2345
$P'_{g,F'}$	0.5049

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0022
$\triangle P_{g,F}$	-0.0070
$\triangle P_{C,t}$	0.0080
$\triangle P_{C,s}$	0.0041

Thermal Properties	
Tg (℃)	619
Ts (℃)	655
$T_{10}^{14.5}$ (℃)	568
T_{10}^{13} (℃)	585
$\alpha_{-50/80℃}$ (10^{-7}/K)	62
$\alpha_{100/300℃}$ (10^{-7}/K)	77
λ (W/(m·K))	0.96
β_d	148

Mechanical Properties	
HK (10^7Pa)	634
F_A	75
E (GPa)	127.0
G (GPa)	47.2
μ	0.345
σ_b (MPa)	98
B (10^{-12}/Pa)	1.61

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	54
-40/-30	57
-30/-20	58
-20/-10	60
-10/0	61
0/10	62
10/20	63
20/30	64
30/40	64
40/50	65
50/60	66
60/70	66
70/80	67
80/90	68
90/100	69
100/110	70
110/120	71
120/130	72
130/140	73
140/150	74
150/160	75

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.885	0.783
2200	0.984	0.968
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.997	0.995
480	0.995	0.992
460	0.992	0.989
440	0.988	0.983
420	0.984	0.972
400	0.971	0.949
390	0.958	0.923
380	0.935	0.878
370	0.893	0.792
360	0.794	0.619
350	0.585	0.324
340	0.228	0.049
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	5.0	5.3	5.6	5.6	5.7	6.0	6.1	6.4	6.4	6.9
-40～-20	5.1	5.4	5.6	5.7	5.8	6.0	6.3	6.6	6.7	7.4
-20～0	5.3	5.6	5.8	5.9	6.0	6.1	6.4	6.6	6.7	7.7
0～20	5.3	5.6	5.9	6.0	6.1	6.2	6.6	6.6	6.7	8.0
20～40	5.4	5.7	6.0	6.1	6.2	6.3	6.7	6.8	6.9	8.4
40～60	5.4	5.7	6.0	6.1	6.2	6.4	6.8	6.9	7.0	8.7
60～80	5.5	5.7	6.0	6.1	6.2	6.4	6.9	7.1	7.2	8.9
80～100	5.6	5.8	6.0	6.1	6.2	6.4	7.0	7.2	7.3	9.1
100～120	5.7	5.9	6.1	6.1	6.2	6.5	7.1	7.4	7.5	9.2
120～140	5.8	6.0	6.1	6.2	6.3	6.6	7.2	7.7	7.7	9.4
140～160	5.8	6.0	6.1	6.2	6.3	6.7	7.3	7.9	7.9	9.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(380)/340
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	371/340

Constants of dn/dt		
D_0	D_1	D_2
5.68E-06	1.13E-08	-2.80E-11
E_0	E_1	λ_{TK}
2.16E-07	4.91E-10	3.62E-01

F4	620364	n_d = 1.62005	υ_d = 36.35	$n_F - n_C$ = 0.017060
		n_e = 1.62408	υ_e = 36.09	$n_{F'} - n_{C'}$ = 0.017291

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.58511
n_{1970}	1970.09	1.58980
n_{1530}	1529.58	1.59522
n_{1129}	1128.64	1.60075
n_{1064}	1064.00	1.60186
n_t	1013.98	1.60282
n_s	852.11	1.60672
$n_{A'}$	768.19	1.60957
n_r	706.52	1.61228
n_C	656.27	1.61504
$n_{C'}$	643.85	1.61582
n_{He-Ne}	632.80	1.61656
n_D	589.29	1.61990
n_d	587.56	1.62005
n_e	546.07	1.62408
n_F	486.13	1.63210
$n_{F'}$	479.99	1.63312
n_g	435.84	1.64205
n_h	404.66	1.65066
n_i	365.01	1.66625

Relative Partial Dispersion	
$P_{d,C}$	0.2937
$P_{e,d}$	0.2362
$P_{g,F}$	0.5832
$P'_{d,c'}$	0.2445
$P'_{e,d}$	0.2329
$P'_{g,F'}$	0.5162

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0000
$\triangle P_{g,F}$	0.0000
$\triangle P_{C,t}$	0.0000
$\triangle P_{C,s}$	0.0001

Thermal Properties	
Tg (℃)	414
Ts (℃)	471
$T_{10}^{14.5}$ (℃)	355
T_{10}^{13} (℃)	398
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	110
λ (W/(m·K))	0.73

Mechanical Properties	
HK (10^7Pa)	418
F_A	172
E (GPa)	58.4
G (GPa)	23.3
μ	0.251
σ_b (MPa)	60
B (10^{-12}/Pa)	2.48

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	78
-40/-30	81
-30/-20	83
-20/-10	85
-10/0	86
0/10	88
10/20	89
20/30	90
30/40	91
40/50	92
50/60	93
60/70	94
70/80	95
80/90	96
90/100	98
100/110	99
110/120	100
120/130	101
130/140	103
140/150	104
150/160	105

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.889	0.790
2200	0.918	0.843
2000	0.964	0.930
1800	0.986	0.972
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.997	0.994
420	0.995	0.990
400	0.993	0.986
390	0.991	0.978
380	0.987	0.968
370	0.982	0.957
360	0.971	0.932
350	0.940	0.874
340	0.855	0.725
330	0.620	0.383
320	0.178	0.036
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.55510802E+00
A_1	-8.64431010E-03
A_2	2.26592448E-02
A_3	8.22256872E-04
A_4	-1.60646686E-05
A_5	4.04183096E-06

Density	
ρ (g/cm^3)	3.57

Solarization	
△λ (%)	0.5

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	1.2	1.7	2.1	2.1	2.1	2.3	2.5	3.2	3.3	4.3
-40～-20	1.2	1.7	2.1	2.1	2.1	2.3	2.6	3.3	3.4	4.5
-20～0	1.3	1.7	2.1	2.1	2.1	2.4	2.7	3.5	3.6	4.5
0～20	1.3	1.8	2.1	2.1	2.2	2.5	2.8	3.6	3.7	4.6
20～40	1.4	1.9	2.2	2.2	2.2	2.5	3.0	3.7	3.8	4.9
40～60	1.4	1.9	2.3	2.4	2.4	2.7	3.0	3.9	4.0	5.0
60～80	1.5	2.0	2.5	2.6	2.6	2.9	3.4	4.1	4.2	5.2
80～100	1.7	2.1	2.6	2.6	2.7	2.9	3.5	4.2	4.3	5.3
100～120	1.8	2.2	2.7	2.7	2.8	3.2	3.7	4.3	4.4	5.5
120～140	2.0	2.3	2.8	2.9	3.0	3.4	3.8	4.5	4.6	5.7
140～160	2.1	2.4	3.0	3.1	3.2	3.5	4.1	4.7	4.8	5.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	350/320
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	342/320

Constants of dn/dt		
D_0	D_1	D_2
-1.07E-06	1.43E-08	-1.76E-11
E_0	E_1	λ_{TK}
8.75E-07	5.84E-10	2.59E-01

ZF1	648338	n_d = 1.64769	υ_d = 33.84	$n_F - n_C$ = 0.019140
		n_e = 1.65223	υ_e = 33.58	$n_{F'} - n_{C'}$ = 0.019421

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.61010
n_{1970}	1970.09	1.61487
n_{1530}	1529.58	1.62046
n_{1129}	1128.64	1.62633
n_{1064}	1064.00	1.62755
n_t	1013.98	1.62858
n_s	852.11	1.63287
$n_{A'}$	768.19	1.63602
n_r	706.52	1.63902
n_C	656.27	1.64210
$n_{C'}$	643.85	1.64297
n_{He-Ne}	632.80	1.64380
n_D	589.29	1.64753
n_d	587.56	1.64769
n_e	546.07	1.65223
n_F	486.13	1.66124
$n_{F'}$	479.99	1.66239
n_g	435.84	1.67252
n_h	404.66	1.68238
n_i	365.01	1.70035

Constants of Dispersion Formula	
A_0	2.63523951E+00
A_1	-8.81500293E-03
A_2	2.60315994E-02
A_3	8.16500390E-04
A_4	6.27737485E-06
A_5	4.11832992E-06

Density	
ρ (g/cm^3)	3.85

Solarization	
△λ (%)	-1.4

Relative Partial Dispersion	
$P_{d,C}$	0.2921
$P_{e,d}$	0.2372
$P_{g,F}$	0.5893
$P'_{d,c'}$	0.2430
$P'_{e,d}$	0.2338
$P'_{g,F'}$	0.5216

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0008
$\triangle P_{g,F}$	0.0019
$\triangle P_{C,t}$	0.0023
$\triangle P_{C,s}$	0.0006

Thermal Properties	
Tg (℃)	428
Ts (℃)	478
$T_{10}^{14.5}$ (℃)	388
T_{10}^{13} (℃)	403
$\alpha_{-50/80℃}$ (10^{-7}/K)	88
$\alpha_{100/300℃}$ (10^{-7}/K)	102
λ (W/(m·K))	0.88

Mechanical Properties	
HK (10^7Pa)	395
F_A	198
E (GPa)	55.2
G (GPa)	22.3
μ	0.236
σ_b (MPa)	
B (10^{-12}/Pa)	2.40

Chemical Properties (grade)	
RC (S)	1
RA (S)	2
D_W	1
D_A	2
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	78
-40/-30	81
-30/-20	83
-20/-10	84
-10/0	86
0/10	87
10/20	88
20/30	89
30/40	90
40/50	91
50/60	92
60/70	92
70/80	93
80/90	94
90/100	95
100/110	96
110/120	97
120/130	98
130/140	99
140/150	100
150/160	101

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.931	0.867
2200	0.950	0.900
2000	0.987	0.974
1800	0.995	0.990
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.999	0.998
440	0.998	0.996
420	0.997	0.994
400	0.995	0.992
390	0.992	0.986
380	0.986	0.976
370	0.979	0.961
360	0.949	0.914
350	0.895	0.811
340	0.732	0.541
330	0.343	0.120
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	2.4	2.8	3.0	3.0	3.1	3.3	3.6	4.3	4.3	5.2
-40～-20	2.4	2.8	3.0	3.1	3.1	3.4	3.6	4.3	4.4	5.2
-20～0	2.4	2.8	3.1	3.1	3.2	3.4	3.7	4.4	4.5	5.2
0～20	2.4	2.8	3.1	3.1	3.2	3.4	3.7	4.5	4.5	5.5
20～40	2.4	2.9	3.2	3.2	3.2	3.5	3.8	4.6	4.7	5.5
40～60	2.5	2.9	3.3	3.3	3.3	3.6	3.9	4.8	4.8	5.8
60～80	2.7	3.1	3.4	3.5	3.6	3.8	4.1	5.0	5.1	6.0
80～100	2.8	3.2	3.6	3.7	3.7	4.0	4.4	5.2	5.3	6.3
100～120	2.9	3.3	3.8	3.9	3.9	4.1	4.6	5.4	5.4	6.6
120～140	3.1	3.4	3.9	4.0	4.0	4.3	4.8	5.5	5.6	6.8
140～160	3.1	3.5	4.1	4.1	4.2	4.4	5.0	5.7	5.8	7.1

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	360/330
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	349/327

Constants of dn/dt		
D_0	D_1	D_2
1.23E-06	1.30E-08	-1.05E-11
E_0	E_1	λ_{TK}
6.78E-07	6.73E-10	2.81E-01

ZF2	673322	n_d = 1.67270	υ_d = 32.17	$n_F - n_C$ = 0.020910
		n_e = 1.67765	υ_e = 31.92	$n_{F'} - n_{C'}$ = 0.021227

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.63283
n_{1970}	1970.09	1.63777
n_{1530}	1529.58	1.64358
n_{1129}	1128.64	1.64972
n_{1064}	1064.00	1.65099
n_t	1013.98	1.65209
n_s	852.11	1.65665
$n_{A'}$	768.19	1.66003
n_r	706.52	1.66327
n_C	656.27	1.66661
$n_{C'}$	643.85	1.66756
n_{He-Ne}	632.80	1.66846
n_D	589.29	1.67252
n_d	587.56	1.67270
n_e	546.07	1.67765
n_F	486.13	1.68752
$n_{F'}$	479.99	1.68878
n_g	435.84	1.69988
n_h	404.66	1.71070
n_i	365.01	1.73059

Constants of Dispersion Formula	
A_0	2.71117096E+00
A_1	-9.26643122E-03
A_2	2.71311967E-02
A_3	1.51892246E-03
A_4	-8.58228606E-05
A_5	1.01100745E-05

Density	
ρ (g/cm^3)	4.07

Solarization	
△λ (%)	-0.3

Relative Partial Dispersion	
$P_{d,C}$	0.2912
$P_{e,d}$	0.2367
$P_{g,F}$	0.5911
$P'_{d,c'}$	0.2421
$P'_{e,d}$	0.2332
$P'_{g,F'}$	0.5229

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0004
$\triangle P_{g,F}$	0.0009
$\triangle P_{C,t}$	-0.0016
$\triangle P_{C,s}$	-0.0013

Thermal Properties	
Tg (℃)	443
Ts (℃)	490
$T_{10}^{14.5}$ (℃)	417
T_{10}^{13} (℃)	430
$\alpha_{-50/80℃}$ (10^{-7}/K)	81
$\alpha_{100/300℃}$ (10^{-7}/K)	94
λ (W/(m·K))	0.74

Mechanical Properties	
HK (10^7Pa)	392
F_A	191
E (GPa)	55.4
G (GPa)	22.6
μ	0.226
σ_b (MPa)	49
B (10^{-12}/Pa)	2.17

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	2
R_{OH} (S)	2
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	74
-40/-30	76
-30/-20	78
-20/-10	79
-10/0	80
0/10	81
10/20	82
20/30	82
30/40	83
40/50	84
50/60	84
60/70	85
70/80	85
80/90	86
90/100	86
100/110	87
110/120	88
120/130	89
130/140	90
140/150	91
150/160	92

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.937	0.878
2200	0.949	0.901
2000	0.980	0.960
1800	0.990	0.980
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.999	0.998
480	0.999	0.998
460	0.998	0.996
440	0.996	0.993
420	0.994	0.989
400	0.990	0.976
390	0.986	0.961
380	0.973	0.932
370	0.951	0.884
360	0.895	0.772
350	0.757	0.531
340	0.434	0.152
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.4	4.0	4.6	4.6	4.7	5.0	5.4	6.7	6.7	7.7
-40～-20	3.5	4.2	4.8	4.8	4.8	5.2	5.7	6.8	6.9	8.1
-20～0	3.8	4.4	5.0	5.0	5.1	5.3	6.0	7.2	7.3	8.4
0～20	3.9	4.5	5.1	5.2	5.2	5.5	6.2	7.4	7.5	8.7
20～40	4.0	4.6	5.2	5.3	5.4	5.8	6.4	7.6	7.7	8.9
40～60	4.2	4.8	5.4	5.5	5.6	6.1	6.6	7.9	8.0	9.3
60～80	4.5	5.1	5.7	5.8	5.9	6.4	6.9	8.2	8.3	9.7
80～100	4.7	5.3	6.0	6.0	6.1	6.6	7.1	8.6	8.7	10.0
100～120	4.9	5.5	6.2	6.2	6.3	6.8	7.3	8.9	8.9	10.3
120～140	5.2	5.7	6.4	6.4	6.5	7.0	7.5	9.1	9.2	10.6
140～160	5.4	5.8	6.5	6.6	6.7	7.2	7.8	9.4	9.5	10.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	360/335

Constants of dn/dt		
D_0	D_1	D_2
3.63E-06	1.84E-08	-2.29E-11
E_0	E_1	λ_{TK}
1.17E-06	7.95E-10	2.59E-01

ZF3	717295	n_d = 1.71736	υ_d = 29.50	$n_F - n_C$ = 0.024317
		n_e = 1.72311	υ_e = 29.27	$n_{F'} - n_{C'}$ = 0.024703

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.67350
n_{1970}	1970.09	1.67852
n_{1530}	1529.58	1.68453
n_{1129}	1128.64	1.69113
n_{1064}	1064.00	1.69254
n_t	1013.98	1.69376
n_s	852.11	1.69890
$n_{A'}$	768.19	1.70276
n_r	706.52	1.70647
n_C	656.27	1.71032
$n_{C'}$	643.85	1.71142
n_{He-Ne}	632.80	1.71245
n_D	589.29	1.71715
n_d	587.56	1.71736
n_e	546.07	1.72311
n_F	486.13	1.73464
$n_{F'}$	479.99	1.73612
n_g	435.84	1.74915
n_h	404.66	1.76195
n_i	365.01	1.78575

Constants of Dispersion Formula	
A_0	2.84584649E+00
A_1	-9.46700467E-03
A_2	3.18063247E-02
A_3	1.98612859E-03
A_4	-1.26050821E-04
A_5	1.48076105E-05

Density	
ρ (g/cm^3)	4.46

Solarization	
△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2895
$P_{e,d}$	0.2365
$P_{g,F}$	0.5967
$P'_{d,c'}$	0.2405
$P'_{e,d}$	0.2328
$P'_{g,F'}$	0.5275

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0002
$\triangle P_{g,F}$	0.0021
$\triangle P_{C,t}$	-0.0021
$\triangle P_{C,s}$	-0.0016

Thermal Properties	
Tg (℃)	437
Ts (℃)	486
$T_{10}^{14.5}$ (℃)	385
T_{10}^{13} (℃)	409
$\alpha_{-50/80℃}$ (10^{-7}/K)	77
$\alpha_{100/300℃}$ (10^{-7}/K)	92
λ (W/(m·K))	0.68

Mechanical Properties	
HK (10^7Pa)	385
F_A	232
E (GPa)	56.1
G (GPa)	22.7
μ	0.234
σ_b (MPa)	
B (10^{-12}/Pa)	1.81

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	71
-40/-30	73
-30/-20	74
-20/-10	75
-10/0	76
0/10	77
10/20	78
20/30	79
30/40	79
40/50	80
50/60	80
60/70	81
70/80	81
80/90	82
90/100	82
100/110	83
110/120	84
120/130	85
130/140	86
140/150	87
150/160	87

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.948	0.905
2200	0.962	0.929
2000	0.983	0.970
1800	0.990	0.982
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.996	0.992
460	0.994	0.989
440	0.991	0.983
420	0.986	0.973
400	0.968	0.938
390	0.947	0.899
380	0.911	0.833
370	0.848	0.722
360	0.714	0.512
350	0.440	0.196
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.4	5.2	5.8	5.9	6.0	6.4	6.9	8.3	8.4	9.9
-40～-20	4.5	5.3	5.9	6.0	6.1	6.6	7.0	8.6	8.7	10.2
-20～0	4.7	5.5	6.1	6.2	6.3	6.8	7.4	8.9	9.0	10.6
0～20	4.8	5.6	6.3	6.4	6.5	7.0	7.6	9.2	9.3	10.9
20～40	5.0	5.9	6.6	6.6	6.8	7.3	7.9	9.4	9.5	11.3
40～60	5.2	6.1	6.8	6.8	6.9	7.5	8.0	9.6	9.8	11.7
60～80	5.5	6.3	7.2	7.2	7.3	7.9	8.4	10.0	10.2	12.1
80～100	5.7	6.5	7.4	7.4	7.4	8.2	8.5	10.4	10.5	12.4
100～120	5.9	6.7	7.5	7.5	7.6	8.5	9.0	10.7	10.8	12.5
120～140	6.1	6.9	7.6	7.6	7.7	8.7	9.2	11.0	11.0	13.0
140～160	6.2	7.1	7.8	7.8	7.9	8.8	9.4	11.2	11.3	13.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/345
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	385/342

Constants of dn/dt		
D_0	D_1	D_2
5.06E-06	1.85E-08	-2.75E-11
E_0	E_1	λ_{TK}
1.31E-06	7.78E-10	2.67E-01

ZF4	728283	n_d = 1.72825	υ_d = 28.32	$n_F - n_C$ = 0.025716
		n_e = 1.73432	υ_e = 28.10	$n_{F'} - n_{C'}$ = 0.026133

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.68348
n_{1970}	1970.09	1.68834
n_{1530}	1529.58	1.69423
n_{1129}	1128.64	1.70086
n_{1064}	1064.00	1.70230
n_t	1013.98	1.70355
n_s	852.11	1.70887
$n_{A'}$	768.19	1.71289
n_r	706.52	1.71678
n_C	656.27	1.72082
$n_{C'}$	643.85	1.72198
n_{He-Ne}	632.80	1.72307
n_D	589.29	1.72804
n_d	587.56	1.72825
n_e	546.07	1.73432
n_F	486.13	1.74654
$n_{F'}$	479.99	1.74811
n_g	435.84	1.76193
n_h	404.66	1.77555
n_i	365.01	1.80097

Constants of Dispersion Formula	
A_0	2.87717417E+00
A_1	-9.11236503E-03
A_2	3.30792997E-02
A_3	2.36796622E-03
A_4	-1.69344300E-04
A_5	1.80959601E-05

Density	
ρ (g/cm^3)	4.52

Solarization	
△λ (%)	-0.2

Relative Partial Dispersion	
$P_{d,C}$	0.2889
$P_{e,d}$	0.2360
$P_{g,F}$	0.5985
$P'_{d,c'}$	0.2399
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5288

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0006
$\triangle P_{g,F}$	0.0019
$\triangle P_{C,t}$	-0.0058
$\triangle P_{C,s}$	-0.0037

Thermal Properties	
Tg (℃)	417
Ts (℃)	452
$T_{10}^{14.5}$ (℃)	353
T_{10}^{13} (℃)	391
$\alpha_{-50/80℃}$ (10^{-7}/K)	92
$\alpha_{100/300℃}$ (10^{-7}/K)	105
λ (W/(m·K))	1.03

Mechanical Properties	
HK (10^7Pa)	356
F_A	219
E (GPa)	54.0
G (GPa)	21.9
μ	0.235
σ_b (MPa)	
B (10^{-12}/Pa)	1.85

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	86
-40/-30	88
-30/-20	89
-20/-10	90
-10/0	91
0/10	92
10/20	93
20/30	94
30/40	94
40/50	95
50/60	95
60/70	96
70/80	96
80/90	97
90/100	97
100/110	98
110/120	99
120/130	100
130/140	101
140/150	102
150/160	102

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.946	0.888
2200	0.959	0.918
2000	0.983	0.961
1800	0.991	0.980
1600	0.998	0.997
1400	0.998	0.997
1200	0.998	0.997
1060	0.998	0.997
1000	0.998	0.997
950	0.998	0.997
900	0.998	0.997
850	0.998	0.997
800	0.998	0.997
750	0.998	0.997
700	0.998	0.997
650	0.998	0.997
600	0.998	0.997
550	0.998	0.997
500	0.998	0.997
480	0.997	0.994
460	0.996	0.991
440	0.993	0.986
420	0.989	0.976
400	0.972	0.945
390	0.955	0.911
380	0.925	0.855
370	0.865	0.746
360	0.725	0.524
350	0.415	0.171
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	0.3	0.3	0.3	0.3	0.4	1.1	1.3	1.9	2.0	2.9
-40～-20	0.4	0.4	0.4	0.4	0.5	1.2	1.6	2.2	2.3	3.4
-20～0	0.5	0.6	0.6	0.6	0.7	1.3	1.8	2.7	2.8	4.1
0～20	0.3	0.6	0.7	0.7	0.8	1.5	2.0	3.0	3.0	4.5
20～40	0.3	0.6	0.9	1.0	1.1	1.6	2.3	3.2	3.2	4.8
40～60	0.2	0.7	1.2	1.3	1.4	1.8	2.4	3.5	3.6	4.9
60～80	0.2	0.9	1.5	1.5	1.5	2.0	2.6	3.9	4.0	5.7
80～100	0.3	0.9	1.6	1.6	1.7	2.1	2.8	4.2	4.3	6.1
100～120	0.4	1.0	1.7	1.8	1.9	2.3	2.8	4.4	4.4	6.3
120～140	0.4	1.0	1.8	1.9	2.0	2.7	3.1	4.6	4.6	6.5
140～160	0.6	1.2	2.0	2.1	2.2	2.8	3.2	4.8	4.8	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	395/345
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	374/345

Constants of dn/dt		
D_0	D_1	D_2
-3.35E-06	1.29E-08	-3.14E-11
E_0	E_1	λ_{TK}
8.30E-07	1.50E-09	2.96E-01

ZF6	755275	n_d = 1.75520	υ_d = 27.53	$n_F - n_C$ = 0.027432
		n_e = 1.76168	υ_e = 27.32	$n_{F'} - n_{C'}$ = 0.027881

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.70796
n_{1970}	1970.09	1.71296
n_{1530}	1529.58	1.71906
n_{1129}	1128.64	1.72604
n_{1064}	1064.00	1.72757
n_t	1013.98	1.72890
n_s	852.11	1.73456
$n_{A'}$	768.19	1.73884
n_r	706.52	1.74299
n_C	656.27	1.74729
$n_{C'}$	643.85	1.74852
n_{He-Ne}	632.80	1.74968
n_D	589.29	1.75496
n_d	587.56	1.75520
n_e	546.07	1.76168
n_F	486.13	1.77472
$n_{F'}$	479.99	1.77640
n_g	435.84	1.79122
n_h	404.66	1.80589
n_i	365.01	1.83340

Constants of Dispersion Formula	
A_0	2.96120222E+00
A_1	-9.41359191E-03
A_2	3.65105867E-02
A_3	2.28852534E-03
A_4	-1.42034085E-04
A_5	1.84318687E-05

Density	
ρ (g/cm^3)	4.78

Solarization	
△λ (%)	-0.4

Relative Partial Dispersion	
$P_{d,C}$	0.2883
$P_{e,d}$	0.2362
$P_{g,F}$	0.6015
$P'_{d,c'}$	0.2396
$P'_{e,d}$	0.2324
$P'_{g,F'}$	0.5315

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0004
$\triangle P_{g,F}$	0.0036
$\triangle P_{C,t}$	-0.0031
$\triangle P_{C,s}$	-0.0024

Thermal Properties	
Tg (℃)	436
Ts (℃)	471
$T_{10}^{14.5}$ (℃)	378
T_{10}^{13} (℃)	401
$\alpha_{-50/80℃}$ (10^{-7}/K)	82
$\alpha_{100/300℃}$ (10^{-7}/K)	94
λ (W/(m·K))	0.72

Mechanical Properties	
HK (10^7Pa)	368
F_A	232
E (GPa)	55.4
G (GPa)	22.7
μ	0.220
σ_b (MPa)	
B (10^{-12}/Pa)	1.24

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	75
-40/-30	77
-30/-20	79
-20/-10	79
-10/0	80
0/10	81
10/20	82
20/30	83
30/40	84
40/50	84
50/60	85
60/70	85
70/80	85
80/90	86
90/100	87
100/110	87
110/120	88
120/130	89
130/140	90
140/150	91
150/160	91

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.953	0.909
2200	0.968	0.934
2000	0.989	0.970
1800	0.994	0.984
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.997	0.994
460	0.995	0.990
440	0.992	0.983
420	0.983	0.967
400	0.966	0.933
390	0.948	0.898
380	0.910	0.830
370	0.828	0.686
360	0.628	0.394
350	0.250	0.063
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.9	4.1	5.1	5.2	5.3	6.0	6.7	7.8	7.9	9.1
-40～-20	4.3	4.8	5.5	5.6	5.7	6.4	7.1	8.3	8.4	10.1
-20～0	5.0	5.4	6.6	6.6	6.7	7.3	7.7	9.5	9.6	11.6
0～20	5.8	5.9	7.2	7.3	7.4	8.0	8.7	10.3	10.3	12.5
20～40	6.2	6.4	7.7	7.8	7.9	8.7	9.4	11.2	11.2	13.4
40～60	6.3	6.9	8.1	8.2	8.3	8.9	9.7	11.9	11.9	13.9
60～80	6.5	7.2	8.4	8.5	8.6	9.2	10.2	12.1	12.2	14.3
80～100	6.6	7.5	8.8	8.9	8.9	9.5	10.5	12.4	12.5	14.7
100～120	6.9	7.6	9.0	9.2	9.2	9.7	11.1	12.9	12.9	15.0
120～140	7.2	7.7	9.3	9.4	9.4	10.1	11.4	13.2	13.3	15.4
140～160	7.5	7.8	9.4	9.5	9.6	10.2	11.7	13.5	13.6	15.8

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	400/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	377/349

Constants of dn/dt		
D_0	D_1	D_2
5.44E-06	2.85E-08	-7.94E-11
E_0	E_1	λ_{TK}
1.62E-06	1.76E-09	2.41E-01

ZF7L	805255	n_d = 1.80518	υ_d = 25.46	$n_F - n_C$ = 0.031620
		n_e = 1.81265	υ_e = 25.27	$n_{F'} - n_{C'}$ = 0.032161

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75298
n_{1970}	1970.09	1.75808
n_{1530}	1529.58	1.76445
n_{1129}	1128.64	1.77203
n_{1064}	1064.00	1.77373
n_t	1013.98	1.77521
n_s	852.11	1.78159
$n_{A'}$	768.19	1.78645
n_r	706.52	1.79118
n_C	656.27	1.79611
$n_{C'}$	643.85	1.79752
n_{He-Ne}	632.80	1.79885
n_D	589.29	1.80491
n_d	587.56	1.80518
n_e	546.07	1.81265
n_F	486.13	1.82773
$n_{F'}$	479.99	1.82968
n_g	435.84	1.84704
n_h	404.66	1.86436
n_i	365.01	1.89719

Constants of Dispersion Formula	
A_0	3.11669081E+00
A_1	-9.59227399E-03
A_2	4.35039882E-02
A_3	2.45457058E-03
A_4	-1.14670084E-04
A_5	2.12993988E-05

Density	
ρ (g/cm^3)	5.17

Solarization	
△λ (%)	-0.9

Relative Partial Dispersion	
$P_{d,C}$	0.2868
$P_{e,d}$	0.2362
$P_{g,F}$	0.6107
$P'_{d,c'}$	0.2382
$P'_{e,d}$	0.2323
$P'_{g,F'}$	0.5398

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0008
$\triangle P_{g,F}$	0.0094
$\triangle P_{C,t}$	-0.0025
$\triangle P_{C,s}$	-0.0023

Thermal Properties	
Tg (℃)	440
Ts (℃)	472
$T_{10}^{14.5}$ (℃)	413
T_{10}^{13} (℃)	422
$\alpha_{-50/80℃}$ (10^{-7}/K)	78
$\alpha_{100/300℃}$ (10^{-7}/K)	90
λ (W/(m·K))	1.08

Mechanical Properties	
HK (10^7Pa)	351
F_A	251
E (GPa)	58.9
G (GPa)	22.1
μ	0.240
σ_b (MPa)	54
B (10^{-12}/Pa)	0.76

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	4
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	72
-40/-30	74
-30/-20	75
-20/-10	76
-10/0	77
0/10	78
10/20	79
20/30	79
30/40	80
40/50	80
50/60	81
60/70	81
70/80	82
80/90	82
90/100	83
100/110	84
110/120	84
120/130	85
130/140	86
140/150	87
150/160	88

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.960	0.922
2200	0.977	0.955
2000	0.990	0.980
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.998	0.996
480	0.996	0.992
460	0.994	0.989
440	0.989	0.976
420	0.972	0.930
400	0.924	0.839
390	0.870	0.742
380	0.771	0.582
370	0.576	0.325
360	0.251	0.064
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	6.8	8.0	8.9	9.0	9.1	9.6	10.4	12.6	12.7	15.0
-40～-20	6.9	8.1	9.0	9.1	9.2	9.8	10.8	12.9	13.0	15.6
-20～0	7.1	8.2	9.3	9.3	9.4	10.2	11.1	13.3	13.4	16.1
0～20	7.3	8.4	9.5	9.5	9.6	10.4	11.5	13.7	13.7	16.6
20～40	7.4	8.5	9.7	9.7	9.8	10.5	11.6	14.0	14.1	17.0
40～60	7.8	8.8	9.9	9.9	10.1	11.0	11.9	14.4	14.5	17.4
60～80	8.2	9.1	10.3	10.3	10.5	11.3	12.3	14.9	15.0	18.2
80～100	8.3	9.2	10.5	10.5	10.6	11.7	12.6	15.4	15.4	18.7
100～120	8.4	9.4	10.7	10.8	10.9	12.1	13.0	15.8	15.8	19.0
120～140	8.5	9.5	11.0	11.1	11.2	12.4	13.2	16.0	16.0	19.4
140～160	8.8	9.7	11.3	11.4	11.5	12.7	13.6	16.3	16.4	19.9

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	425/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	389/359

Constants of dn/dt		
D_0	D_1	D_2
8.09E-06	1.60E-08	-2.15E-11
E_0	E_1	λ_{TK}
1.62E-06	1.37E-09	2.86E-01

ZF13	785258	n_d = 1.78472	υ_d = 25.76	$n_F - n_C$ = 0.030468
		n_e = 1.79190	υ_e = 25.55	$n_{F'} - n_{C'}$ = 0.030990

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.73295
n_{1970}	1970.09	1.73841
n_{1530}	1529.58	1.74509
n_{1129}	1128.64	1.75271
n_{1064}	1064.00	1.75438
n_t	1013.98	1.75583
n_s	852.11	1.76202
$n_{A'}$	768.19	1.76671
n_r	706.52	1.77125
n_C	656.27	1.77598
$n_{C'}$	643.85	1.77735
n_{He-Ne}	632.80	1.77862
n_D	589.29	1.78446
n_d	587.56	1.78472
n_e	546.07	1.79190
n_F	486.13	1.80645
$n_{F'}$	479.99	1.80834
n_g	435.84	1.82518
n_h	404.66	1.84208
n_i	365.01	

Constants of Dispersion Formula	
A_0	3.05204937E+00
A_1	-1.04510979E-02
A_2	4.04326587E-02
A_3	2.56140604E-03
A_4	-1.44794376E-04
A_5	2.40560900E-05

Density		Solarization	
ρ (g/cm^3)	4.89	△λ (%)	-0.7

Relative Partial Dispersion	
$P_{d,C}$	0.2869
$P_{e,d}$	0.2357
$P_{g,F}$	0.6147
$P'_{d,c'}$	0.2378
$P'_{e,d}$	0.2317
$P'_{g,F'}$	0.5434

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	0.0016
$\triangle P_{g,F}$	0.0139
$\triangle P_{C,t}$	-0.0036
$\triangle P_{C,s}$	-0.0040

Thermal Properties	
Tg (℃)	439
Ts (℃)	477
$T_{10}^{14.5}$ (℃)	384
T_{10}^{13} (℃)	412
$\alpha_{-50/80℃}$ (10^{-7}/K)	81
$\alpha_{100/300℃}$ (10^{-7}/K)	94
λ (W/(m·K))	0.54

Mechanical Properties	
HK (10^7Pa)	405
F_A	254
E (GPa)	57.5
G (GPa)	22.9
μ	0.253
σ_b (MPa)	48
B (10^{-12}/Pa)	1.02

Chemical Properties (grade)	
RC (S)	1
RA (S)	1
D_W	1
D_A	3
R_{OH} (S)	2
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	76
-40/-30	78
-30/-20	79
-20/-10	80
-10/0	81
0/10	82
10/20	82
20/30	83
30/40	84
40/50	84
50/60	85
60/70	85
70/80	86
80/90	86
90/100	87
100/110	88
110/120	88
120/130	89
130/140	90
140/150	91
150/160	92

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.960	0.922
2200	0.972	0.945
2000	0.985	0.970
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.999	0.998
500	0.996	0.992
480	0.993	0.986
460	0.988	0.976
440	0.979	0.958
420	0.948	0.899
400	0.834	0.696
390	0.693	0.480
380	0.446	0.199
370	0.149	0.022
360		
350		
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	3.4	4.3	5.1	5.2	5.3	5.9	6.7	8.0	8.1	10.1
-40～-20	3.6	4.6	5.4	5.5	5.6	6.2	7.0	8.4	8.5	10.7
-20～0	3.9	4.9	5.8	5.9	6.0	6.7	7.4	8.9	9.0	11.5
0～20	4.3	5.2	6.2	6.3	6.4	7.1	7.8	9.3	9.4	12.2
20～40	4.7	5.6	6.6	6.7	6.8	7.4	8.2	9.7	9.9	12.6
40～60	5.0	5.9	7.0	7.1	7.2	7.7	8.5	10.3	10.4	13.0
60～80	5.2	6.1	7.3	7.4	7.5	8.0	8.8	10.8	10.9	13.5
80～100	5.3	6.3	7.5	7.6	7.7	8.2	9.1	11.1	11.3	14.0
100～120	5.4	6.5	7.7	7.8	7.9	8.5	9.4	11.5	11.6	14.5
120～140	5.6	6.6	7.8	7.9	8.0	8.6	9.6	11.7	11.8	14.9
140～160	5.7	6.7	7.9	8.0	8.1	8.8	9.7	11.9	12.0	15.2

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	420/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	395/365

Constants of dn/dt		
D_0	D_1	D_2
3.80E-06	2.07E-08	-4.79E-11
E_0	E_1	λ_{TK}
1.38E-06	1.21E-09	2.84E-01

LaF5	754377	n_d = 1.75364	υ_d = 37.66	$n_F - n_C$ = 0.020012
		n_e = 1.75839	υ_e = 37.41	$n_{F'} - n_{C'}$ = 0.020270

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.71279
n_{1970}	1970.09	1.71821
n_{1530}	1529.58	1.72451
n_{1129}	1128.64	1.73097
n_{1064}	1064.00	1.73228
n_t	1013.98	1.73340
n_s	852.11	1.73798
$n_{A'}$	768.19	1.74133
n_r	706.52	1.74450
n_C	656.27	1.74775
$n_{C'}$	643.85	1.74868
n_{He-Ne}	632.80	1.74955
n_D	589.29	1.75347
n_d	587.56	1.75364
n_e	546.07	1.75839
n_F	486.13	1.76776
$n_{F'}$	479.99	1.76895
n_g	435.84	1.77937
n_h	404.66	1.78942
n_i	365.01	1.80754

Relative Partial Dispersion	
$P_{d,C}$	0.2943
$P_{e,d}$	0.2374
$P_{g,F}$	0.5802
$P'_{d,c'}$	0.2447
$P'_{e,d}$	0.2343
$P'_{g,F'}$	0.5141

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0012
$\triangle P_{g,F}$	-0.0009
$\triangle P_{C,t}$	-0.0055
$\triangle P_{C,s}$	-0.0026

Thermal Properties	
Tg (℃)	657
Ts (℃)	699
$T_{10}^{14.5}$ (℃)	595
T_{10}^{13} (℃)	606
$\alpha_{-50/80℃}$ (10^{-7}/K)	67
$\alpha_{100/300℃}$ (10^{-7}/K)	82
λ (W/(m·K))	0.73

Mechanical Properties	
HK (10^7Pa)	535
F_A	157
E (GPa)	91.9
G (GPa)	35.3
μ	0.303
σ_b (MPa)	53
B (10^{-12}/Pa)	1.57

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	2

Expansion Coefficient α ($\times 10^{-7}$/K)	
℃	α
-50/-40	60
-40/-30	62
-30/-20	64
-20/-10	65
-10/0	66
0/10	67
10/20	68
20/30	68
30/40	69
40/50	70
50/60	71
60/70	71
70/80	72
80/90	72
90/100	73
100/110	74
110/120	75
120/130	77
130/140	78
140/150	79
150/160	80

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.934	0.872
2200	0.984	0.968
2000	0.995	0.990
1800	0.999	0.998
1600	0.999	0.998
1400	0.999	0.998
1200	0.999	0.998
1060	0.999	0.998
1000	0.999	0.998
950	0.999	0.998
900	0.999	0.998
850	0.999	0.998
800	0.999	0.998
750	0.999	0.998
700	0.999	0.998
650	0.999	0.998
600	0.999	0.998
550	0.996	0.993
500	0.994	0.988
480	0.988	0.979
460	0.982	0.965
440	0.972	0.946
420	0.956	0.915
400	0.920	0.847
390	0.883	0.781
380	0.823	0.677
370	0.718	0.516
360	0.527	0.282
350	0.250	0.065
340		
330		
320		
310		
300		
290		
280		

Constants of Dispersion Formula	
A_0	2.98667829E+00
A_1	-1.08050950E-02
A_2	2.88888082E-02
A_3	1.07502295E-03
A_4	-3.31886033E-05
A_5	5.86224298E-06

Density	
ρ (g/cm^3)	4.16

Solarization	
△λ (%)	-1.3

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative ($\times 10^{-6}$ / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	4.4	4.9	5.2	5.3	5.3	5.5	5.9	6.6	6.7	7.5
-40～-20	4.5	4.8	5.2	5.2	5.3	5.5	6.0	6.6	6.7	7.5
-20～0	4.4	4.8	5.2	5.2	5.3	5.6	6.0	6.7	6.9	7.7
0～20	4.3	4.8	5.1	5.1	5.2	5.6	5.9	6.8	6.9	7.7
20～40	4.2	4.8	5.2	5.2	5.3	5.6	6.0	6.9	6.9	7.9
40～60	4.2	4.8	5.2	5.2	5.4	5.7	6.2	7.0	7.0	8.0
60～80	4.4	4.9	5.3	5.3	5.4	5.7	6.2	7.1	7.1	8.2
80～100	4.5	5.0	5.5	5.5	5.6	5.8	6.3	7.2	7.2	8.3
100～120	4.7	5.2	5.5	5.6	5.7	6.0	6.5	7.3	7.4	8.4
120～140	4.7	5.3	5.7	5.7	5.8	6.2	6.7	7.4	7.5	8.6
140～160	4.8	5.3	5.7	5.8	5.8	6.2	6.8	7.5	7.6	8.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	437/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	379/346

Constants of dn/dt		
D_0	D_1	D_2
4.10E-06	1.07E-08	-1.44E-11
E_0	E_1	λ_{TK}
7.17E-07	4.50E-10	2.63E-01

ZLaF58	803314	n_d = 1.80336	υ_d = 31.43	$n_F - n_C$ = 0.025560
		n_e = 1.80941	υ_e = 31.21	$n_{F'} - n_{C'}$ = 0.025932

Refractive Indices		
	λ (nm)	n_λ
n_{2325}	2325.42	1.75659
n_{1970}	1970.09	1.76193
n_{1530}	1529.58	1.76837
n_{1129}	1128.64	1.77547
n_{1064}	1064.00	1.77699
n_t	1013.98	1.77830
n_s	852.11	1.78382
$n_{A'}$	768.19	1.78792
n_r	706.52	1.79186
n_C	656.27	1.79592
$n_{C'}$	643.85	1.79709
n_{He-Ne}	632.80	1.79818
n_D	589.29	1.80314
n_d	587.56	1.80336
n_e	546.07	1.80941
n_F	486.13	1.82148
$n_{F'}$	479.99	1.82302
n_g	435.84	1.83666
n_h	404.66	1.85000
n_i	365.01	1.87451

Constants of Dispersion Formula	
A_0	3.13543652E+00
A_1	-1.05061656E-02
A_2	3.74554959E-02
A_3	1.36611172E-03
A_4	-9.45470495E-06
A_5	8.08479475E-06

Density	
ρ (g/cm^3)	4.86

Solarization	
△λ (%)	-1.4

Relative Partial Dispersion	
$P_{d,C}$	0.2911
$P_{e,d}$	0.2367
$P_{g,F}$	0.5939
$P'_{d,c'}$	0.2418
$P'_{e,d}$	0.2333
$P'_{g,F'}$	0.5260

Deviation of Relative Partial Dispersions	
$\triangle P_{F,e}$	-0.0006
$\triangle P_{g,F}$	0.0025
$\triangle P_{C,t}$	-0.0031
$\triangle P_{C,s}$	-0.0024

Thermal Properties	
Tg (℃)	567
Ts (℃)	617
$T_{10}^{14.5}$ (℃)	526
T_{10}^{13} (℃)	542
$\alpha_{-50/80℃}$ (10^{-7}/K)	54
$\alpha_{100/300℃}$ (10^{-7}/K)	68
λ (W/(m·K))	0.75

Mechanical Properties	
HK (10^7Pa)	510
F_A	184
E (GPa)	56.8
G (GPa)	22.8
μ	0.245
σ_b (MPa)	
B (10^{-12}/Pa)	1.44

Chemical Properties (grade)	
RC (S)	1
RA (S)	3
D_W	1
D_A	3
R_{OH} (S)	1
RP (S)	1

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	47
-40/-30	50
-30/-20	51
-20/-10	52
-10/0	53
0/10	54
10/20	55
20/30	55
30/40	56
40/50	57
50/60	58
60/70	59
70/80	59
80/90	60
90/100	61
100/110	61
110/120	63
120/130	64
130/140	65
140/150	66
150/160	67

Internal Transmittance		
λ (nm)	τ5mm	τ10mm
2400	0.968	0.937
2200	0.995	0.990
2000	0.998	0.996
1800	0.998	0.996
1600	0.998	0.996
1400	0.998	0.996
1200	0.998	0.996
1060	0.998	0.996
1000	0.998	0.996
950	0.998	0.996
900	0.998	0.996
850	0.998	0.996
800	0.998	0.996
750	0.998	0.996
700	0.998	0.996
650	0.998	0.996
600	0.998	0.996
550	0.998	0.996
500	0.996	0.992
480	0.993	0.989
460	0.987	0.980
440	0.978	0.963
420	0.957	0.924
400	0.905	0.830
390	0.853	0.739
380	0.767	0.602
370	0.619	0.398
360	0.372	0.149
350	0.094	0.014
340		
330		
320		
310		
300		
290		
280		

Range of Temperature (℃)	Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60～-40	10.0	10.6	10.7	10.8	11.1	11.8	12.0	12.3	12.5	14.3
-40～-20	10.2	10.6	10.8	10.8	11.2	11.8	12.2	12.6	12.7	14.4
-20～0	10.2	10.6	10.8	10.9	11.2	11.9	12.2	12.8	12.9	14.8
0～20	10.3	10.7	10.9	11.0	11.2	11.9	12.4	13.0	13.1	15.4
20～40	10.2	10.8	11.0	11.1	11.3	11.9	12.5	13.0	13.2	15.6
40～60	10.3	10.8	11.1	11.1	11.3	12.1	12.6	13.3	13.3	15.7
60～80	10.5	10.8	11.2	11.2	11.3	12.1	12.7	13.3	13.4	15.9
80～100	10.5	10.9	11.3	11.4	11.5	12.2	12.9	13.5	13.5	16.1
100～120	10.5	11.0	11.4	11.5	11.7	12.2	13.0	13.5	13.6	16.4
120～140	10.5	11.1	11.5	11.6	11.7	12.4	13.2	13.7	13.8	16.6
140～160	10.6	11.3	11.6	11.7	11.8	12.5	13.2	13.9	13.9	16.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	430/355
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	398/354

Constants of dn/dt		
D_0	D_1	D_2
1.39E-05	1.17E-08	-2.49E-11
E_0	E_1	λ_{TK}
4.39E-07	4.87E-10	3.56E-01

红外材料数据表

IR materials Data Sheets

赤外材料のデータ表

IRG105

$n_4 = 1.8541$	$\upsilon_4 = 18.92$	$n_3-n_5 = 0.0452$

Refractive Indices	
λ(μm)	n_λ
0.852	1.9156
1.014	1.9076
1.129	1.9037
1.530	1.8949
1.970	1.8883
2.000	1.8879
2.500	1.8809
3.000	1.8732
3.500	1.8643
4.000	1.8541
4.500	1.8421
5.000	1.8280
5.500	
6.000	

Constants of Dispersion Formula	
A	1.8933906E+00
B	1.6495794E-02
C	1.7208613E-04
D	-2.3819428E-03
E	-5.8492005E-06
F	-1.7972933E-07

Chemical Properties (grade)	
RC(S)	1
RA(S)	3
D_W	2
D_A	5
R_{OH} (S)	
RP (S)	

Thermal Properties	
Tg (℃)	534
Ts (℃)	565
$\alpha_{-60/120℃}$ (10^{-7}/K)	65
$\alpha_{100/300℃}$ (10^{-7}/K)	78

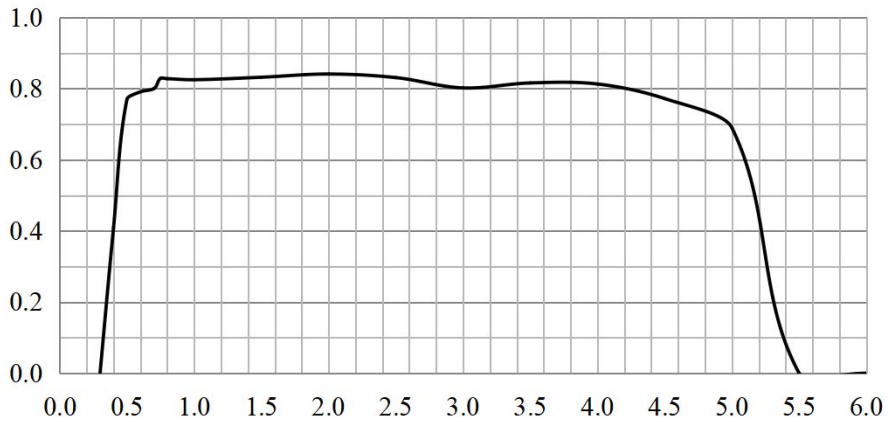
Mechanical Properties	
HK (10^7Pa)	447
弯曲强度(MPa)	
压缩强度(MPa)	
弹性模量(GPa)	

Other Properties	
ρ (g/cm^3)	5.62

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	57
-40/-30	59
-30/-20	61
-20/-10	63
-10/0	64
0/10	65
10/20	66
20/30	67
30/40	67
40/50	68
50/60	68
60/70	69
70/80	69
80/90	70
90/100	71
100/110	72
110/120	72
120/130	73
130/140	74
140/150	75
150/160	76

External Transmittance	
λ (μm)	τ 2mm
6.0	
5.5	
5.0	0.690
4.5	0.772
4.0	0.813
3.5	0.816
3.0	0.802
2.5	0.831
2.0	0.841
1.5	0.832
1.0	0.825
0.8	0.828
0.75	0.829
0.7	0.800
0.6	0.791
0.5	0.770
0.4	0.408
0.3	

Transmittance τ (2mm)



Temperature Coefficients of Refractive Index dn/dt relative (×10^{-6} / ℃)		
℃	1.013μm	0.852μm
-60～-40	16.5	16.9
-40～-20	16.5	16.9
-20～0	16.6	16.9
0～20	16.6	17.0
20～40	16.8	17.2
40～60	16.8	17.3
60～80	17.0	17.4
80～100	17.2	17.6
100～120	17.2	17.7
120～140	17.3	17.8
140～160	17.4	17.9

IRG201 Ge33Se55As12

$n_{10.6}$ = 2.4940	$\upsilon_{10.6}$ = 95.77	n_8-$n_{12.5}$ = 0.0156

Refractive Indices	
λ（μm）	n_λ
2.0	2.5293
3.0	2.5175
4.0	2.5127
5.0	2.5097
6.0	2.5072
7.0	2.5047
8.0	2.5021
9.0	2.4993
10.0	2.4961
11.0	2.4926
12.0	2.4886
12.5	2.4865
13.0	2.4843
14.0	2.4794

Constants of Dispersion Formula	
A	2.5100146E+00
B	7.7495165E-02
C	4.9371281E-03
D	-1.3389514E-04
E	-1.3508347E-07
F	5.7156655E-11

Other Properties	
ρ (g/cm^3)	4.42
εr	

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

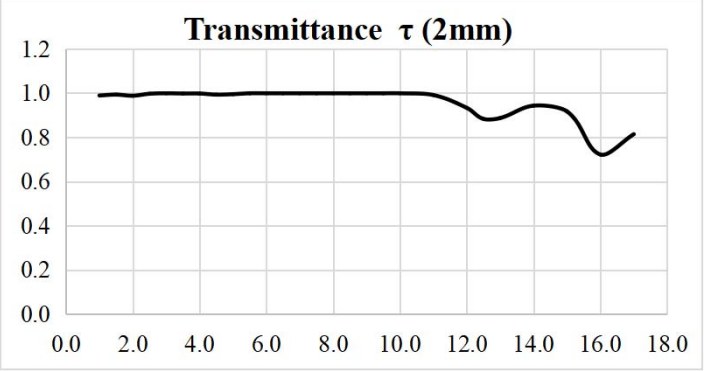
Thermal Properties	
Tg (℃)	369
Ts (℃)	409
$\alpha_{-60/120℃}$ (10^{-7}/K)	123
$\alpha_{20/120℃}$ (10^{-7}/K)	123
Cp (J/g·K)	

Mechanical Properties	
HK (10^7Pa)	150
E (GPa)	22.0
G (GPa)	8.3
μ	0.331

Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6}/℃)	
λ (μm)	dn_{rel}/dt
3	67
5	65
8	64
10	62
12	62

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	118
-40/-30	120
-30/-20	121
-20/-10	122
-10/0	122
0/10	122
10/20	123
20/30	123
30/40	123
40/50	123
50/60	123
60/70	123
70/80	123
80/90	124
90/100	124
100/110	124
110/120	124
120/130	123
130/140	123
140/150	123
150/160	124

Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.814
16.0	0.722
15.0	0.917
14.0	0.943
13.0	0.887
12.5	0.883
12.0	0.933
11.0	0.991
10.0	0.999
9.5	0.999
9.0	0.999
8.5	0.999
8.0	0.999
7.5	0.999
7.0	0.999
6.5	0.999
6.0	0.999
5.5	0.999
5.0	0.995
4.5	0.993
4.0	0.998
3.5	0.998
3.0	0.999
2.5	0.997
2.0	0.988
1.5	0.993
1.0	0.989



Constants of dn/dt	
D_0	5.82025E-05
D_1	2.04218E-08
D_2	-7.67374E-11
E_0	1.65764E-04
E_1	9.67536E-07
λ_{TK}	-4.58177E+00

IRG202 Ge22Se58As20

$n_{10.6}$ = 2.4925	$\upsilon_{10.6}$ = 102.93	n_8-$n_{12.5}$ = 0.0145

Refractive Indices	
λ（μm）	n_λ
2.0	2.5265
3.0	2.5148
4.0	2.5101
5.0	2.5072
6.0	2.5047
7.0	2.5024
8.0	2.5000
9.0	2.4974
10.0	2.4944
11.0	2.4911
12.0	2.4875
12.5	2.4855
13.0	2.4835
14.0	2.4787

Constants of Dispersion Formula	
A	2.5074929E+00
B	7.5363484E-02
C	8.9642516E-03
D	-1.3362851E-04
E	-1.5544515E-08
F	-3.1301497E-10

Other Properties	
ρ (g/cm^3)	4.41
εr	

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	2
D_A	1
R_{OH} (S)	1
RP (S)	1

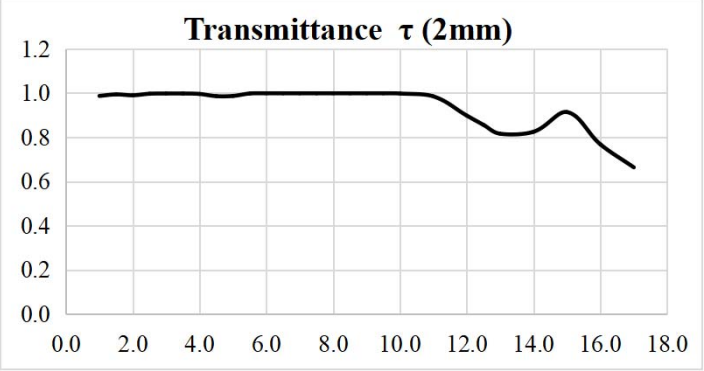
Thermal Properties	
Tg (℃)	292
Ts (℃)	347
$\alpha_{-60/120℃}$ (10^{-7}/K)	164
$\alpha_{20/120℃}$ (10^{-7}/K)	165
Cp (J/g·K)	

Mechanical Properties	
HK (10^7Pa)	152
E (GPa)	18.6
G (GPa)	6.8
μ	0.367

Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6}/℃)	
λ (μm)	dn_{rel}/dt
3	41
5	40
8	39
10	39
12	37

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	161
-40/-30	162
-30/-20	163
-20/-10	164
-10/0	164
0/10	165
10/20	165
20/30	165
30/40	165
40/50	165
50/60	165
60/70	165
70/80	165
80/90	166
90/100	166
100/110	166
110/120	166
120/130	166
130/140	166
140/150	166
150/160	167

Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.664
16.0	0.768
15.0	0.914
14.0	0.825
13.0	0.816
12.5	0.856
12.0	0.898
11.0	0.985
10.0	0.998
9.5	0.999
9.0	0.999
8.5	0.999
8.0	0.999
7.5	0.999
7.0	0.999
6.5	0.999
6.0	0.999
5.5	0.998
5.0	0.987
4.5	0.986
4.0	0.996
3.5	0.998
3.0	0.998
2.5	0.997
2.0	0.990
1.5	0.994
1.0	0.987



Constants of dn/dt	
D_0	3.41318E-05
D_1	3.57898E-08
D_2	5.35457E-10
E_0	3.75406E-05
E_1	6.49642E-07
λ_{TK}	-2.08675E+00

IRG203 Ge20Se65Sb15

$n_{10.6}$ = 2.5837	$\upsilon_{10.6}$ = 86.07	n_8-$n_{12.5}$ = 0.0184

Refractive Indices	
λ（μm）	n_λ
2.0	2.6261
3.0	2.6118
4.0	2.6060
5.0	2.6024
6.0	2.5993
7.0	2.5963
8.0	2.5933
9.0	2.5899
10.0	2.5862
11.0	2.5820
12.0	2.5774
12.5	2.5749
13.0	2.5723
14.0	2.5666

Constants of Dispersion Formula	
A	2.6027335E+00
B	9.4148223E-02
C	5.0288851E-03
D	-1.6360399E-04
E	-1.1188941E-07
F	-3.3257266E-11

Other Properties	
ρ (g/cm^3)	4.71
εr	10

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	2
D_A	1
R_{OH} (S)	4
RP (S)	1

Thermal Properties	
Tg (℃)	266
Ts (℃)	301
$\alpha_{-60/120℃}$ (10^{-7}/K)	162
$\alpha_{20/120℃}$ (10^{-7}/K)	164
Cp (J/g·K)	

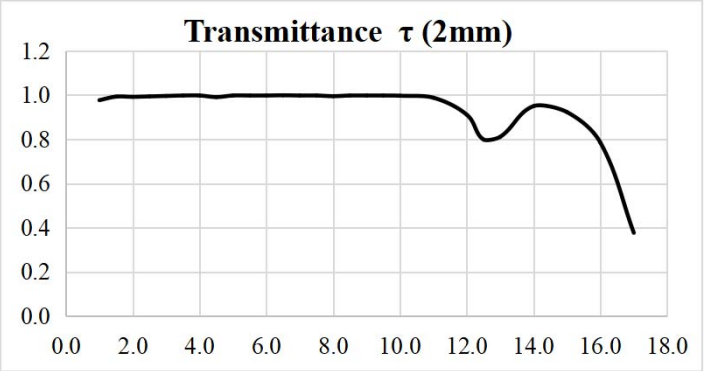
Mechanical Properties	
HK (10^7Pa)	137
E (GPa)	19.8
G (GPa)	7.7
μ	0.291

Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6}/℃)	
λ (μm)	dn_{rel}/dt
3	42
5	40
8	39
10	39
12	39

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	159
-40/-30	160
-30/-20	161
-20/-10	162
-10/0	162
0/10	162
10/20	163
20/30	163
30/40	163
40/50	163
50/60	163
60/70	163
70/80	163
80/90	164
90/100	164
100/110	164
110/120	164
120/130	164
130/140	164
140/150	164
150/160	165

Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.377
16.0	0.785
15.0	0.923
14.0	0.950
13.0	0.811
12.5	0.799
12.0	0.911
11.0	0.988
10.0	0.997
9.5	0.998
9.0	0.998
8.5	0.998
8.0	0.995
7.5	0.998
7.0	0.998
6.5	0.999
6.0	0.998
5.5	0.998
5.0	0.998
4.5	0.991
4.0	0.998
3.5	0.998
3.0	0.996
2.5	0.994
2.0	0.992
1.5	0.993
1.0	0.977

Constants of dn/dt	
D_0	3.47396E-05
D_1	-7.61268E-09
D_2	2.63506E-10
E_0	1.45448E-05
E_1	4.85455E-08
λ_{TK}	8.33183E-01



IRG204 Se63As30Sb4Sn3

$n_{10.6}$ = 2.7659	$\upsilon_{10.6}$ = 132.77	n_8-$n_{12.5}$ = 0.0133

Refractive Indices	
λ（μm）	n_λ
2.0	2.8095
3.0	2.7914
4.0	2.7846
5.0	2.7808
6.0	2.7779
7.0	2.7754
8.0	2.7730
9.0	2.7704
10.0	2.7677
11.0	2.7647
12.0	2.7614
12.5	2.7597
13.0	2.7578
14.0	2.7538

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	2
D_A	1
R_{OH} (S)	2
RP (S)	1

Thermal Properties	
Tg (℃)	174
Ts (℃)	199
$\alpha_{-60/120℃}$ (10^{-7}/K)	209
$\alpha_{20/120℃}$ (10^{-7}/K)	212
Cp (J/g·K)	

Mechanical Properties	
HK (10^7Pa)	115
E (GPa)	19.8
G (GPa)	7.3
μ	0.366

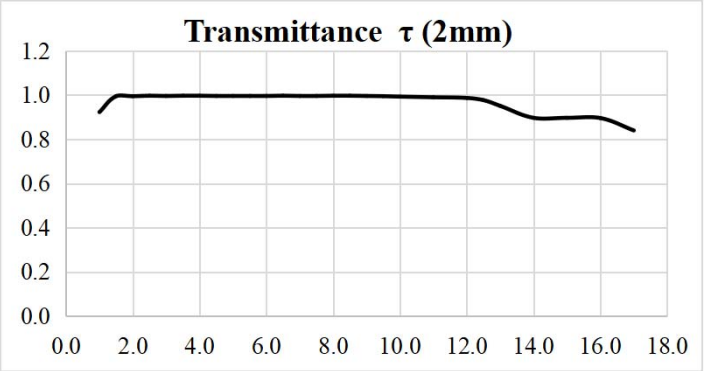
Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	202
-40/-30	205
-30/-20	206
-20/-10	207
-10/0	208
0/10	208
10/20	209
20/30	209
30/40	210
40/50	210
50/60	211
60/70	211
70/80	212
80/90	212
90/100	213
100/110	213
110/120	214
120/130	215
130/140	216
140/150	217
150/160	217

Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.840
16.0	0.896
15.0	0.897
14.0	0.897
13.0	0.951
12.5	0.977
12.0	0.987
11.0	0.990
10.0	0.993
9.5	0.995
9.0	0.996
8.5	0.997
8.0	0.997
7.5	0.996
7.0	0.996
6.5	0.997
6.0	0.996
5.5	0.996
5.0	0.996
4.5	0.996
4.0	0.997
3.5	0.997
3.0	0.996
2.5	0.997
2.0	0.995
1.5	0.995
1.0	0.923

Constants of Dispersion Formula	
A	2.7790481E+00
B	1.1911498E-01
C	1.5043403E-02
D	-1.2268557E-04
E	-1.0906501E-08
F	-1.8517301E-10

Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6} /℃)	
λ (μm)	dn_{rel}/dt
3	21
5	19
8	18
10	18
12	17

Other Properties	
ρ (g/cm^3)	4.72
εr	



Constants of dn/dt	
D_0	1.39794E-05
D_1	6.65805E-08
D_2	-1.61120E-10
E_0	3.04933E-05
E_1	8.15250E-08
λ_{TK}	-7.27149E-01

IRG205 Ge28Se60Sb12

$n_{10.6}$ = 2.6011	$\upsilon_{10.6}$ = 93.63	n_8-$n_{12.5}$ = 0.0171

Refractive Indices	
λ（μm）	n_λ
2.0	2.6423
3.0	2.6279
4.0	2.6222
5.0	2.6186
6.0	2.6157
7.0	2.6129
8.0	2.6100
9.0	2.6068
10.0	2.6033
11.0	2.5994
12.0	2.5952
12.5	2.5929
13.0	2.5905
14.0	2.5850

Constants of Dispersion Formula	
A	2.6191393E+00
B	8.9681707E-02
C	1.9616489E-02
D	-1.6512236E-04
E	1.7019611E-08
F	-3.7871669E-10

Other Properties	
ρ (g/cm^3)	4.68
εr	10

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	1
D_A	1
R_{OH} (S)	2
RP (S)	1

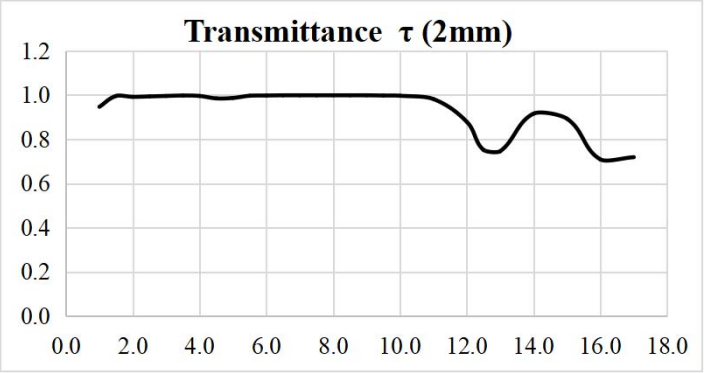
Thermal Properties	
Tg (℃)	282
Ts (℃)	314
$\alpha_{-60/120℃}$ (10^{-7}/K)	140
$\alpha_{20/120℃}$ (10^{-7}/K)	141
Cp (J/g·K)	0.33

Mechanical Properties	
HK (10^7Pa)	132
E (GPa)	21.3
G (GPa)	8.5
μ	0.250

Temperature Coefficients of Refractive Index (-40 ～ 80℃) ($\times10^{-6}$/℃)	
λ (μm)	dn_{rel}/dt
3	72
5	70
8	70
10	70
12	70

Expansion Coefficient α ($\times10^{-7}$/K)	
℃	α
-50/-40	137
-40/-30	139
-30/-20	139
-20/-10	140
-10/0	141
0/10	141
10/20	141
20/30	141
30/40	142
40/50	142
50/60	142
60/70	142
70/80	142
80/90	142
90/100	142
100/110	142
110/120	142
120/130	142
130/140	142
140/150	142
150/160	142

Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.719
16.0	0.709
15.0	0.893
14.0	0.916
13.0	0.746
12.5	0.752
12.0	0.879
11.0	0.982
10.0	0.997
9.5	0.998
9.0	0.999
8.5	0.999
8.0	0.999
7.5	0.999
7.0	0.999
6.5	0.999
6.0	0.998
5.5	0.997
5.0	0.987
4.5	0.985
4.0	0.996
3.5	0.998
3.0	0.996
2.5	0.994
2.0	0.992
1.5	0.996
1.0	0.947



Constants of dn/dt	
D_0	6.14573E-05
D_1	1.00146E-07
D_2	4.99576E-10
E_0	1.79054E-05
E_1	4.39155E-09
λ_{TK}	9.29200E-01

IRG206 Se60As40

$n_{10.6}$ = 2.7764	$\upsilon_{10.6}$ = 137.71	n_8-$n_{12.5}$ = 0.0129

Refractive Indices	
λ（μm）	n_λ
2.0	2.8197
3.0	2.8015
4.0	2.7947
5.0	2.7909
6.0	2.7880
7.0	2.7856
8.0	2.7832
9.0	2.7807
10.0	2.7781
11.0	2.7752
12.0	2.7720
12.5	2.7703
13.0	2.7685
14.0	2.7646

Constants of Dispersion Formula	
A	2.7890145E+00
B	1.2022832E-01
C	1.4096806E-02
D	-1.1959367E-04
E	3.8785934E-09
F	-2.3183781E-10

Other Properties	
ρ (g/cm^3)	4.63
εr	

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	1
D_A	1
R_{OH} (S)	2
RP (S)	1

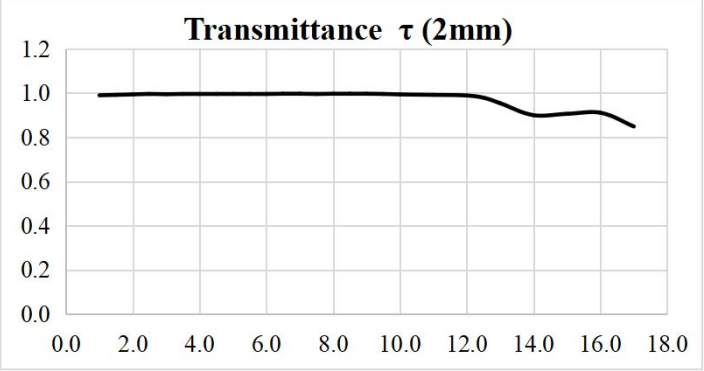
Thermal Properties	
Tg (℃)	184
Ts (℃)	216
$\alpha_{-60/120℃}$ (10^{-7}/K)	206
$\alpha_{20/120℃}$ (10^{-7}/K)	208
Cp (J/g·K)	0.24

Mechanical Properties	
HK (10^7Pa)	118
E (GPa)	18.5
G (GPa)	7.0
μ	0.331

Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6}/℃)	
λ (μm)	dn_{rel}/dt
3	37
5	34
8	32
10	32
12	32

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	203
-40/-30	205
-30/-20	205
-20/-10	206
-10/0	207
0/10	207
10/20	207
20/30	207
30/40	207
40/50	207
50/60	208
60/70	208
70/80	208
80/90	208
90/100	208
100/110	208
110/120	209
120/130	209
130/140	209
140/150	210
150/160	210

Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.849
16.0	0.911
15.0	0.906
14.0	0.900
13.0	0.954
12.5	0.979
12.0	0.989
11.0	0.992
10.0	0.994
9.5	0.996
9.0	0.997
8.5	0.997
8.0	0.997
7.5	0.996
7.0	0.997
6.5	0.997
6.0	0.996
5.5	0.996
5.0	0.996
4.5	0.996
4.0	0.996
3.5	0.996
3.0	0.995
2.5	0.996
2.0	0.994
1.5	0.992
1.0	0.990



Constants of dn/dt	
D_0	2.65967E-05
D_1	-3.30028E-08
D_2	-2.13498E-10
E_0	3.35590E-05
E_1	4.18229E-08
λ_{TK}	4.48973E-02

IRG207 Ge10Se50As40

$n_{10.6}$ = 2.6075	$\upsilon_{10.6}$ = 154.57	n_8-$n_{12.5}$ = 0.0104

Refractive Indices	
λ（μm）	n_λ
2.0	2.6413
3.0	2.6271
4.0	2.6219
5.0	2.6190
6.0	2.6168
7.0	2.6149
8.0	2.6130
9.0	2.6110
10.0	2.6089
11.0	2.6066
12.0	2.6040
12.5	2.6026
13.0	2.6011
14.0	2.5979

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

Thermal Properties	
Tg (℃)	228
Ts (℃)	281
$\alpha_{-60/120℃}$ (10^{-7}/K)	206
$\alpha_{20/120℃}$ (10^{-7}/K)	209
Cp (J/g·K)	0.37

Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.526
16.0	0.865
15.0	0.912
14.0	0.902
13.0	0.853
12.5	0.873
12.0	0.941
11.0	0.983
10.0	0.990
9.5	0.996
9.0	0.998
8.5	0.998
8.0	0.992
7.5	0.996
7.0	0.997
6.5	0.998
6.0	0.998
5.5	0.996
5.0	0.985
4.5	0.982
4.0	0.996
3.5	0.996
3.0	0.995
2.5	0.996
2.0	0.994
1.5	0.992
1.0	0.990

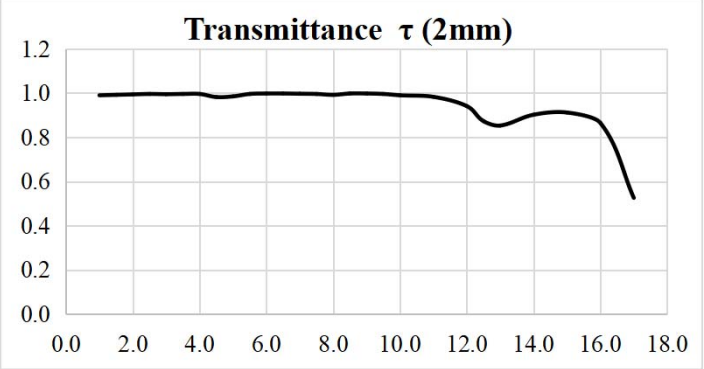
Constants of Dispersion Formula	
A	2.6178540E+00
B	8.7753077E-02
C	2.7480087E-02
D	-9.7270254E-05
E	1.2742318E-08
F	-2.4376453E-10

Mechanical Properties	
HK (10^7Pa)	126
E (GPa)	15.6
G (GPa)	6.1
μ	0.287

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	199
-40/-30	201
-30/-20	203
-20/-10	204
-10/0	205
0/10	205
10/20	206
20/30	206
30/40	207
40/50	208
50/60	208
60/70	209
70/80	209
80/90	209
90/100	210
100/110	211
110/120	211
120/130	213
130/140	214
140/150	214
150/160	215

Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6}/℃)	
λ (μm)	dn_{rel}/dt
3	18
5	17
8	17
10	17
12	

Other Properties	
ρ (g/cm^3)	4.49
εr	



Constants of dn/dt	
D_0	1.45032E-05
D_1	3.49366E-08
D_2	2.49190E-10
E_0	1.32518E-05
E_1	2.46745E-08
λ_{TK}	9.73196E-01

IRG208 As40S60

$n_{4.0}$ = 2.4168	$\upsilon_{4.0}$ = 159.19	$n_{3.0}$-$n_{5.0}$ = 0.0089

Refractive Indices	
λ（μm）	n_λ
0.6328	2.6133
0.7065	2.5652
0.8521	2.5121
0.8944	2.5023
1.0140	2.4816
1.5296	2.4437
2.0	2.4318
2.5	2.4255
3.0	2.4217
4.0	2.4168
5.0	2.4128
6.0	2.4087
7.0	2.4043
8.0	2.3994
9.0	2.3936
10.0	2.3870
11.0	2.3793
12.0	2.3700

Constants of Dispersion Formula	
A	2.4180937E+00
B	5.8099763E-02
C	5.4197832E-03
D	-3.1062129E-04
E	2.2955580E-07
F	-2.8583874E-09

Other Properties	
ρ (g/cm^3)	3.19
εr	

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	1
D_A	1
R_{OH} (S)	4
RP (S)	2

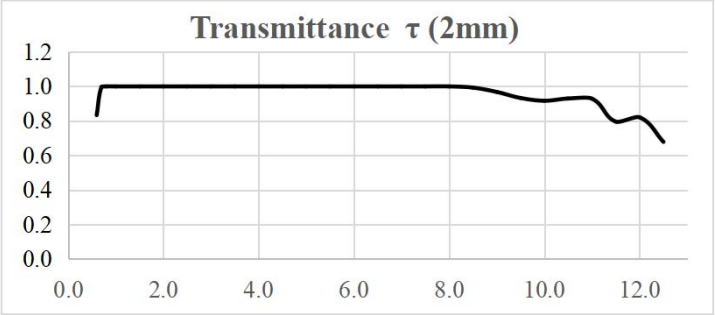
Thermal Properties	
Tg (℃)	205
Ts (℃)	227
$\alpha_{-60/120℃}$ (10^{-7}/K)	218
$\alpha_{20/120℃}$ (10^{-7}/K)	221
Cp (J/g·K)	

Mechanical Properties	
HK (10^7Pa)	112
E (GPa)	17.1
G (GPa)	6.5
μ	0.300

Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6} /℃)	
λ (μm)	dn_{rel}/dt
3	-1.4
5	-2.8
8	-3.9
10	-4.0
12	-4.2

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	209
-40/-30	210
-30/-20	212
-20/-10	213
-10/0	214
0/10	215
10/20	216
20/30	217
30/40	218
40/50	218
50/60	219
60/70	220
70/80	221
80/90	222
90/100	223
100/110	224
110/120	231
120/130	236
130/140	241
140/150	246
150/160	254

Internal Transmittance	
λ (μm)	τ 2mm
12.5	0.678
12	0.820
11.5	0.795
11	0.928
10.5	0.929
10	0.916
9.5	0.932
9	0.967
8.5	0.992
8	0.999
7.5	0.999
7	0.999
6.5	0.999
6	0.999
5.5	0.999
5	0.999
4.5	0.999
4	0.999
3.5	0.999
3	0.999
2.5	0.999
2	0.999
1.5	0.999
1	0.999
0.8	0.999
0.7	0.996
0.6	0.833



Constants of dn/dt	
D_0	-4.64123E-06
D_1	4.63395E-09
D_2	2.54086E-11
E_0	2.46810E-05
E_1	4.44783E-08
λ_{TK}	5.91022E-08

IRG209

$n_{10.6}$ = 3.1393	$\upsilon_{10.6}$ = 207.70	n_8-$n_{12.5}$ = 0.0103

Refractive Indices	
λ（μm）	n_λ
2.0	
3.0	3.1767
4.0	3.1622
5.0	3.1552
6.0	3.1507
7.0	3.1477
8.0	3.1452
9.0	3.1429
10.0	3.1408
11.0	3.1385
12.0	3.1361
12.5	3.1349
13.0	
14.0	

Constants of Dispersion Formula	
A	3.1453861E+00
B	2.8871318E-01
C	-1.7639771E-02
D	-7.2158095E-05
E	-7.1772673E-09
F	-2.3844250E-10

Other Properties	
ρ (g/cm^3)	5.31
εr	

Chemical Properties (grade)	
RC(S)	1
RA(S)	1
D_W	1
D_A	1
R_{OH} (S)	1
RP (S)	1

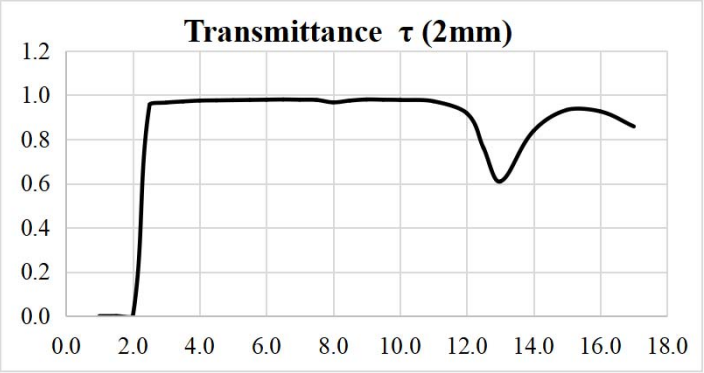
Thermal Properties	
Tg (℃)	190
Ts (℃)	210
$\alpha_{-60/120℃}$ (10^{-7}/K)	163
$\alpha_{20/120℃}$ (10^{-7}/K)	167
Cp (J/g·K)	

Mechanical Properties	
HK (10^7Pa)	112
E (GPa)	21.8
G (GPa)	8.1
μ	0.344

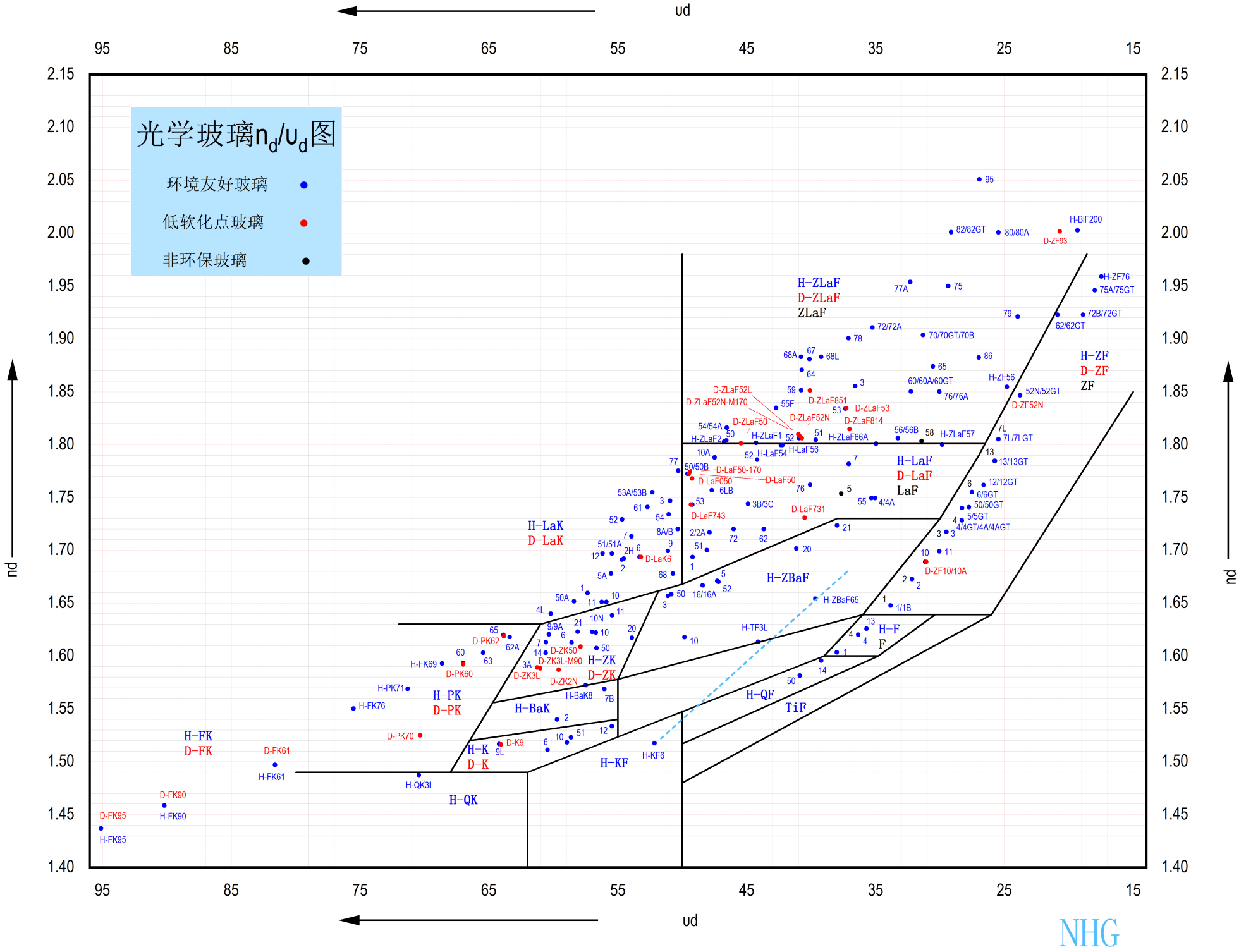
Temperature Coefficients of Refractive Index (-40 ～ 80℃) (×10^{-6}/℃)	
λ (μm)	dn_{rel}/dt
3	181
5	168
8	161
10	160
12	159

Expansion Coefficient α (×10^{-7}/K)	
℃	α
-50/-40	160
-40/-30	161
-30/-20	162
-20/-10	163
-10/0	163
0/10	164
10/20	164
20/30	164
30/40	165
40/50	165
50/60	165
60/70	165
70/80	166
80/90	166
90/100	166
100/110	167
110/120	167
120/130	168
130/140	168
140/150	169
150/160	169

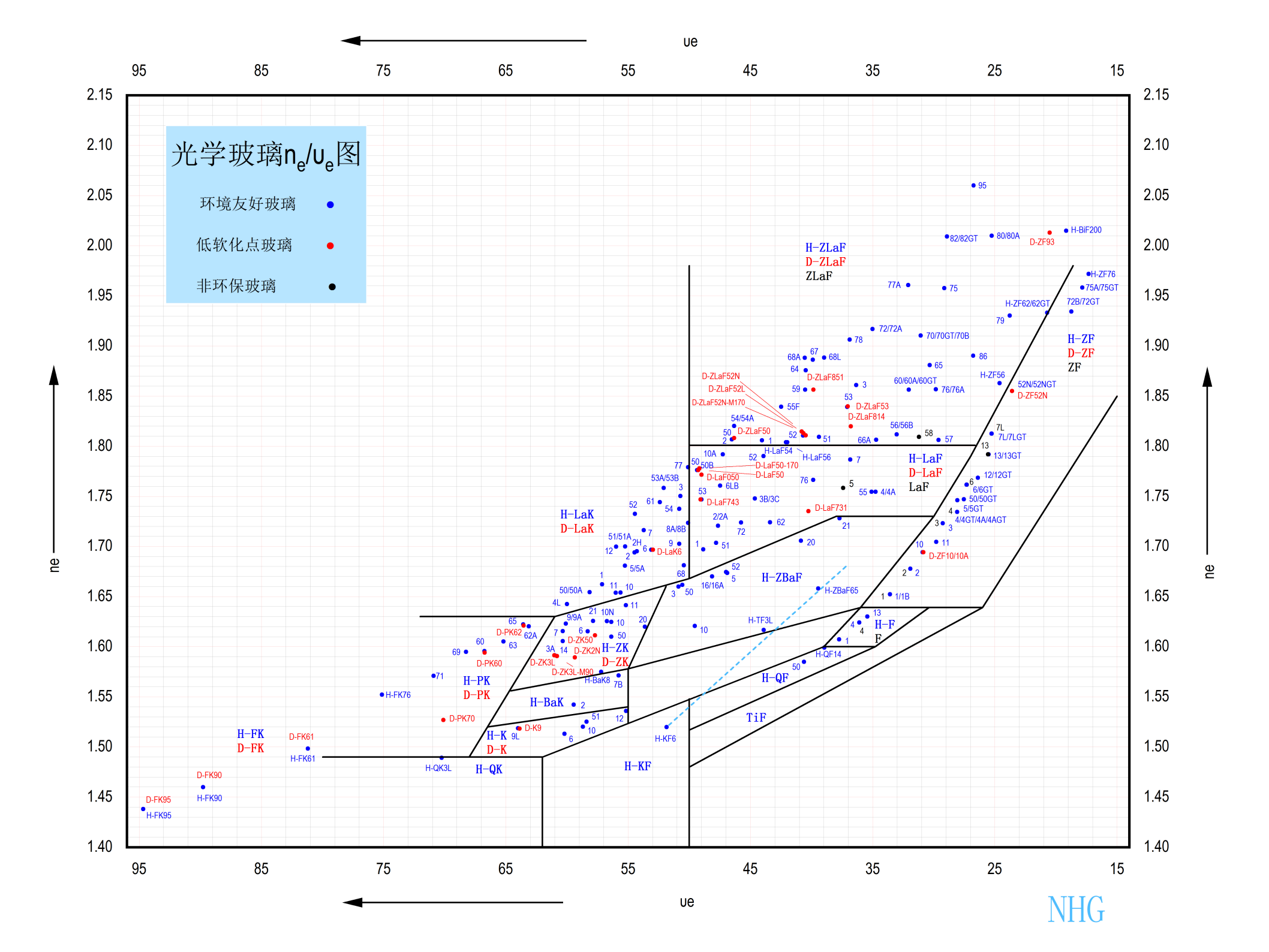
Internal Transmittance	
λ (μm)	τ 2mm
17.0	0.858
16.0	0.926
15.0	0.933
14.0	0.838
13.0	0.609
12.5	0.761
12.0	0.918
11.0	0.972
10.0	0.978
9.5	0.979
9.0	0.980
8.5	0.975
8.0	0.967
7.5	0.978
7.0	0.979
6.5	0.980
6.0	0.979
5.5	0.978
5.0	0.977
4.5	0.976
4.0	0.975
3.5	0.971
3.0	0.966
2.5	0.956
2.0	
1.5	
1.0	

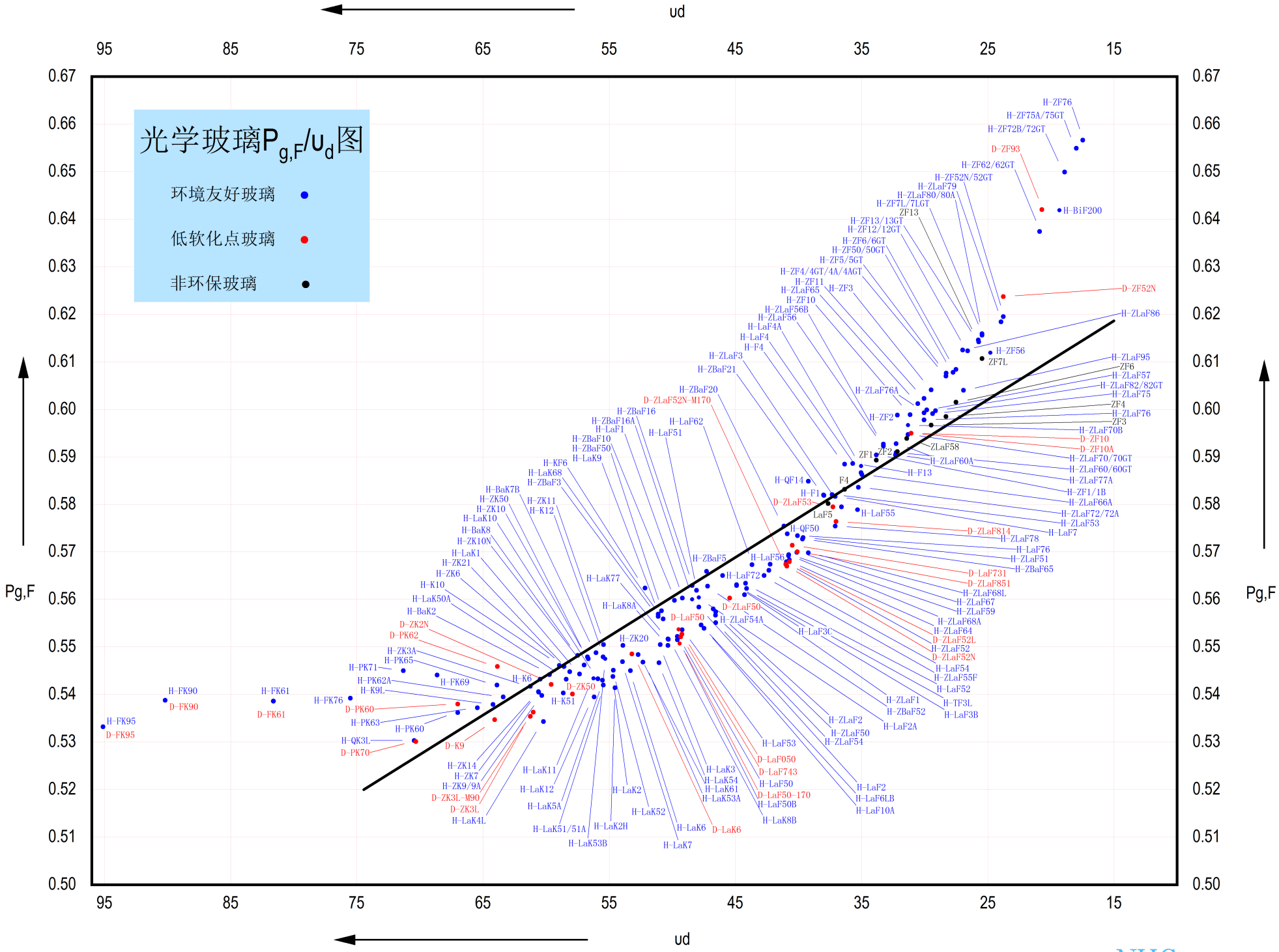


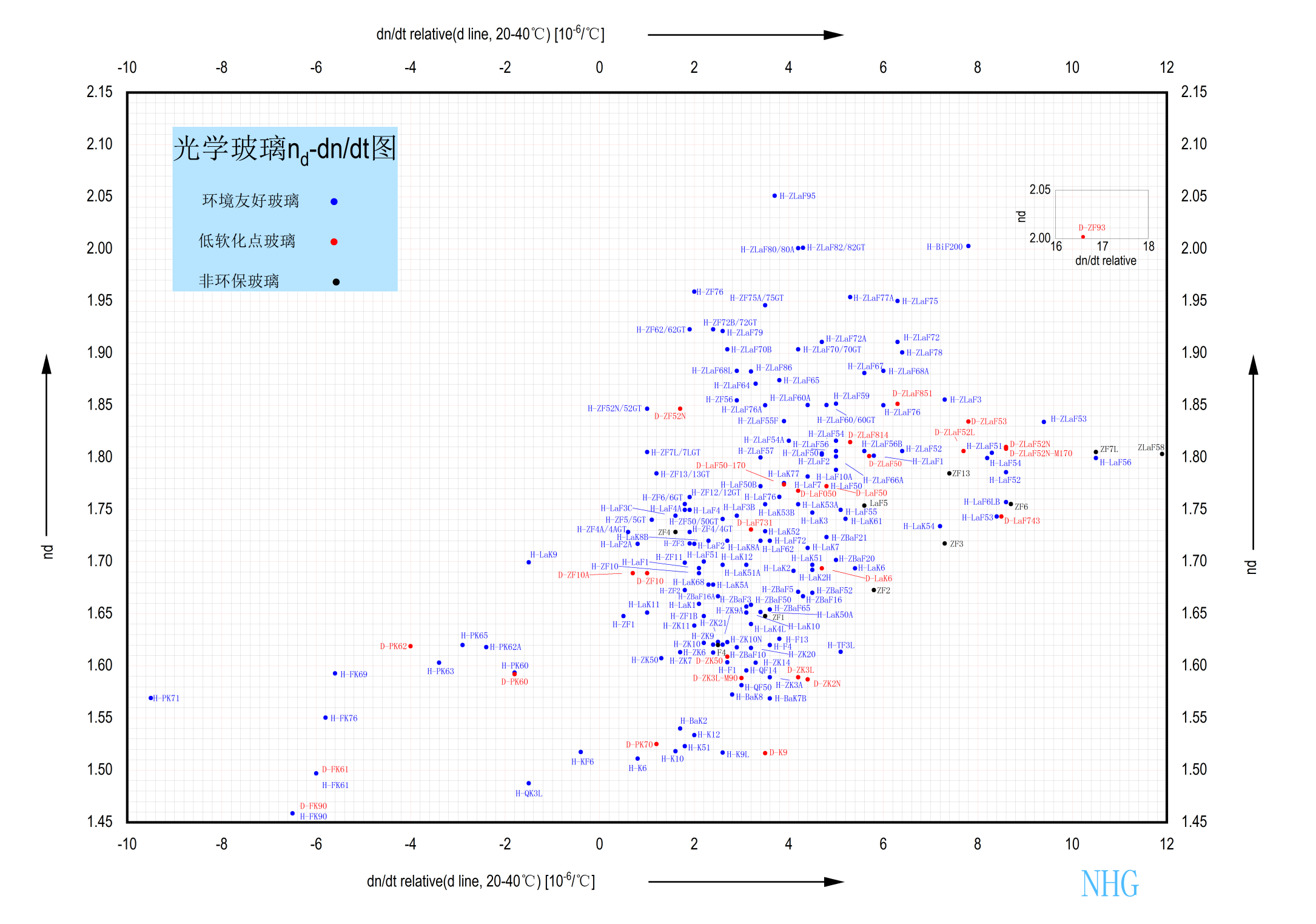
Constants of dn/dt	
D_0	1.16845E-04
D_1	2.20933E-07
D_2	-2.09490E-09
E_0	1.32867E-04
E_1	3.75602E-07
λ_{TK}	2.92771E-01

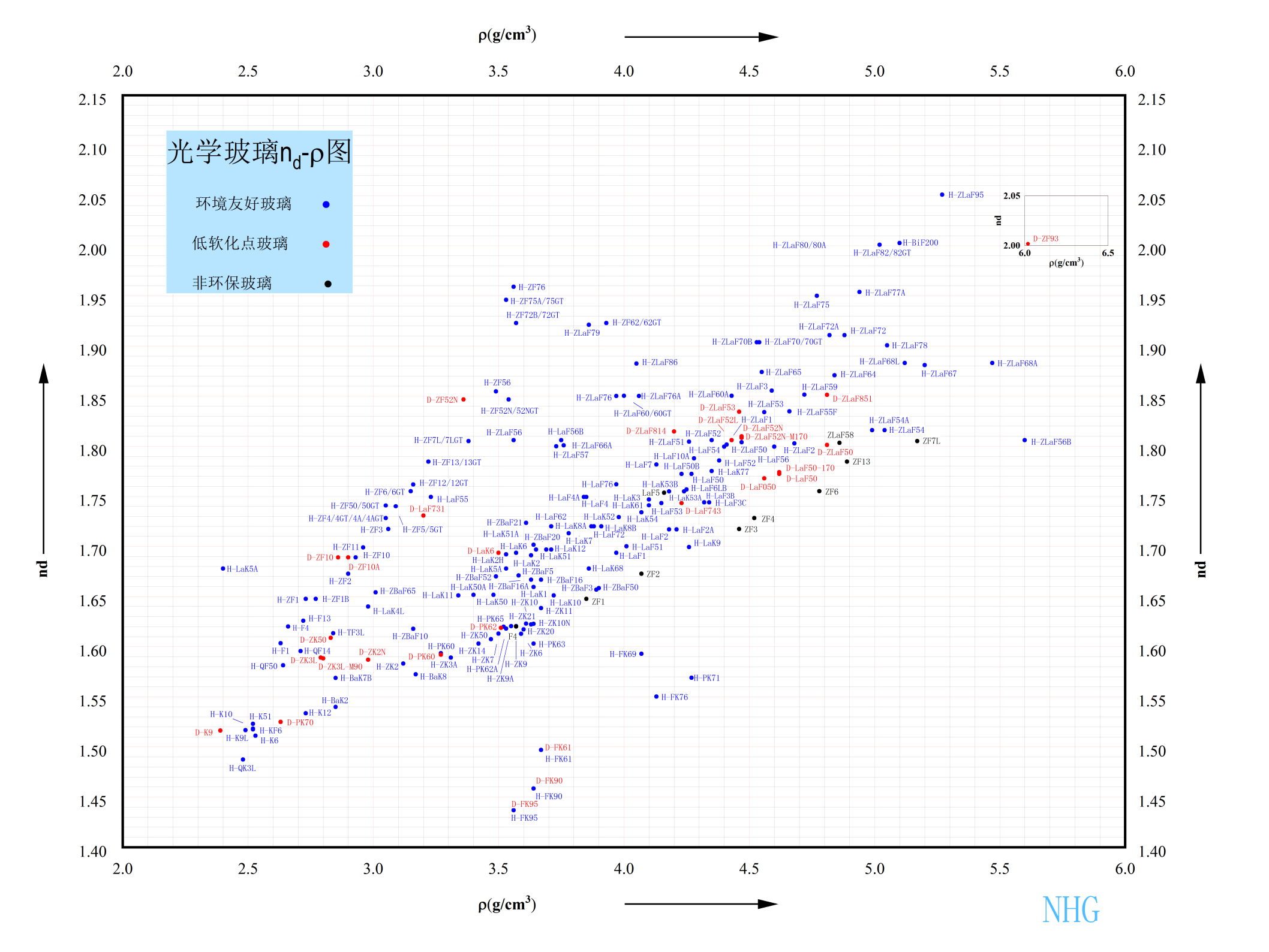

光学玻璃n_d/u_d图
环境友好玻璃
低软化点玻璃
非环保玻璃
ud
nd
95
85
75
65
55
45
35
25
15
2.15
2.10
2.05
2.00
1.95
1.90
1.85
1.80
1.75
1.70
1.65
1.60
1.55
1.50
1.45
1.40
H-ZLaF
D-ZLaF
ZLaF
H-ZF
D-ZF
ZF
H-LaF
D-LaF
LaF
H-LaK
D-LaK
H-ZBaF
H-ZK
D-ZK
H-PK
D-PK
H-BaK
H-FK
D-FK
H-K
D-K
H-KF
H-QK
H-QF
TiF
H-F
F
H-TF3L
H-ZBaF65
H-BiF200
D-ZF93
H-ZF76
75A/75GT
72B/72GT
62/62GT
52N/52GT
D-ZF52N
H-ZF56
7L/7LGT
13/13GT
12/12GT
6/6GT
50/50GT
5/5GT
4/4GT/4A/4AGT
D-ZF10/10A
1/1B
82/82GT
80/80A
77A
75
72/72A
70/70GT/70B
68A
68L
60/60A/60GT
76/76A
D-ZLaF52L
D-ZLaF52N-M170
D-ZLaF851
D-ZLaF53
D-ZLaF52N
D-ZLaF814
D-ZLaF50
54/54A
H-ZLaF2
H-ZLaF1
H-ZLaF66A
56/56B
H-ZLaF57
H-LaF54
H-LaF56
50/50B
D-LaF50-170
D-LaF050
D-LaF50
6LB
53A/53B
3B/3C
D-LaF731
D-LaF743
4/4A
D-LaK6
51/51A
2H
8A/B
2/2A
16/16A
5A
50A
4L
10N
9/9A
D-PK62
62A
D-ZK50
D-ZK3L-M90
D-ZK3L
D-ZK2N
H-BaK8
7B
H-FK69
D-PK60
H-PK71
H-FK76
D-PK70
D-K9
9L
H-KF6
H-QK3L
D-FK61
H-FK61
D-FK90
H-FK90
D-FK95
H-FK95

NHG


光学玻璃ne/ue图
环境友好玻璃
低软化点玻璃
非环保玻璃
ue
ne
95
85
75
65
55
45
35
25
15
2.15
2.10
2.05
2.00
1.95
1.90
1.85
1.80
1.75
1.70
1.65
1.60
1.55
1.50
1.45
1.40
H-ZLaF
D-ZLaF
ZLaF
H-ZF
D-ZF
ZF
H-LaF
D-LaF
LaF
H-LaK
D-LaK
H-ZBaF
H-ZK
D-ZK
H-PK
D-PK
H-BaK
H-FK
D-FK
H-K
D-K
H-QK
H-KF
H-QF
TiF
H-F
F
H-TF3L
H-ZBaF65
H-KF6
H-QF14
H-BiF200
D-ZF93
H-ZF76
75A/75GT
72B/72GT
H-ZF62/62GT
82/82GT
80/80A
72/72A
70/70GT/70B
H-ZF56
52N/52NGT
D-ZF52N
60/60A/60GT
76/76A
D-ZLaF52N
D-ZLaF52L
D-ZLaF52N-M170
D-ZLaF851
D-ZLaF53
D-ZLaF814
D-ZLaF50
54/54A
56/56B
7L/7LGT
13/13GT
H-LaF54
H-LaF56
D-LaF50-170
D-LaF050
D-LaF50
12/12GT
6/6GT
50/50GT
5/5GT
4/4GT/4A/4AGT
D-LaF743
D-LaF731
3B/3C
4/4A
D-ZF10/10A
1/1B
D-LaK6
5/5A
50/50A
16/16A
D-ZK50
D-ZK2N
D-ZK3L
D-ZK3L-M90
H-BaK8
D-PK62
D-PK60
H-FK76
D-PK70
D-K9
H-QK3L
D-FK61
H-FK61
D-FK90
H-FK90
D-FK95
H-FK95
NHG


光学玻璃Pg,F/ud图
环境友好玻璃
低软化点玻璃
非环保玻璃
ud
Pg,F
95
85
75
65
55
45
35
25
15
0.67
0.66
0.65
0.64
0.63
0.62
0.61
0.60
0.59
0.58
0.57
0.56
0.55
0.54
0.53
0.52
0.51
0.50
H-ZF76
H-ZF75A/75GT
H-ZF72B/72GT
D-ZF93
H-ZF62/62GT
H-ZF52N/52GT
H-ZLaF79
H-ZLaF80/80A
H-ZF7L/7LGT
ZF13
H-BiF200
H-ZF13/13GT
H-ZF12/12GT
H-ZF6/6GT
H-ZF50/50GT
H-ZF5/5GT
H-ZF4/4GT/4A/4AGT
H-ZF11
H-ZLaF65
H-ZF3
H-ZF10
H-ZLaF56B
H-ZLaF56
H-LaF4A
H-LaF4
H-F4
H-ZLaF3
H-ZBaF21
H-ZBaF20
D-ZLaF52N-M170
H-ZBaF16
H-ZBaF16A
H-LaF1
H-ZBaF10
H-ZBaF50
H-LaK9
H-KF6
H-LaK68
H-ZBaF3
H-BaK7B
H-ZK50
H-ZK10
H-LaK10
H-BaK8
H-ZK10N
H-LaK1
H-ZK21
H-ZK6
H-K10
H-LaK50A
H-BaK2
D-ZK2N
D-PK62
H-ZK3A
H-PK65
H-PK71
H-PK62A
H-K9L
H-FK69
H-K6
D-ZK50
H-K51
H-FK90
D-FK90
H-FK61
D-FK61
H-FK76
D-PK60
H-PK63
H-PK60
H-QK3L
D-PK70
H-FK95
D-FK95
H-ZK14
H-ZK7
H-ZK9/9A
D-ZK3L-M90
D-ZK3L
H-LaK4L
D-K9
H-LaK11
H-LaK12
H-LaK5A
H-LaK51/51A
H-LaK53B
H-LaK2H
H-LaK2
H-LaK52
H-LaK6
H-LaK7
D-LaK6
H-LaK3
H-LaK54
H-LaK61
H-LaK53A
H-LaK8B
D-LaF050
D-LaF743
H-LaF50
D-LaF50-170
H-LaF50B
H-LaF2
H-LaF6LB
H-LaF10A
H-LaF53
H-ZLaF2
H-ZLaF50
H-ZLaF54
H-LaF2A
H-ZLaF1
H-ZBaF52
H-LaF3B
H-TF3L
H-LaF52
H-ZLaF55F
H-LaF54
D-ZLaF52N
D-ZLaF52L
H-ZLaF52
H-ZLaF64
H-ZLaF68A
H-LaF3C
H-ZLaF54A
D-ZLaF50
D-LaF50
H-LaK8A
H-LaK77
H-LaF72
H-ZBaF5
H-LaF56
D-LaF731
D-ZLaF851
H-ZLaF68L
H-ZLaF67
H-ZLaF59
H-ZBaF65
H-ZLaF51
H-LaF76
H-ZLaF78
D-ZLaF814
H-LaF7
H-ZLaF53
H-ZLaF72/72A
H-ZLaF66A
H-ZF1/1B
H-ZLaF60/60GT
H-ZLaF70/70GT
D-ZF10A
D-ZF10
H-ZLaF70B
ZF3
H-ZLaF76
ZF4
H-ZLaF75
H-ZLaF82/82GT
ZF6
H-ZLaF95
H-ZLaF86
D-ZF52N
H-ZF56
ZF7L
H-ZF2
ZF1
ZF2
ZLaF58
H-ZLaF60A
H-F13
F4
H-QF14
H-F1
D-ZLaF53
LaF5
H-LaF55
H-QF50
H-ZLaF76A
H-LaF3
H-ZLaF86
NHG


光学玻璃nd-dn/dt图
环境友好玻璃
低软化点玻璃
非环保玻璃
dn/dt relative(d line, 20-40℃) [10-6/℃]
nd
NHG


光学玻璃n_d-ρ图
环境友好玻璃
低软化点玻璃
非环保玻璃
ρ(g/cm³)
nd
NHG



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中英日文/V 2025

附表1

NHG低熔点玻璃在不同退火速率下折射率及模压折射率（一定模压条件下）参考对照表

牌号	分类	n_{1064}	n_t	n_s	$n_{A'}$	n_r	n_C	$n_{C'}$	n_{He-Ne}	n_D	n_d	n_e	n_F	$n_{F'}$	n_g	n_h	n_i	υ_d	A_0	A_1	A_2	A_3	A_4	A_5
		1064.00	1013.98	852.11	768.19	706.52	656.27	643.85	632.80	589.29	587.56	546.07	486.13	479.99	435.84	404.66	365.01							
D-FK61	D-FK61@30	1.48965	1.490 10	1.491 83	1.493 01	1.494 07	1.495 14	1.495 43	1.495 71	1.496 94	1.497 00	1.498 45	1.501 23	1.501 57	1.504 51	1.507 21	1.511 73	81.61	2.21807952E+00	-5.67922113E-03	8.28756139E-03	9.66891434E-05	3.56668643E-06	-3.63065113E-07
	D-FK61@4	1.49017	1.490 62	1.492 35	1.493 53	1.494 60	1.495 66	1.495 96	1.49623	1.497 47	1.497 52	1.498 97	1.501 75	1.502 10	1.505 04	1.507 74	1.512 26	81.69	2.21924633E+00	-5.50682294E-03	8.57906707E-03	3.76004475E-06	1.69911482E-05	-1.06003218E-06
	D-FK61@MY	1.48840	1.488 88	1.490 66	1.491 84	1.492 91	1.493 96	1.494 26	1.494 54	1.495 76	1.495 82	1.497 27	1.500 04	1.500 39	1.503 32	1.506 01	1.510 53	81.55	2.21662175E+00	-6.95464652E-03	7.12874443E-03	3.95290832E-04	-3.34640166E-05	1.38048819E-06
D-FK90	D-FK90@30	1.45238	1.452 77	1.454 25	1.455 24	1.456 15	1.457 04	1.457 29	1.457 52	1.458 55	1.458 60	1.459 81	1.462 12	1.462 41	1.464 86	1.467 10	1.470 85	90.19	2.10866977E+00	-4.81589397E-03	7.02478609E-03	-2.48667024E-05	1.78185408E-05	-1.09874507E-06
	D-FK90@MY	1.45130	1.451 73	1.453 28	1.454 29	1.455 20	1.456 09	1.456 33	1.456 56	1.457 59	1.457 64	1.458 85	1.461 16	1.461 45	1.463 88	1.466 12	1.469 87	90.26	2.10864501E+00	-6.59257859E-03	5.45164317E-03	3.94323524E-04	-3.56305873E-05	1.47619898E-06
D-FK95	D-FK95@30	1.43134	1.431 70	1.433 06	1.433 96	1.434 78	1.435 59	1.435 82	1.436 03	1.436 96	1.437 00	1.438 10	1.440 19	1.440 44	1.442 64	1.444 66	1.448 03	95.10	2.04831817E+00	-4.48612591E-03	6.22248873E-03	-7.98581030E-06	1.22118495E-05	-7.39464344E-07
	D-FK95@MY	1.43033	1.430 75	1.432 23	1.433 17	1.433 99	1.434 80	1.435 03	1.435 24	1.436 17	1.436 21	1.437 30	1.439 40	1.439 66	1.441 85	1.443 86	1.447 23	94.83	2.05094559E+00	-7.62903612E-03	3.38061143E-03	7.59245138E-04	-8.44910069E-05	3.82064819E-06
D-K9	D-K9@30	1.50603	1.506 73	1.509 29	1.510 94	1.512 41	1.513 84	1.514 24	1.51461	1.516 25	1.516 33	1.518 25	1.521 90	1.522 36	1.526 21	1.529 76	1.53574 6	4.06	2.27095299E+00	-1.08648469E-02	1.05786491E-02	1.54454636E-04	5.64088446E-06	-4.70999004E-07
	D-K9@4	1.50653	1.507 23	1.509 79	1.511 44	1.512 91	1.514 34	1.514 74	1. 51511	1.516 75	1.516 82	1.518 74	1.522 40	1.522 85	1.526 70	1.530 25	1 .53624 6	4.12	2.27328277E+00	-1.12400565E-02	9.97599803E-03	3.45416287E-04	-2.14522809E-05	9.35402686E-07
	D-K9@MY	1.50444	1.505 24	1.508 04	1.509 75	1.511 23	1.512 65	1.513 05	1.51342	1.515 04	1.515 12	1.517 03	1.520 69	1.521 15	1.525 02	1.528 58	1.53456 6	4.07	2.27572092E+00	-1.64829292E-02	6.08873299E-03	1.23341948E-03	-1.13324426E-04	4.43679918E-06
D-PK60	D-PK60@30	1.58112	1.581 82	1.584 44	1.586 18	1.587 75	1.589 31	1.589 74	1.590 14	1.591 93	1.592 01	1.594 12	1.598 14	1.598 64	1.602 91	1.606 84	1.613 49	67.00	2.50030926E+00	-1.01689443E-02	1.24607241E-02	1.85952458E-04	2.05179854E-06	-1.49222817E-07
	D-PK60@MY	1.57865	1.579 43	1.582 23	1.584 01	1.585 59	1.587 14	1.587 57	1.587 97	1.589 75	1.589 83	1.591 93	1.595 96	1.596 46	1.600 73	1.604 66	1.611 31	66.87	2.49938722E+00	-1.42892453E-02	9.34545116E-03	9.22415376E-04	-7.96926698E-05	3.28459896E-06
D-PK62	D-PK62@30	1.60722	1.607 93	1.610 65	1.612 49	1.614 18	1.615 86	1.616 33	1.616 76	1.618 72	1.618 81	1.621 12	1.625 55	1.626 10	1.630 84	1.635 22	1.642 65	63.85	2.58101085E+00	-9.35112569E-03	1.43302338E-02	8.87867497E-05	2.39962149E-05	-1.31422303E-06
	D-PK62@4	1.60801	1.608 72	1.611 44	1.613 29	1.614 98	1.616 66	1.617 12	1.61756	1.619 51	1.619 60	1.621 91	1.626 35	1.626 90	1.631 63	1.636 02	1.643 45	63.94	2.58349824E+00	-9.38526125E-03	1.44926085E-02	8.39203690E-06	3.91021928E-05	-2.23935731E-06
	D-PK62@MY	1.60546	1.606 10	1.608 66	1.610 47	1.612 15	1.613 84	1.614 31	1.614 75	1.616 71	1.616 80	1.619 12	1.623 55	1.624 10	1.628 82	1.633 20	1.640 63	63.52	2.56860724E+00	-5.38707629E-03	1.75069855E-02	-6.87624754E-04	1.10995728E-04	-4.98467098E-06
D-PK70	D-PK70@30	1.51542	1.516 07	1.518 45	1.519 99	1.521 36	1.522 69	1.523 06	1.523 41	1.524 93	1.525 00	1.526 79	1.530 17	1.530 58	1.534 13	1.537 38	1.542 87	70.32	2.29965045E+00	-1.03835061E-02	9.47420898E-03	3.16683036E-04	-2.62425226E-05	1.36324904E-06
	D-PK70@4	1.51690	1.517 55	1.519 93	1.521 48	1.522 85	1.524 19	1.524 56	1.52491	1.526 44	1.526 51	1.528 29	1.531 68	1.532 10	1.535 64	1.538 90	1.544 41	70.30	2.30381090E+00	-1.02497505E-02	9.70787950E-03	2.73667281E-04	-2.32664293E-05	1.35699791E-06
	D-PK70@MY	1.51168	1.512 34	1.514 73	1.516 27	1.517 64	1.518 97	1.519 33	1.519 68	1.521 19	1.521 26	1.523 03	1.526 38	1.526 80	1.530 33	1.533 59	1.539 08	70.35	2.28762859E+00	-1.01674763E-02	1.02576513E-02	-1.66576093E-05	2.58810983E-05	-1.41889408E-06
D-ZK2N	D-ZK2N@30	1.57504	1.575 79	1.578 63	1.580 54	1.582 28	1.583 99	1.584 48	1.584 92	1.586 91	1.587 00	1.589 35	1.593 84	1.594 41	1.599 18	1.603 64	1.611 45	59.59	2.48098765E+00	-1.07611097E-02	1.30595297E-02	5.70453194E-04	-6.87445031E-05	5.08145529E-06
	D-ZK2N@4	1.57581	1.576 56	1.579 41	1.581 32	1.583 05	1.584 77	1.585 25	1.58570	1.587 69	1.587 78	1.590 13	1.594 62	1.595 18	1.599 96	1.604 42	1.612 22	59.67	2.48339168E+00	-1.07617647E-02	1.30949062E-02	5.62576223E-04	-6.76286371E-05	5.01368289E-06
	D-ZK2N@MY	1.57321	1.573 95	1.576 77	1.578 67	1.580 40	1.582 12	1.582 60	1.583 04	1.585 03	1.585 12	1.587 47	1.591 96	1.592 52	1.597 30	1.601 77	1.609 59	59.46	2.47402496E+00	-1.00824802E-02	1.37248962E-02	3.54682439E-04	-3.75091837E-05	3.45387288E-06
D-ZK3L	D-ZK3L@30	1.57711	1.577 90	1.580 83	1.582 75	1.584 48	1.586 18	1.586 65	1.587 09	1.589 04	1.589 13	1.591 42	1.595 80	1.596 34	1.600 95	1.605 20	1.612 47	61.25	2.49074484E+00	-1.28107504E-02	1.19021712E-02	7.38866979E-04	-8.24332058E-05	4.70546661E-06
	D-ZK3L@4	1.57796	1.578 75	1.581 68	1.583 61	1.585 33	1.587 03	1.587 50	1.58794	1.589 90	1.589 98	1.592 28	1.596 65	1.597 19	1.601 80	1.606 06	1.613 32	61.33	2.49311083E+00	-1.27088514E-02	1.21872378E-02	6.41303476E-04	-6.72916072E-05	3.85806013E-06
	D-ZK3L@MY	1.57487	1.575 70	1.578 72	1.580 68	1.582 42	1.584 12	1.584 59	1.585 03	1.586 98	1.587 07	1.589 36	1.593 73	1.594 27	1.598 90	1.603 17	1.610 40	61.09	2.48448282E+00	-1.37621177E-02	1.24887564E-02	3.73488038E-04	-1.17280886E-05	2.89945496E-07
D-ZK3L-M90	D-ZK3L-M90@30	1.57635	1.577 12	1.580 01	1.581 93	1.583 65	1.585 35	1.585 82	1.586 27	1.588 23	1.588 31	1.590 61	1.594 99	1.595 55	1.600 18	1. 60446	1.611 71	61.02	2.48520640E+00	-1.11940698E-02	1.38766236E-02	1.12540137E-04	1.15205458E-05	-4.63440822E-07
	D-ZK3L-M90@4	1.57717	1.577 94	1.580 84	1.582 76	1.584 48	1.586 18	1.586 65	1.587 09	1.589 05	1.589 13	1.591 43	1.595 80	1.596 36	1.600 99	16 0528	1.612 54	61.19	2.48756481E+00	-1.11596189E-02	1.41902136E-02	-1.92545015E-05	3.28872808E-05	-1.61366406E-06
	D-ZK3L-M90@MY	1.57423	1.575 10	1.578 21	1.580 17	1.581 90	1.583 59	1.584 06	1.584 50	1.586 45	1.586 53	1.588 82	1.593 21	1.593 76	1.598 41	1. 60269	1.609 94	60.97	2.48745772E+00	-1.64332369E-02	9.67827735E-03	1.12480235E-03	-1.02097805E-04	4.34876912E-06
D-ZK50	D-ZK50@30	1.59586	1.596 71	1.599 86	1.601 94	1.603 80	1.605 65	1.606 16	1.60664	1.608 76	1.608 86	1.611 36	1.616 16	1.616 76	1.621 84	1.626 55	1.634 60	57.90	2.54913552E+00	-1.32831855E-02	1.39362205E-02	4.99307363E-04	-3.36145332E-05	1.90094032E-06
	D-ZK50@4	1.59683	1.597 67	1.600 82	1.602 90	1.604 77	1.606 61	1.607 12	1.60760	1.609 72	1.609 82	1.612 32	1.617 12	1.617 71	1.622 79	1.627 50	1.635 55	58.02	2.55263609E+00	-1.34661326E-02	1.36063144E-02	6.14980384E-04	-5.15909720E-05	2.90489184E-06
	D-ZK50@MY	1.59363	1.594 48	1.597 66	1.599 74	1.601 61	1.603 45	1.603 96	1.60444	1.606 56	1.606 66	1.609 16	1.613 95	1.614 55	1.619 64	1.624 36	1.632 41	57.78	2.54256185E+00	-1.36618478E-02	1.37992487E-02	4.85457779E-04	-2.63719962E-05	1.33894389E-06
D-LaK6	D-LaK6@30	1.67799	1.678 95	1.682 59	1.685 06	1.687 31	1.689 55	1.690 17	1.690 76	1.693 38	1.693 50	1.696 61	1.702 58	1.703 33	1.709 73	1.715 70	1.725 93	53.20	2.81505089E+00	-1.41604226E-02	1.82673200E-02	6.74961616E-04	-4.03278304E-05	2.39186650E-06
	D-LaK6@4	1.67915	1.680 10	1.683 75	1.686 21	1.688 47	1.690 71	1.691 34	1.69192	1.694 54	1.694 66	1.697 76	1.703 74	1.704 49	1.710 89	1.716 85	1.727 08	53.31	2.81835454E+00	-1.39294315E-02	1.87498811E-02	5.15999680E-04	-1.67503823E-05	1.12926389E-06
	D-LaK6@MY	1.67527	1.676 21	1.679 85	1.682 33	1.684 60	1.686 85	1.687 48	1.688 07	1.690 69	1.690 81	1.693 91	1.699 88	1.700 63	1.707 04	1.713 02	1.723 23	53.02	2.80103191E+00	-1.19502231E-02	2.18796415E-02	-4.75205602E-04	1.21814032E-04	-5.94782181E-06
D-ZF10	D-ZF10@30	1.66578	1.666 98	1.671 92	1.675 52	1.678 96	1.682 49	1.683 50	1.684 45	1.688 75	1.688 93	1.694 17	1.704 66	1.706 00	1.717 85	1.729 59	1.751 78	31.08	2.76366083E+00	-1.24616807E-02	2.66401782E-02	2.38393825E-03	-2.27557760E-04	2.16448822E-05
	D-ZF10@MY	1.66203	1.663 05	1.667 63	1.671 19	1.674 63	1.678 17	1.679 17	1.680 12	1.684 38	1.684 57	1.689 74	1.700 06	1.701 38	1.713 19	1.724 97	1.747 15	31.27	2.72366950E+00	1.70026066E-03	4.37749094E-02	-2.85248716E-03	4.75548226E-04	-1.27017399E-05
D-ZF10A	D-ZF10A@30	1.66585	1.667 04	1.671 93	1.675 53	1.678 95	1.682 49	1.683 50	1.684 44	1.688 74	1.688 93	1.694 17	1.704 66	1.706 00	1.717 95	1.729 75	1.751 93	31.08	2.76027780E+00	-1.06941385E-02	2.92240616E-02	1.44064372E-03	-7.09323241E-05	1.25693927E-05
	D-ZF10A@4	1.66747	1.668 66	1.673 58	1.677 20	1.680 65	1.684 20	1.685 21	1.686 16	1.690 48	1.690 67	1.695 94	1.706 50	1.707 85	1.719 88	1.731 79	1.754 11	30.97	2.76501131E+00	-1.05557069E-02	2.99621695E-02	1.22008203E-03	-3.03657538E-05	1.02425302E-05
	D-ZF10A@MY	1.66143	1.662 82	1.668 22	1.671 94	1.675 41	1.678 92	1.679 92	1.680 85	1.685 09	1.685 28	1.690 45	1.700 83	1.702 17	1.714 09	1.725 93	1.748 10	31.28	2.75830985E+00	-1.97047359E-02	2.62880213E-02	1.42355045E-03	4.78551035E-06	6.50174732E-06
D-ZF52N	D-ZF52N@30	1.81108	1.812 87	1.820 15	1.825 65	1.830 96	1.836 48	1.838 06	1.839 55	1.846 35	1.846 66	1.855 04	1.872 09	1.874 31	1.894 30	1.914 69	1.954 67	23.78	3.25154745E+00	-1.45603806E-02	4.82406088E-02	3.12705995E-03	-2.06388870E-04	3.78595910E-05
	D-ZF52N@MY	1.80530	1.807 24	1.814 95	1.820 50	1.825 78	1.831 23	1.832 79	1.834 26	1.840 97	1.841 27	1.849 53	1.866 37	1.868 56	1.888 30	1.908 44	1.948 07	23.94	3.25185211E+00	-2.67024819E-02	3.79090037E-02	5.55471595E-03	-5.12673256E-04	5.23054064E-05
D-LaF050	D-LaF050@30	1.74994	1.751 01	1.755 15	1.758 02	1.760 66	1.763 31	1.764 06	1.764 75	1.767 87	1.768 02	1.771 73	1.778 91	1.779 80	1.787 53	1.79 475	1.807 18	49.24	3.05764396E+00	-1.46517743E-02	2.34463123E-02	7.01742420E-04	-2.73402326E-05	1.97166425E-06
	D-LaF050@4	1.75107	1.752 13	1.756 28	1.759 16	1.761 81	1.764 47	1.765 21	1.765 91	1.769 03	1.769 17	1.772 88	1.780 06	1.780 96	1.788 68	1.795 90	1.808 31	49.34	3.05999444E+00	-1.39997235E-02	2.47467284E-02	2.85627025E-04	3.28925135E-05	-1.22103526E-06
	D-LaF050@MY	1.74720	1.748 26	1.752 37	1.755 22	1.757 85	1.760 49	1.761 23	1.761 93	1.765 03	1.765 17	1.768 87	1.776 04	1.776 94	1.784 66	1.79 188	1.804 31	49.21	3.04720608E+00	-1.41269343E-02	2.39142422E-02	4.73669677E-04	1.10526123E-05	-2.01636002E-07
D-LaF50	D-LaF50@30	1.75438	1.755 45	1.759 61	1.762 48	1.765 13	1.767 79	1.768 54	1.769 23	1.772 36	1.772 50	1.776 22	1.783 40	1.784 30	1.792 04	1.799 27	1.811 74	49.50	3.07337625E+00	-1.48574785E-02	2.34948451E-02	7.16989975E-04	-3.03961557E-05	2.24464169E-06
	D-LaF50@4	1.75559	1.756 66	1.760 82	1.763 70	1.766 35	1.769 01	1.769 75	1.770 45	1.773 57	1.773 71	1.777 43	1.784 62	1.785 52	1.793 25	1.800 49	1.812 97	49.57	3.07720793E+00	-1.47008474E-02	2.38529304E-02	6.07390558E-04	-1.53514506E-05	1.52980567E-06
	D-LaF50@MY	1.75140	1.752 50	1.756 74	1.759 63	1.762 28	1.764 94	1.765 68	1.766 38	1.769 49	1.769 63	1.773 35	1.780 54	1.781 44	1.789 18	1.796 41	1.808 88	49.34	3.06570728E+00	-1.65756530E-02	2.23887351E-02	9.15550779E-04	-4.50949865E-05	2.51895099E-06
D-LaF50-170	D-LaF50-170@30	1.75608	1.757 14	1.761 29	1.764 16	1.766 81	1.769 47	1.770 22	1.770 92	1.774 06	1.774 20	1.777 93	1.785 14	1.786 04	1.793 77	1 .80098	1.813 46	49.41	3.07996867E+00	-1.49730363E-02	2.26125445E-02	1.12810004E-03	-9.99130408E-05	6.18705456E-06
	D-LaF50-170@4	1.75729	1.758 35	1.762 50	1.765 37	1.768 03	1.770 69	1.771 44	1.772 14	1.775 27	1.775 41	1.779 15	1.786 36	1.787 26	1.794 98	1 .80220	1.814 69	49.48	3.08441970E+00	-1.50876838E-02	2.24959159E-02	1.17624206E-03	-1.07935431E-04	6.68643564E-06
	D-LaF50-170@MY	1.75312	1.754 22	1.758 43	1.761 31	1.763 96	1.766 62	1.767 36	1.768 06	1.771 19	1.771 33	1.775 06	1.782 28	1.783 18	1.790 91	1 .79812	1.810 60	49.25	3.07292494E+00	-1.68469614E-02	2.09164931E-02	1.54018025E-03	-1.47194151E-04	8.21460866E-06
D-LaF731	D-LaF731@30	1.71080	1.711 91	1.716 35	1.719 49	1.722 43	1.725 41	1.726 25	1.727 05	1.730 61	1.730 77	1.735 05	1.743 45	1.744 52	1.753 76	1.76 260	1.778 35	40.50	2.91839395E+00	-1.31881796E-02	2.56126448E-02	9.59611523E-04	-3.53323234E-05	4.57862484E-06
	D-LaF731@4	1.71165	1.712 77	1.717 21	1.720 36	1.723 31	1.726 30	1.727 14	1.727 93	1.731 50	1.731 65	1.735 94	1.744 36	1.745 42	1.754 68	1.763 53	1.779 30	40.50	2.92108182E+00	-1.31204360E-02	2.58761021E-02	8.84958938E-04	-2.40217764E-05	3.98375191E-06
	D-LaF731@MY	1.70963	1.710 48	1.714 35	1.717 38	1.720 31	1.723 31	1.724 16	1.724 95	1.728 53	1.728 69	1.732 98	1.741 34	1.742 39	1.751 59	1.76 042	1.776 18	40.42	2.88710153E+00	2.55539041E-03	3.90963758E-02	-2.48817054E-03	3.67355418E-04	-1.29914977E-05
D-LaF743	D-LaF743@30	1.72590	1.726 92	1.730 91	1.733 66	1.736 21	1.738 76	1.739 48	1.740 16	1.743 17	1.743 30	1.746 89	1.753 83	1.754 70	1.762 15	1.76 911	1.781 10	49.33	2.97441605E+00	-1.38572738E-02	2.19649180E-02	8.10197466E-04	-4.79702937E-05	3.00170973E-06
	D-LaF743@4	1.72706	1.728 08	1.732 07	1.734 83	1.737 37	1.739 93	1.740 65	1.741 32	1.744 33	1.744 47	1.748 06	1.755 00	1.755 86	1.763 31	1.770 26	1.782 26	49.40	2.97884807E+00	-1.40607707E-02	2.16628828E-02	9.23913202E-04	-6.62890845E-05	4.04699479E-06
	D-LaF743@MY	1.72297	1.724 05	1.728 17	1.730 97	1.733 53	1.736 09	1.736 80	1.737 47	1.740 48	1.740 61	1.744 18	1.751 11	1.751 98	1.759 45	1.76 642	1.778 41	49.31	2.96819362E+00	-1.65194417E-02	2.09155349E-02	8.79510678E-04	-3.49347469E-05	1.57148322E-06
D-ZLaF52L	D-ZLaF52L@30	1.78422	1.785 43	1.790 27	1.793 71	1.796 94	1.800 22	1.801 14	1.802 01	1.805 92	1.806 10	1.810 80	1.820 02	1.821 17	1.831 26	1.8 4085	1.857 84	40.73	3.17316178E+00	-1.45588429E-02	2.92758988E-02	1.20865059E-03	-6.18358136E-05	5.88185791E-06
	D-ZLaF52L@4	1.78546	1.786 67	1.791 51	1.794 96	1.798 19	1.801 47	1.802 39	1.803 26	1.807 17	1.807 35	1.812 05	1.821 27	1.822 43	1.832 52	1.84 212	1.859 12	40.78	3.17770048E+00	-1.46668389E-02	2.92787167E-02	1.20475248E-03	-5.96497411E-05	5.72773146E-06
	D-ZLaF52L@MY	1.78160	1.782 79	1.787 61	1.791 05	1.794 28	1.797 55	1.798 48	1.799 35	1.803 25	1.803 42	1.808 11	1.817 30	1.818 46	1.828 53	1.8 3812	1.855 08	40.68	3.16119139E+00	-1.32645181E-02	3.10381098E-02	6.23527886E-04	1.87542859E-05	1.85364216E-06
D-ZLaF52N	D-ZLaF52N@30	1.78814	1.789 35	1.794 18	1.797 62	1.800 84	1.804 11	1.805 05	1.805 91	1.809 82	1.810 00	1.814 69	1.823 87	1.825 02	1.835 08	1.8 4465	1.861 60	41.00	3.18681101E+00	-1.44191920E-02	2.95460135E-02	1.15252022E-03	-5.90862778E-05	5.97442323E-06
	D-ZLaF52N@4	1.78932	1.790 52	1.795 36	1.798 80	1.802 03	1.805 31	1.806 23	1.807 10	1.811 01	1.811 19	1.815 88	1.825 07	1.826 23	1.836 30	1.84 587	1.862 83	41.05	3.19028483E+00	-1.40949828E-02	3.00983925E-02	9.93160032E-04	-3.59599527E-05	4.74677131E-06
	D-ZLaF52N@MY	1.78552	1.786 71	1.791 51	1.794 95	1.798 17	1.801 45	1.802 37	1.803 24	1.807 14	1.807 31	1.811 99	1.821 16	1.822 32	1.832 36	1.8 4193	1.858 87	40.96	3.17422835E+00	-1.27898867E-02	3.16327740E-02	4.79294391E-04	3.35588491E-05	1.34253852E-06
D-ZLaF52N-M170	D-ZLaF52N-M170@30	1.78654	1.787 74	1.792 56	1.795 99	1.799 21	1.802 47	1.80340	1.804 27	1.808 17	1.808 34	1.813 03	1.822 23	1.823 39	1.833 43	1.842 98	1.859 82	40.92	3.18131839E+00	-1.44359617E-02	2.92512247E-02	1.19876602E-03	-5.70803235E-05	5.23040290E-06
	D-ZLaF52N-M170@4	1.78776	1.788 96	1.793 78	1.797 21	1.800 44	1.803 71	1.80463	1.805 50	1.809 40	1.809 58	1.814 27	1.823 47	1.824 63	1.834 69	1.844 24	1.861 09	40.97	3.18560474E+00	-1.44291698E-02	2.93401057E-02	1.17993577E-03	-5.31087576E-05	4.96363126E-06
	D-ZLaF52N-M170@MY	1.78392	1.785 10	1.789 89	1.793 32	1.796 54	1.799 80	1.80073	1.801 59	1.805 49	1.805 66	1.810 35	1.819 51	1.820 67	1.830 70	1.840 24	1.857 09	40.88	3.16956802E+00	-1.31714110E-02	3.07028920E-02	7.46878393E-04	6.37397652E-07	2.57853973E-06
D-ZLaF53	D-ZLaF53@30	1.81004	1.811 37	1.816 71	1.820 54	1.824 14	1.827 81	1.828 84	1.829 81	1.834 21	1.834 41	1.839 72	1.850 19	1.851 52	1.863 16	1.87 437	1.894 51	37.28	3.26258096E+00	-1.52499377E-02	3.41466836E-02	9.84000388E-04	1.27478564E-05	3.62442642E-06
	D-ZLaF53@4	1.81149	1.812 82	1.818 18	1.822 01	1.825 61	1.829 28	1.830 32	1.831 30	1.835 71	1.835 91	1.841 22	1.851 70	1.853 03	1.864 64	1.875 82	1.896 10	37.28	3.27008277E+00	-1.61926283E-02	3.21832707E-02	1.80500371E-03	-1.31286203E-04	1.24549235E-05
	D-ZLaF53@MY	1.80674	1.807 98	1.813 18	1.816 99	1.820 60	1.824 28	1.825 31	1.826 29	1.830 69	1.830 88	1.836 18	1.846 62	1.847 95	1.859 57	1.87 080	1.890 94	37.19	3.23842428E+00	-8.84435461E-03	4.14390646E-02	-1.15440808E-03	2.92286579E-04	-9.82321535E-06
D-ZLaF814	D-ZLaF814@30	1.79076	1.792 07	1.797 34	1.801 10	1.804 65	1.808 25	1.809 27	1.810 23	1.814 55	1.814 74	1.819 95	1.830 25	1.831 56	1.842 93	1.8 5388	1.873 63	37.03	3.19574140E+00	-1.58738035E-02	3.15329222E-02	1.57767624E-03	-9.05739467E-05	9.32711709E-06
	D-ZLaF814@MY	1.78662	1.788 14	1.793 84	1.797 69	1.801 24	1.804 82	1.805 83	1.806 78	1.811 07	1.811 26	1.816 44	1.826 70	1.828 00	1.839 37	1.8 5032	1.870 07	37.08	3.20091413E+00	-2.76681591E-02	2.23495517E-02	3.71629093E-03	-3.29039849E-04	1.95221817E-05
D-ZLaF851	D-ZLaF851@30	1.82801	1.829 29	1.834 42	1.838 08	1.841 54	1.845 05	1.846 04	1.846 97	1.851 16	1.851 35	1.856 39	1.866 28	1.867 53	1.878 38	1.8 8871	1.906 99	40.10	3.32860198E+00	-1.49218815E-02	3.29458426E-02	1.05526131E-03	-2.14847086E-05	3.89175295E-06
	D-ZLaF851@4	1.82929	1.830 56	1.835 70	1.839 37	1.842 83	1.846 33	1.847 33	1.848 26	1.852 45	1.852 64	1.857 69	1.867 58	1.868 83	1.879 69	1.89 003	1.908 31	40.12	3.33321024E+00	-1.49061819E-02	3.29856654E-02	1.06609787E-03	-2.34520199E-05	4.00397431E-06
	D-ZLaF851@MY	1.82492	1.826 25	1.831 54	1.835 25	1.838 71	1.842 22	1.843 21	1.844 14	1.848 32	1.848 51	1.853 53	1.863 40	1.864 65	1.875 49	1.8 8582	1.904 10	40.06	3.32158876E+00	-1.78378196E-02	3.17010602E-02	1.20107109E-03	-2.53759676E-05	3.62765055E-06

**注：同一产品在不同退火速率或模压条件下折射率不同，对低熔点玻璃在不同退火速率下及模压后的折射率进行了名称区分，便于设计人员在Zemax、Code V等设计软