



无色光学玻璃
Colorless optical glass
無色光学ガラス

红外光学玻璃
Infrared optical glass
赤外光学ガラス

2026

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 180 多种光学玻璃的性能数据。与 2601 版手册相比，本手册新增了 7 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

2026.8 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 180 kinds of optical glass. Comparing to the 2601 version, the handbook adds seven new products.

湖北新華光信息材料有限公司は光学ガラス専門メーカーとして、“簡単、**务实**、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、180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。2601版のカタログに比べて、7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ト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良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

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产品推荐
Product recommendations
製品推奨

※ 车载领域 Automotive domain 車載分野

●H-ZF52B 具有与 H-ZF52N 相同的折射率和阿贝数，且 H-ZF52B 具有负的折射率温度系数，可用于解决光学系统温漂问题。

H-ZF52B features the same refractive index and Abbe number as H-ZF52N. In addition, H-ZF52B possesses negative temperature coefficient of refractive index, which helps mitigate thermal drift issues in optical systems.

H-ZF52B は H-ZF52N と同一の屈折率、アッベ数を有します。さらに H-ZF52B は負の屈折率温度係数を持ち、光学システムにおける温度ドリフトの課題解決に活用できます。

性能 Properties		H-ZF52B	H-ZF52N
折射率 Refractive index n_d		1.84666	1.84666
阿贝数 Abbe number v_d		23.78	23.78
折射率温度系数 Temperature coefficient of refractive index $dn/dt_{rel.}$ (d 线, 20-40°C, $10^{-6}/^{\circ}C$)		-1.5	1.0
相对部分色散 Relative partial dispersion $P_{g,F}$		0.6277	0.6195
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)		83	83
转变温度 Transformation temperature T_g ($^{\circ}C$)		551	632
弛垂温度 Sag temperature T_s ($^{\circ}C$)		591	662
密度 Density ρ (g/cm^3)		3.71	3.54
耐水性 Water resistance D_w		1	1
耐酸性 Acid resistance D_A		1	1
耐候性 Climatic resistance CR		1	1
内部透过率 Internal Transmittance	460nm	0.937	0.971
	400nm	0.704	0.830

●以下产品硬度高、耐冷热和机械冲击性能优异，可用于车载 1 号片。

These products deliver high hardness with outstanding thermal-shock and mechanical-impact resistance, suitable for automotive front-element lenses.

下記製品は高硬度、熱衝撃・機械衝撃耐性に優れ、車載 1 番レンズに適用可能です。

类型 Category	1 号片	1 号片	1 号片	1 号片	1 号片
牌号 Type	H-ZLaF50C	H-ZLaF55B	H-ZLaF71	H-ZLaF72	H-ZLaF72A
折射率 Refractive index n_d	1.804	1.8348	1.90056	1.91082	1.91082
阿贝数 Abbe number v_d	46.58	42.73	31.25	35.25	35.25
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^\circ\text{C}} (10^{-7}/\text{K})$	64	64	56	67	68
抗冲击强度 Impact resistance $\sigma(\text{KJ/m}^2)$	2.96	3.14	2.99	3.08	2.91
硬度 Hardness HK (10^7Pa)	712	733	726	663	676
耐候性 Climatic resistance CR	1	1	1	1	1
耐热系数 Thermal-shock resistance	263	395	358	353	338

* 注：H-ZLaF71 为新品。Note: H-ZLaF71 – New product. 注：H-ZLaF71 は新製品です。

●以下产品膨胀系数小、耐候性好、性价比高，可用于车载镜头。

These products have low expansion coefficient, excellent weather resistance and high cost- performance, ideal for automotive lenses.

下記製品は膨張係数が小さく、耐候性に優れ、コストパフォーマンスが高いため、車載レンズに使用できます。

牌号 Type	H-ZLaF52A	H-ZLaF53A	D-ZLaF52NC
折射率 Refractive index n_d	1.8061	1.83399	1.81
阿贝数 Abbe number v_d	40.93	37.32	41.01
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^\circ\text{C}} (10^{-7}/\text{K})$	56	55	58
硬度 Hardness HK (10^7Pa)	662	659	637
耐候性 Climatic resistance CR	1	1	1
内部透过率 Internal Transmittance τ_{460}	0.992	0.977	0.985

※ 投影与摄像领域

Projection & imaging domain 投影・撮像分野

●H-ZF8、H-ZF16 玻璃具有较大的相对部分色散，可有效校正二级光谱，提升复消色差设计性能，且折射率温度系数较负，可补偿热透镜效应，显著提升光学系统在变温环境下的可靠性。

H-ZF8 and H-ZF16 offer large relative partial dispersion for effective secondary-spectrum correction and better apochromatic design performance. Their relatively negative temperature coefficients of refractive index compensate the thermal-lens effect, significantly improving optical-system reliability under variable-temperature conditions.

H-ZF8 と H-ZF16 は大きな相対部分分散により二次スペクトルを補正し、アポクロマート設計性能を向上。比較的負の屈折率温度係数が熱レンズ効果を補償し、温度変化環境での光学システム信頼性を大幅に向上させます。

●H-ZF56 与 H-ZF52N 相比具有低的相对部分色散特性。

H-ZF56 features lower relative partial dispersion compared with H-ZF52N.

H- ZF56 は H- ZF52N と比較し、相対部分分散が低い特性を持っています。

牌号 Type	H-ZF8	H-ZF16	H-ZF56
折射率 Refractive index n_d	1.62201	1.66382	1.85478
阿贝数 Abbe number v_d	30.66	27.35	24.8
折射率温度系数 Temperature coefficient of refractive index dn/dt_{rel} (d 线, 20-40℃, $10^{-6}/^{\circ}C$)	-6.2	-4.2	2.9
相对部分色散 Relative partial dispersion $P_{g,F}$	0.622	0.624	0.6119
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	141	129	76
密度 Density ρ (g/cm^3)	2.81	2.88	3.49
耐候性 Climatic resistance CR	1	1	2
内部透过率 Internal Transmittance τ_{460}	0.977	0.956	0.967

●H-BiF 系列玻璃的折射率超过 2.0，可支持大视场角光学设计，助力系统小型化。

Glasses of the H-BiF series feature a refractive index exceeding 2.0. They enable wide-field-of-view optical design and facilitate system miniaturization.

H-BiF シリーズガラスは屈折率が 2.0 を超えており、広画角の光学設計に対応し、システムの小型化に貢献します。

牌号 Type	H-BiF200	H-BiF210
折射率 Refractive index n_d	2.00272	2.1042
阿贝数 Abbe number v_d	19.32	17.02
折射率温度系数 Temperature coefficient of refractive index $dn/dt_{rel.}$ (d 线, 20-40℃, $10^{-6}/^{\circ}\text{C}$)	7.8	11.4
相对部分色散 Relative partial dispersion $P_{g,F}$	0.6419	0.6612
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^{\circ}\text{C}}$ ($10^{-7}/\text{K}$)	75	69
密度 Density ρ (g/cm^3)	5.1	5.4
硬度 Hardness HK (10^7Pa)	403	411
耐候性 Climatic resistance CR	1	1
内部透过率 Internal Transmittance τ_{460}	0.838	0.576

※ AR 与手机领域

AR & mobile device domain AR・モバイル分野

●可提供折射率 1.8-2.0、规格 8-12 英寸的光波导用高透过玻璃晶圆材料。同时在光学设计中可以提高视场角，减少蓝波区域光损失，也适用于其它领域。

We offer high-transmittance glass wafer materials for optical waveguides (refractive index: 1.8-2.0, size: 8-12 inches). They can expand field-of-view and mitigate light loss in blue-wavelength region in optical design, and are also suitable for other domains.

屈折率 1.8-2.0、サイズ 8-12 インチの光導波路用高透過ガラスウエハ材料を提供可能です。また光学設計において画角を拡大し、青色波長域の光損失を低減でき、その他の分野にも適用可能です。

品名 Designation		JY1.80	JY1.90	JY1.98	JY2.00
折射率 Refractive index n_d		1.8	1.9	1.98	2
阿贝数 Abbe number v_d		25.46	31.32	17.4	29.14
密度 Density ρ (g/cm ³)		3.38	4.54	3.62	5.02
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^\circ\text{C}}$ (10 ⁻⁷ /K)		88	66	45	70
耐候性 Climatic resistance CR		1	1	1	1
内部透过率 Internal Transmittance	τ_{480}	0.983	0.983	0.97	0.979
	τ_{460}	0.98	0.975	0.954	0.969
	τ_{400}	0.904	0.886	0.208	0.85

●H-BaF6 玻璃密度仅 2.90 g/cm³，适合手机棱镜的轻薄设计需求。

H-BaF6 glass features a low density of only 2.90 g/cm³, which meets the lightweight and thin-profile design requirements for mobile-phone prisms.

H-BaF6 ガラスは密度がわずか 2.90 g/cm³ であり、モバイル用プリズムの薄型・軽量設計ニーズに適しています。

折射率 Refractive index n_d	1.60801	膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^\circ\text{C}}$ (10 ⁻⁷ /K)	70
阿贝数 Abbe number v_d	46.20	硬度 Hardness HK (10 ⁷ Pa)	587
密度 Density ρ (g/cm ³)	2.90	耐候性 Climatic resistance CR	1
着色度 Color code λ_{80}/λ_5	380/345	耐酸性 Acid resistance D _A	1

※ 光通信領域

Optical-communication domain 光通信分野

●光通信用合光材料

Beam-combining materials for optical-communication 光通信用ビーム合成材料

面向光通信用合光透镜场景，提供高透过率光学玻璃，兼具优异热学和化学稳定性，长期服役性能稳定可靠。

We supply high-transmittance optical glasses for optical-communication beam-combining lens applications. They feature excellent thermal and chemical stability with stable and reliable long-term service performance.

光通信ビーム合成レンズ用途向けに高透過率光学ガラスを提供します。優れた熱的安定性と化学的安定性を兼ね備え、長期使用において安定かつ信頼性の高い性能を発揮します。

性能 Properties	H-ZF13GT	D-LaF50A	D-ZLaF52N	H-ZLaF80A
折射率 Refractive index n_d	1.78472	1.77672	1.81000	2.00069
阿贝数 Abbe number v_d	25.72	49.50	41.00	25.46
中部色散 Central dispersion $n_F - n_C$	0.030510	0.015693	0.019758	0.039308
转变温度 Transformation temperature T_g (°C)	601	575	548	700
弛垂温度 Sag temperature T_s (°C)	638	624	578	748
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^\circ\text{C}}$ ($10^{-7}/\text{K}$)	87	70	60	73
耐候性 Climatic resistance CR	1	1	1	1
密度 Density ρ (g/cm ³)	3.22	4.84	4.47	4.76
着色度 Color code $\lambda_{80}(\lambda_{70})/\lambda_5$	420/365	370/280	395/330	(440)/370
内部透过率 Internal Transmittance τ_{460}	0.985	0.994	0.993	0.922

※ 低熔点玻璃系列产品

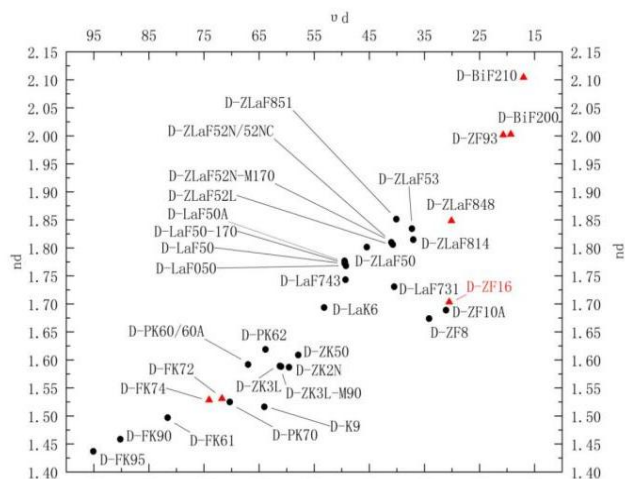
Low softening point glass series 非球面用ガラス推奨硝種

●低熔点玻璃材料的折射率和阿贝数通常按照-30℃/H 进行控制，也可根据客户需求进行特殊定制，如镜片的不退火设计等。允许波动范围： $n_d \pm 0.00050$ ， $v_d \pm 0.5\%$ 。

The refractive index and Abbe number of low melting point glass materials are usually controlled according to the standard value of -30℃/H. Special customization is available according to customer requirements, such as non-annealed lens design. Allowable tolerance: $n_d \pm 0.00050$ ， $v_d \pm 0.5\%$.

低軟化点ガラス材料の屈折率およびアッペ数は、通常-30℃/H の条件で管理します。レンズの非焼鈍設計など、顧客要求に応じた特殊カスタマイズにも対応可能です。許容公差： $n_d \pm 0.00050$ ， $v_d \pm 0.5\%$ 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。



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

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。

性能 Properties	D-PK60A	D-ZF8	D-ZF16	D-LaF50A
折射率 Refractive index n_d	1.59201	1.67375	1.70330	1.77672
阿贝数 Abbe number v_d	67.00	34.16	30.5	49.5
转变温度 Transformation temperature T_g (°C)	511	521	551	575
弛垂温度 Sag temperature T_s (°C)	541	570	593	624
膨胀系数 Thermal expansion coefficient $\alpha_{-50/80^\circ\text{C}}$ ($10^{-7}/\text{K}$)	92	88	84	70
着色度 Color code λ_{80}/λ_5	340/270	385/355	420/370	370/280
密度 Density ρ (g/cm ³)	3.16	2.91	3.04	4.84
内部透过率 Internal Transmittance τ_{460}	0.996	0.988	0.970	0.994

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	52
593686	H-FK69	(S-FPM2)	H-ZPK5	FCD515		53
550755	H-FK76		H-FK55	FCD705		54
459902	H-FK90		(H-FK71)	FCD10A	(N-FK58)	55
437951	H-FK95	(S-FPL53)	(H-FK95N)	FCD100		56
487704	H-QK3L	S-FSL5	H-QK3L	FC5	N-FK5	57
593670	H-PK60	(S-FPM2)	H-ZPK3	PCD51		58
593670	H-PK60A	(S-FPM2)	H-ZPK3	PCD51		59
618634	H-PK62A	S-PHM52	H-ZPK1A	PCD4	N-PSK53A	60
603654	H-PK63	S-PHM53	H-ZPK2A			61
620639	H-PK65	(S-PHM52)	(H-ZPK1A)	PCD40	(N-PSK53A)	62
569713	H-PK71		H-ZPK7	(FCD615)		63
511605	H-K6		H-K6		K7	64
517642	H-K9L	S-BSL7	H-K9L	BSC7	N-BK7	65
517642	H-K9LGT		H-K9LGT			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-ZK9A	S-BSM16	H-ZK9A	BACD16	N-SK16	76
622567	H-ZK10	(S-BSM10)	H-ZK10	(E-BACD10)	(N-SK10)	77
623570	H-ZK10N	S-BSM10	H-ZK10L	E-BACD10	N-SK10	78
639555	H-ZK11	S-BSM18	H-ZK11	BACD18		79
603606	H-ZK14	S-BSM14	H-ZK14	BACD14	N-SK14	80
617539	H-ZK20		H-ZK20			81
623581	H-ZK21	S-BSM15	H-ZK21	BACD15	N-SK15	82
607567	H-ZK50	S-BSM2	H-ZK50	BACD2	N-SK2	83
660574	H-LaK1		H-LaK1			84
691547	H-LaK2	S-LAL9	H-LaK59A	LAC9	N-LAK9	85
692545	H-LaK2H	(S-LAL9)	H-LaK2A	(LAC9)	(N-LAK9)	86
747510	H-LaK3	(S-LAM60)	H-LaK3		(N-LAK28)	87
640602	H-LaK4L	S-BSM81	H-LaK4L	LACL60	N-LAK21	88
678555	H-LaK5A	S-LAL12Q	H-LaK5A	LAC12	N-LAK12	89
694533	H-LaK6	L-LAL13	H-LaK6A	LAC13		90
713539	H-LaK7	S-LAL8	H-LaK7A	LAC8	N-LAK8	91
720503	H-LaK8A	S-LAL10	H-LaK8A	LAC10	N-LAK10	92
720503	H-LaK8B	S-LAL10	H-LaK8B	LAC10	N-LAK10	93
699511	H-LaK9	S-LAL20				94
651559	H-LaK10	S-LAL54Q	H-LaK10		N-LAK22	95

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
651562	H-LaK11	S-LAL54Q	H-LaK10		N-LAK22	96
697562	H-LaK12	(S-LAL14)	H-LaK12		(N-LAK14)	97
652584	H-LaK50A	S-LAL7Q	H-LaK50A	LAC7	N-LAK7	98
697555	H-LaK51	S-LAL14	H-LaK51A	LAC14	N-LAK14	99
697555	H-LaK51A	S-LAL14	H-LaK51A	LAC14	N-LAK14	100
729547	H-LaK52	S-LAL18	H-LaK52	TAC8	N-LAK34	101
755523	H-LaK53A	S-LAH97	H-LaK53A	TAC6	N-LAK33B	102
755523	H-LaK53B	S-LAH97	H-LaK53B	TAC6L	N-LAK33B	103
734511	H-LaK54	S-LAL59	H-LaK54	TAC4		104
741527	H-LaK61	S-LAL61	H-LaK61	TAC2		105
678507	H-LaK68					106
775503	H-LaK77	(S-LAH66)		(TAF1)	(N-LAF34)	107
517522	H-KF6	S-NSL36	H-KF6	E-CF6		108
596392	H-QF14		H-QF14	E-F8		109
581409	H-QF50	S-TIL25	H-QF50A	E-FL5	LF5	110
603380	H-F1	S-TIM5	H-F1	E-F5	F5	111
620364	H-F4	S-TIM2	H-F4	E-F2	N-F2	112
626357	H-F13		H-F13	E-F1		113
648338	H-ZF1B		H-ZF1A	E-FD2	N-SF2	114
673322	H-ZF2	S-TIM25	H-ZF2	E-FD5	N-SF5	115
717295	H-ZF3	S-TIH1	H-ZF3	E-FD1L	N-SF1	116
728283	H-ZF4A	S-TIH10	H-ZF4A	E-FD10L	N-SF10	117
728283	H-ZF4AGT		H-ZF4AGT			118
740283	H-ZF5	S-TIH3	H-ZF5	(E-FD13)		119
740283	H-ZF5GT					120
755275	H-ZF6	S-TIH4	H-ZF6	E-FD4L	N-SF4	121
755275	H-ZF6GT					122
805255	H-ZF7L	S-TIH6	H-ZF7LA	FD60	N-SF6	123
805255	H-ZF7LGT		H-ZF7LAGT	FD60-W	N-SF6HTultra	124
622307	H-ZF8			(FD300)		125
689312	H-ZF10	S-TIM28	H-ZF10	E-FD8	N-SF8	126
699301	H-ZF11	S-TIM35	H-ZF11	E-FD15L	N-SF15	127
762266	H-ZF12	S-TIH14	H-ZF12	FD140	N-SF14	128
762266	H-ZF12GT					129
785257	H-ZF13	S-TIH11	H-ZF13		N-SF11	130
785257	H-ZF13GT		H-ZF13GT			131
664274	H-ZF16					132
741278	H-ZF50	S-TIH13	H-ZF50	E-FD13		133
741278	H-ZF50GT					134
847238	H-ZF52N	S-TIH53W	H-ZF52GT	FDS90-SG	N-SF57HT	135
847238	H-ZF52NGT	S-TIH53W	H-ZF52TT	FDS90-SG	N-SF57HTultra	136
847238	H-ZF52B					137
855248	H-ZF56	S-NBH56		NBFD25		138
923209	H-ZF62		H-ZF62	E-FDS1	N-SF66	139
923209	H-ZF62GT		H-ZF62GT	E-FDS1-W		140
923189	H-ZF72B	S-NPH2	H-ZF72A			141
923189	H-ZF72GT		H-ZF72AGT			142

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
946180	H-ZF75A		H-ZF88	FDS18		143
946180	H-ZF75GT		H-ZF88GT	FDS18-W		144
959175	H-ZF76	S-NPH3	H-ZF73			145
613441	H-TF3L	S-NBM51	H-TF3L	E-ADF10	N-KZFS4	146
657511	H-ZBaF3	(S-BSM25)	H-ZBaF3	(BACED5)	(N-SSK5)	147
671473	H-ZBaF5		H-ZBaF5	(BAF10)	(N-BAF10)	148
618498	H-ZBaF10	S-BSM28			N-SSK8	149
667484	H-ZBaF16A	S-BAH11	H-ZBaF16	BAF11		150
702412	H-ZBaF20	S-BAH27	H-ZBaF20	BAFD7	(N-BASF64)	151
723380	H-ZBaF21	S-BAH28	H-ZBaF21	BAFD8		152
658509	H-ZBaF50	S-BSM25	H-ZBaF50	BACED5	N-SSK5	153
670472	H-ZBaF52		H-ZBaF52	BAF10	N-BAF10	154
654397	H-ZBaF65	S-NBH5	H-TF5	E-ADF50	N-KZFS5	155
694492	H-LaF1	(S-LAL58)	H-LaF1			156
717479	H-LaF2A	S-LAM3	H-LaF2	LAF3	N-LAF3	157
744449	H-LaF3B	S-LAM2	H-LaF3B	LAF2	N-LAF2	158
744449	H-LaF3C	S-LAM2	H-LaF3B	LAF2	N-LAF2	159
750350	H-LaF4A	S-LAM7	H-LaF4	E-LAF7	N-LAF7	160
757477	H-LaF6LB		H-LaF6LA			161
782371	H-LaF7		H-LaF7			162
788475	H-LaF10A	S-LAH64	H-LaF10LA	TAF4	N-LAF21	163
773496	H-LaF50B	S-LAH66	H-LaF50B	TAF1	N-LAF34	164
700481	H-LaF51		H-LaF51			165
786442	H-LaF52	S-LAH51	H-LaF52	NBFD11	N-LAF33	166
743492	H-LaF53	S-LAM60	H-LaF53	NBF1	N-LAF35	167
800423	H-LaF54	S-LAH52	H-LaF54	NBFD12	N-LAF36	168
750353	H-LaF55	S-NBH51				169
800422	H-LaF56	S-LAH52Q		NBFD12		170
720437	H-LaF62		H-LaF62			171
720460	H-LaF72			(LAF3)		172
762401	H-LaF76	S-LAM55	H-LaF55			173
802443	H-ZLaF1		H-ZLaF1			174
803468	H-ZLaF2	(S-LAH65V)	H-ZLaF2A	(TAF3)	(N-LASF44)	175
855366	H-ZLaF3		H-ZLaF3			176
804466	H-ZLaF50	S-LAH65V	H-ZLaF50E	TAF3D	N-LASF44	177
804466	H-ZLaF50C	S-LAH65V	H-ZLaF50E	TAF3D	N-LASF44	178
805396	H-ZLaF51	S-LAH63Q	H-ZLaF51	NBFD3	(N-LASF43)	179
805396	H-ZLaF51A	S-LAH63Q	H-ZLaF51	NBFD3	(N-LASF43)	180
806410	H-ZLaF52	S-LAH53	H-ZLaF52A	NBFD13	N-LASF43	181
834373	H-ZLaF53	S-LAH60	H-ZLaF53B	NBFD10	N-LASF40	182
834373	H-ZLaF53A	S-LAH60	H-ZLaF53B	NBFD10	N-LASF40	183
816466	H-ZLaF54	S-LAH59	H-ZLaF69	TAF5		184
816466	H-ZLaF54A	S-LAH59	H-ZLaF69A	TAF5		185
835427	H-ZLaF55F	S-LAH55V	H-ZLaF55D	TAFD5G	N-LASF41	186
835427	H-ZLaF55B	S-LAH55V	H-ZLaF55D	TAFD5G	N-LASF41	187
806333	H-ZLaF56B		H-ZLaF56B	NBFD15		188

代码 Code	牌号/ Type					页码 Page
	NHG	OHARA	CDGM	HOYA	SCHOTT	
800298	H-ZLaF57	S-NBH55				189
852408	H-ZLaF59	S-LAH89				190
850323	H-ZLaF60GT		H-ZLaF71AGT		N-LASF9HT	191
850323	H-ZLaF60A	S-LAH71	H-ZLaF71		N-LASF9	192
871407	H-ZLaF64			TAFD32		193
874306	H-ZLaF65					194
801350	H-ZLaF66A	S-LAM66	H-ZLaF66		N-LASF45	195
881401	H-ZLaF67	(S-LAH58)	H-ZLaF73	TAFD33	(N-LASF31A)	196
883408	H-ZLaF68A	S-LAH58	H-ZLaF68B	TAFD30	N-LASF31A	197
883392	H-ZLaF68L		H-ZLaF68N			198
904313	H-ZLaF70	S-LAH95	H-ZLaF75A	TAFD25	N-LASF46A	199
904313	H-ZLaF70GT					200
904313	H-ZLaF70B	S-LAH95	H-ZLaF75A	TAFD25L	N-LASF46A	201
901313	H-ZLaF71					202
911353	H-ZLaF72	(S-LAH93)	H-ZLaF4LA	TAFD35L		203
911353	H-ZLaF72A	(S-LAH93)	H-ZLaF4LB	TAFD35		204
950294	H-ZLaF75				(N-LASF55)	205
850301	H-ZLaF76A	S-NBH57	H-ZLaF76		(N-LASF9)	206
954323	H-ZLaF77A	S-LAH98	H-ZLaF89LA	TAFD45L	(N-LASF55)	207
901371	H-ZLaF78		H-ZLaF78B	TAFD37A		208
921240	H-ZLaF79			FDS24	(SCHOTT RealView® 1.9 lightweight)	209
001255	H-ZLaF80		H-ZLaF90	TAFD40		210
001255	H-ZLaF80A		H-ZLaF90A	TAFD40		211
001291	H-ZLaF82	S-LAH99	H-ZLaF91	TAFD55	SCHOTT RealView® 2.0	212
001291	H-ZLaF82GT	S-LAH99W		TAFD55-W	SCHOTT RealView® 2.0	213
883270	H-ZLaF86					214
051269	H-ZLaF95		H-ZLaF96	TAFD65		215
003193	H-BiF200			E-FDS2		216

(): 附近牌号, Δn_d 超过 ± 0.00050 或 Δv_d 超过 ± 0.5 ;

(): Nearby types, Δn_d exceeds ± 0.00050 or Δv_d exceeds ± 0.5 ;

(): 近傍稍種, 他社材との n_d の差が 0.00050 以上、または他社材との v_d の差が 0.5 以上 ;

低熔点玻璃牌号对照表

[illegible]

- () : 附近牌号, Δn_d 超过 ± 0.00050 或 Δv_d 超过 ± 0.5 ;
() : Nearby types, Δn_d exceeds ± 0.00050 or Δv_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 v_d の差が 0.5 以上 ;

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	248
IRG202			GASIR-1		HWS4	249
IRG203			GASIR-2		HWS2	250
IRG204						251
IRG205	IG5	IRG25		AMTIR-3	HWS1	252
IRG206	IG6	IRG26	GASIR-5	AMTIR-2	HWS6	253
IRG207	IG4	IRG24			HWS5	254
IRG208		IRG27			HWS27	255
IRG209						256

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、タイムリーに供給できる硝種。

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-PK60A	H-QF14	H-F1	H-ZF4AGT
H-FK69		H-PK62A	H-QF50	H-F13	H-ZF5GT
H-FK76		H-PK63			H-ZF7LGT
H-FK90		H-PK65			H-ZF8
H-FK95		H-PK71			H-ZF12GT
					H-ZF13GT
					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-ZLaF50C	D-FK61	H-TF3L
H-ZBaF10	H-LaK4L	H-LaF2A	H-ZLaF51A	D-PK60A	H-KF6
H-ZBaF16A	H-LaK5A	H-LaF3C	H-ZLaF52	D-ZK2N	
H-ZBaF21	H-LaK7	H-LaF4A	H-ZLaF53A	D-ZK3L	
H-ZBaF50	H-LaK9	H-LaF10A	H-ZLaF54A	D-LaK6	
H-ZBaF52	H-LaK11	H-LaF50B	H-ZLaF55B	D-ZF10A	
H-ZBaF65	H-LaK12	H-LaF52	H-ZLaF56B	D-ZLaF52L	
	H-LaK51A	H-LaF62	H-ZLaF60A	D-ZLaF52NC	
	H-LaK52		H-ZLaF64	D-ZLaF52N-M170	
	H-LaK53B		H-ZLaF66A	D-ZLaF851	
			H-ZLaF68A		
			H-ZLaF70GT		
			H-ZLaF70B		
			H-ZLaF71		
			H-ZLaF72A		
			H-ZLaF76A		
			H-ZLaF77A		
			H-ZLaF80A		
			H-ZLaF82GT		

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 v_d 在 n_d-v_d 领域图中的位置，无色光学玻璃分为 18 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， $n_d=1.62005$ ， $v_d=36.35$ ，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 無色光学ガラスの説明

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 (v_d) in n_d - v_d domain diagram, colorless optical glass are classified into the 18 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） v_d が n_d - v_d 図にある位置によって、表 1 の 18 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 v_d . For example, F4 with n_d of 1.62005 and v_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（ v_d ）の初めの3桁を表示しています）。例えば：F4, $n_d=1.62005$, $v_d=36.35$ 、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他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 $\pm 3 \times 10^{-6}$; 可见光波段 $\pm 2 \times 10^{-6}$; 近红外波段 $\pm 5 \times 10^{-6}$;

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~14 μ m 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:

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

式中: $A_0 \sim A_5$ —计算常数;

λ —波长, μ m;

n —折射率 (计算精度: 可见波段 $\pm 1 \times 10^{-5}$)。

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°C/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。

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

式中:

s —退火速率;

s_0 —退火速率 -30°C/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: $\pm 3 \times 10^{-6}$ in the ultraviolet range, $\pm 2 \times 10^{-6}$ in the visible range, $\pm 5 \times 10^{-6}$ in the near-infrared range,

測定の精度: 紫外波長: $\pm 3 \times 10^{-6}$ 、可視光波長: $\pm 2 \times 10^{-6}$ 、近赤外波長: $\pm 5 \times 10^{-6}$,

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 14 μ m.

特別なご要望があれば、波長 253.65nm~14 μ m 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。

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

Where ここで:

$A_0 \sim A_5$ —Calculating constants 計算定数;

λ —Wavelength 波長, μ m;

n —Refractive index 屈折率 (Calculation accuracy at the visible band 目に見える光バンド: $\pm 1 \times 10^{-5}$).

Correlative spectrum lines' refractive indices of low softening point glass (glass starting with "D-") in this handbook are tested after -30 °C /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°C/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。

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

Where ここで:

s —Annealing rate アニールスピード,

s_0 —Annealing rate -30°C/H アニールスピード基準 -30°C/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 をご覧ください。

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 v_d 、 v_e 定义如下：

$$v_d = \frac{n_d - 1}{n_F - n_C} \dots\dots\dots (3)$$

$$v_e = \frac{n_e - 1}{n_{F'} - n_{C'}} \dots\dots\dots (4)$$

2.3 相对部分色散

相对部分色散一般用任意光谱线计算。如波长 X 和 Y 的相对部分色散按公式（5）表示：

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

手册中按牌号给出了 $P_{d,c}$ 、 $P_{e,d}$ 、 $P_{g,F}$ 和 $P'_{d,c'}$ 、 $P'_{e,d}$ 、 $P'_{g,F'}$ 的值。

2.4 异常色散性

根据阿贝公式，大多数所谓“正常玻璃”，存在如下线性关系：

$$P_{X,Y} = m_{X,Y} v_d + b_{X,Y} \dots\dots\dots (6)$$

相对部分色散的偏离 $\Delta P_{X,Y}$ 用如下公式表示：

$$P_{X,Y} = m_{X,Y} v_d + b_{X,Y} + \Delta P_{X,Y} \dots\dots\dots (7)$$

本手册中是以 H-K6 和 F4 为基准，按公式（8）计算 $\Delta P_{g,F}$ 、 $\Delta P_{F,e}$ 、 $\Delta P_{C,t}$ 和 $\Delta P_{C,s}$ 。

$$\begin{aligned} \Delta P_{F,e} &= P_{F,e} - 0.4902 + 0.000552 v_d \\ \Delta P_{g,F} &= P_{g,F} - 0.6436 + 0.001661 v_d \\ \Delta P_{C,t} &= P_{C,t} - 0.5401 - 0.004846 v_d \\ \Delta P_{C,s} &= P_{C,s} - 0.4004 - 0.002400 v_d \dots\dots\dots (8) \end{aligned}$$

2.5 折射率温度系数 dn/dt

光学玻璃的折射率会受温度的影响而发生变化。折射率随温度的变化用折射率温度系数 dn/dt 来表示。折射率温度系数可用干燥空气中的相对折射率温度系数 $(dn/dt)_{rel.}$ (101.3KPa)和真空中的绝对折射率温度系数 $(dn/dt)_{abs.}$ 表示。在-60℃~+160℃的温度范围内，每隔 20℃提供一个测试数据。

绝对折射率温度系数按公式（9）计算，空气的折射率温度系数 dn_{air}/dt 见表 3。

表 3 Table 3 表 3

温度范围 (℃)	$dn_{air}/dt(10^{-6}/^{\circ}C)$									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60~-40	-1.60	-1.60	-1.61	-1.61	-1.61	-1.61	-1.62	-1.63	-1.63	-1.64
-40~-20	-1.34	-1.35	-1.35	-1.35	-1.35	-1.36	-1.36	-1.37	-1.37	-1.38
-20~0	-1.15	-1.15	-1.15	-1.15	-1.16	-1.16	-1.16	-1.17	-1.17	-1.17
0~+20	-0.99	-0.99	-1.00	-1.00	-1.00	-1.00	-1.00	-1.01	-1.01	-1.01
+20~+40	-0.86	-0.86	-0.87	-0.87	-0.87	-0.87	-0.87	-0.88	-0.88	-0.88
+40~+60	-0.76	-0.76	-0.76	-0.76	-0.77	-0.77	-0.77	-0.77	-0.77	-0.78
+60~+80	-0.67	-0.67	-0.68	-0.68	-0.68	-0.68	-0.68	-0.69	-0.69	-0.69
+80~+100	-0.60	-0.60	-0.60	-0.61	-0.61	-0.61	-0.61	-0.61	-0.61	-0.62
+100~+120	-0.54	-0.54	-0.54	-0.54	-0.54	-0.55	-0.55	-0.55	-0.55	-0.55
+120~+140	-0.49	-0.49	-0.49	-0.49	-0.49	-0.49	-0.49	-0.50	-0.50	-0.50
+140~+160	-0.44	-0.44	-0.45	-0.45	-0.45	-0.45	-0.45	-0.45	-0.45	-0.45

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

2.2 Dispersion and Abbe-number 分散とアッペ数

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 v_d and v_e are defined as:

アッペ数 v_d 、 v_e はそれぞれ次式によって求めています：

$$v_d = \frac{n_d - 1}{n_F - n_C} \dots \dots \dots (3)$$

$$v_e = \frac{n_e - 1}{n_{F'} - n_{C'}} \dots \dots \dots (4)$$

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。

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

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" :

アッペ公式に基づいて、大多数の「正常ガラス」が、次の公式は成立的です。

$$P_{X,Y} = m_{X,Y} v_d + b_{X,Y} \dots \dots \dots (6)$$

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：

$$P_{X,Y} = m_{X,Y} v_d + b_{X,Y} + \Delta P_{X,Y} \dots \dots \dots (7)$$

$\Delta P_{g,F}$, $\Delta P_{F,e}$, $\Delta P_{C,t}$ 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、 $\Delta P_{g,F}$ 、 $\Delta P_{F,e}$ 、 $\Delta P_{C,t}$ と $\Delta P_{C,s}$ を算出できます：

$$\begin{aligned} \Delta P_{F,e} &= P_{F,e} - 0.4902 + 0.000552 v_d \\ \Delta P_{g,F} &= P_{g,F} - 0.6436 + 0.001661 v_d \\ \Delta P_{C,t} &= P_{C,t} - 0.5401 - 0.004846 v_d \\ \Delta P_{C,s} &= P_{C,s} - 0.4004 - 0.002400 v_d \dots \dots \dots (8) \end{aligned}$$

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 $(dn/dt)_{rel.}(101.3\text{KPa})$ and temperature coefficients of absolute refractive indices in the vacuum $(dn/dt)_{abs.}$. The testing data are provided every 20°C from -60°C to +160°C.

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 $(dn/dt)_{rel.}(101.3\text{KPa})$ 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°C ~ +160°C の温度範囲に、20°C 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。

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

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：

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

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 $\Delta\sigma$ 值为：

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

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 $\Delta\sigma$ 存在以下关系：

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

由公式（11）（12）可以推导出光弹系数，见公式（13）：

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

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。

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

Where ここで:

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

T_0 —Reference temperature 参考温度(20 °C);

T —Targeted temperature 目標温度(°C);

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

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°C to +160°C;

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 $\Delta\sigma$ 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 $\Delta\sigma$ は次の式で算出します。

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

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 $\Delta\sigma$ of the photoelastic coefficient B:

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

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

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。

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

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 $10^{-12}/\text{Pa}$.

測定波長: 1550nm. 光弾性定数 B の単位: $10^{-12}/\text{Pa}$ 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 ：

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

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）。

测试设备：日立 UH4150 UV-VIS-NIR 分光光度计；

测试精度：优于 $\pm 0.3\%$ ；

样品要求：气泡 1 级，条纹度 B 级。

手册里给出了各牌号玻璃 5mm 和 10mm 厚的不同波长的内透过率。

2.9 着色度 $\lambda_{80(70)}/\lambda_5$

光学玻璃的短波透射光谱特性用着色度 $\lambda_{80(70)}/\lambda_5$ 表示，测试厚度 $10\text{mm} \pm 0.1\text{mm}$ 玻璃的透过率（含表面反射损失），分别以透过率 80%、5% 对应的波长 λ_{80} 和 λ_5 表示，以 5nm 为单位（将整数个位按 2 舍 3 入、7 舍 8 入的原则确定）。例如：80% 透过率对应的波长为 357nm，5% 透过率对应的波长为 324nm，玻璃的着色度 λ_{80}/λ_5 为 355/325，见图 1。

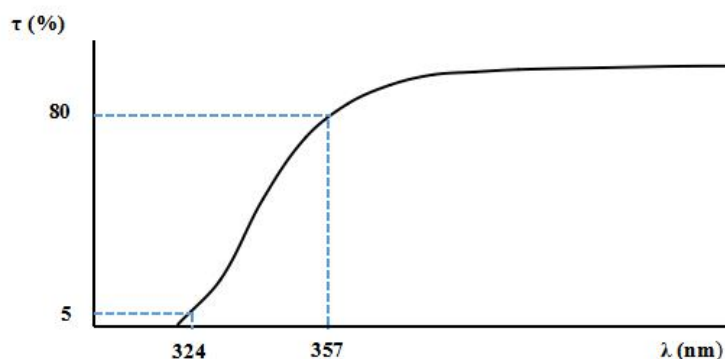


图 1 Figure 1 图 1

当 $n_e \geq 1.85$ 时，由于玻璃的反射损失较大，着色度用透过率 70% 对应的波长 λ_{70} 代替 λ_{80} ，即 λ_{70}/λ_5 。着色度的变动范围一般在 $\pm 10\text{nm}$ 以内。如果客户有特殊要求，我们可以提供公差更小的材料。

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50mmと10mm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 τ_λ を算出できます。

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

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 $\pm 0.3\%$,

測定の精度 : $\pm 0.3\%$ 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 (τ_{10}) 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 (τ_{10})、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 $10\text{mm} \pm 0.1\text{mm}$ (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 $10\text{mm} \pm 0.1\text{mm}$ 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_c 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、 $n_c \geq 1.85$ 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.

着色度は基準値の $\pm 10\text{nm}$ 内に変動し管理されています。特別なご要望に対して、もっと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 $\Delta\lambda$

“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 $\Delta\lambda$ 即为过度曝光指数。

过度曝光指数 $\Delta\lambda$ 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 $\Delta\lambda$

“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°C±5°C, and then keep the sample in dark place and room temperature. Test its corresponding transmittance after solarization at wavelength λ inside 24h. $\Delta\lambda$ refers to the transmittance difference before and after solarization. Solarization $\Delta\lambda$ is expressed as a percentage and is accurate to one decimal place.

“ソラリゼーション $\Delta\lambda$ ”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°C±5°C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 Dw(粉末法)

在过滤器中装入 10g(精确至 0.0001g)、粒度 400~600μm 粉末玻璃(过 40 目~30 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:

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

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 DA(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:

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

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されています。

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°C and humidity of 85% (see table 4).

温度が 50°C、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°C (see table 5).

0.1N、温度 50°C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 Dw (powder method) 耐水性 Dw(粉末法)

Place 10g (accurate to 0.0001g) glass powder of grain size 400-600μm (sieved with 40~30 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°C) 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 °C . Calculate the leaching percentage according to formula (15).

フィルターに、10g(0.0001g まで正確に)、粒度 400~600 μ m 粉末ガラス (40~30 メッシュ通過)、80 ml の蒸留水(pH = 6.5~7.5)を入れた石英ガラスフラスコ中に浸漬し、98°C~100°Cの水浴中で 60 分間恒温保持後、ガラス粒子を一定の重量のフィルターに移し、80mL の無水エタノール洗浄し、120±5°Cに一定の重量になるまで乾燥させる。式(15)によると、ガラスの溶出率を算出します。

$$D_w = \frac{B-C}{B-A} \times 100 \dots \dots \dots (15)$$

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。

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

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/(cm²·15h)，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Na₅P₃O₁₀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/(cm²·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

3.7 耐候性 CR

按GB-T7962.23-2019的测试方法，将试样放置在相对湿度为90%的饱和水蒸气环境的测试箱内，在40℃~50℃每隔1 h交替循环，循环15个周期。根据被测样品侵蚀前后的浊度增加量对耐候性进行分级，见表10。

表 10 Table 10 表 10

级别 Grade	1	2	3	4		
				a	b	c
浊度增加量 Increase in haze ΔH (%)	<0.3	≥0.3 <1.0	≥1.0 <2.0	≥2.0 <4.0	≥4.0 <6.0	≥6.0

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 $50\pm3^{\circ}\text{C}$, 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 $\text{mg}/(\text{cm}^2\cdot 15\text{h})$, 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 の試料を十分に攪拌して、固定な温度 $50^{\circ}\text{C}\pm 3^{\circ}\text{C}$ 、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 $\text{mg}/(\text{cm}^2\cdot 15\text{h})$ 。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 $\text{Na}_5\text{P}_3\text{O}_{10}$ solution, whose constant temperature and concentration is $50\pm3^{\circ}\text{C}$, 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 $\text{mg}/(\text{cm}^2\cdot \text{h})$, 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 の試料を十分に攪拌して、固定な温度 $50^{\circ}\text{C}\pm 3^{\circ}\text{C}$ 、濃度が 0.01mol/L の $\text{Na}_5\text{P}_3\text{O}_{10}$ 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 $\text{mg}/(\text{cm}^2\cdot \text{h})$ 。表 9 のように。

3.7 Climatic Resistance CR 耐候性 CR

According to the test method specified in GB/T 7962.23-2019, place the sample in a testing chamber with a saturated water vapor environment at 90% relative humidity. The temperature is cycled alternately every 1 hour between 40°C and 50°C for a total of 15 cycles. The climatic resistance is classified based on the increase in haze of the tested sample before and after exposure, as shown in Table 10.

GB-T7962.23-2019 の測定方法によって、試料を相対湿度 90%の飽和水蒸気環境試験箱内に入れて、 $40^{\circ}\text{C}\sim 50^{\circ}\text{C}$ の温度で 1 時間ごとに、15 サイクルに交互循環します。試料が侵蝕される前後の濁度増加量に基づいて、耐候性を等級分けています、表 10 を参照する。

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 $\pm 1\%$ ；

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。

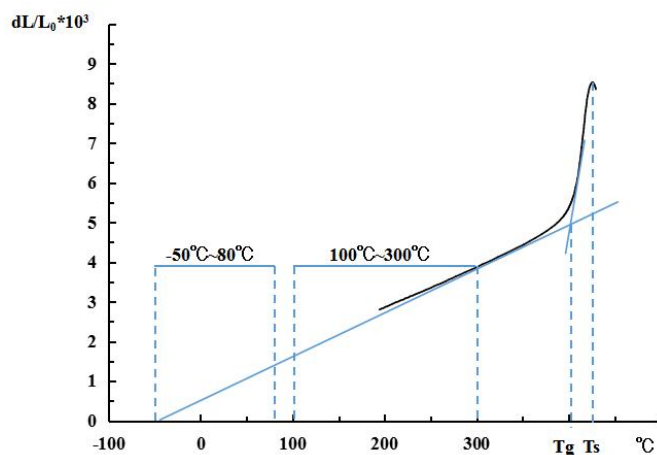


图 2 Figure 2 图 2

4.2 转变温度 T_g

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 $^{\circ}C$ 。

4.3 弛垂温度 T_s

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 $^{\circ}C$ ，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 $10^{14.5}dPa \cdot s$ 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 $10^{13}dPa \cdot s$ 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 $W/(m \cdot ^{\circ}C)$ 。

本产品目录的数据表上记载的导热系数是玻璃温度为 70℃~30℃的数值，测定精确度 $\pm 5\%$ 。

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 °C 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 °C 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 °C 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 T_s が描画法で求めた。測定サンプルは特定の温度範囲、1 °C 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 Corporation DIL402 SELECT 膨張係数測定機,

Temperature range: -150 °C ~ 1000 °C,

温度範囲: -150 °C ~ 1000 °C,

Measurement accuracy: better than $\pm 1\%$,

測定の精度: $\pm 1\%$ 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 °C to 80 °C and from 100 °C to 300 °C are given in the handbook (see figure 2). Also, the mean thermal expansion coefficients of every 10 °C from -50 °C to 160 °C are provided.

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

4.2 Transformation temperature 転移点 T_g

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 T_g 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 °C です。

4.3 Sag temperature 屈伏点 T_s

The sag temperature T_s 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 °C。膨張曲線のピークは、屈伏点 T_s 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、ガラスのアニールの下限温度とも言われています。

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 $W/(m \cdot ^\circ C)$.

The thermal conductivity listed in this catalog is measured at the temperature of 70 ~ 30 °C. The measurement accuracy is $\pm 5\%$.

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、 $W/(m \cdot ^\circ C)$ を単位として表示されます。70 ~ 30 °C の数値であり、測定精度は $\pm 5\%$ 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：

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

$$G = V_T^2 \cdot \rho \dots\dots\dots (18)$$

$$\mu = \frac{E}{2G} - 1 \dots\dots\dots (19)$$

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/cm³。

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：

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

式中：

F—加压负荷，N；

d—压痕长对角线的长度，mm；

HK—Knoop 硬度，10⁷Pa。

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 W₀，按公式（21）计算磨耗度。

$$F_A = \frac{W}{W_0} \times 100 = \frac{w/\rho}{w_0/\rho_0} \times 100 \dots\dots\dots (21)$$

式中：

W₀—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/cm³；

ρ —被测试样的密度，g/cm³。

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：

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

$$G = V_T^2 \cdot \rho \dots\dots\dots (18)$$

$$\mu = \frac{E}{2G} - 1 \dots\dots\dots (19)$$

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/cm³.

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。

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

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, 10⁷Pa.

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 glass H-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。

$$F_A = \frac{V}{V_0} \times 100 = \frac{w/p}{w_0/p_0} \times 100 \dots\dots\dots (21)$$

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;

p_0 —The density of the standard glass H-K9L 標準ガラス H-K9L の密度, g/cm³;

ρ —The density of the test sample 試料の密度, g/cm³.

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：

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

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。

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

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 v_d 允许偏差

每批次产品的折射率 n_d 和阿贝数 v_d 与标准值的差异一般在以下公差范围内：
折射率 n_d : $\pm 30 \times 10^{-5}$;
阿贝数 v_d : $\pm 0.5\%$ 。
如有特殊要求，可按照以下标准供货：
板料折射率 n_d : $\pm 2 \times 10^{-5} \sim \pm 5 \times 10^{-5}$;
阿贝数 v_d : $\pm 0.3\%$ 。
二次型料折射率 n_d : $\pm 10 \times 10^{-5} \sim \pm 20 \times 10^{-5}$;
阿贝数 v_d : $\pm 0.3\%$ 。
圆棒切片品折射率 n_d : $\pm 5 \times 10^{-5} \sim \pm 20 \times 10^{-5}$;
阿贝数 v_d : $\pm 0.3\%$ 。

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 11。

表 11 Table 11 表 11

级别 Grade	玻璃中部光程差 $\delta(\text{nm/cm}) \leq$ 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 $\delta_{\max}$ 表示时，分为 5 级，见表 12。

表 12 Table 12 表 12

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

表 13 Table 13 表 13

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 13。

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 v_d 屈折率 n_d とアッベ数 v_d の公差

The differences between refractive index n_d , Abbe-number v_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 v_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 : $\pm 30 \times 10^{-5}$

屈折率 n_d : $\pm 30 \times 10^{-5}$

Abbe-number v_d : $\pm 0.5\%$

アッベ数 v_d : $\pm 0.5\%$

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 : $\pm 2 \times 10^{-5} \sim \pm 5 \times 10^{-5}$

Abbe-number アッベ数 v_d : $\pm 0.3\%$

Reheated-press blank プレス品:

Refractive index 屈折率 n_d : $\pm 10 \times 10^{-5} \sim \pm 20 \times 10^{-5}$

Abbe-number アッベ数 v_d : $\pm 0.3\%$

Products cut from round rod 丸棒切断品:

Refractive index 屈折率 n_d : $\pm 5 \times 10^{-5} \sim \pm 20 \times 10^{-5}$

Abbe-number アッベ数 v_d : $\pm 0.3\%$

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 11.

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 11 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 $\delta_{\max}$ 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 12.

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 $\delta_{\max}$ で表示して、5 級に分類しています。表 12 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 occur by turning round the sample, and then compare with the standard samples. Striae are classified into 4 grades as shown in table 13.

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 13 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 cm³ 玻璃中所含气泡(直径 $\Phi \geq 0.03\text{mm}$)的总截面积来确定，分为 5 级，见表 14。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 14 Table 14 表 14

级别 Grade	1	2	3	4	5
$\Phi \geq 0.03 \text{ mm}$ 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 15。

表 15 Table 15 表 15

级别 Grade	光吸收系数 $\leq$ Coefficient of light absorption	级别 Grade	光吸收系数 $\leq$ 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 $\Delta n_{\max}$ 来表示，使用平行光管，采用分辨率法测量。分为 4 级，见表 16。

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 16 Table 16 表 16

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

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 $\Phi \geq 0.03 \text{ mm}$) in 100 cm^3 glass volume, and are divided into 5 grades as shown in table 14.

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とが非常に困難です。ガラスの中の泡の直径と個数はガラスの種類と熔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 $\varphi \geq 0.03 \text{ mm}$) の合計断面積によって決定されます。表 14 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 15.

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 15 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 $\Delta n_{\max}$ within a single piece of glass. It is measured by resolution method with collimator, and is classified into 4 grades as shown in table 16.

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 $\Delta n_{\max}$ で表示します。表 16 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 17。

表 17 Table 17 表 17 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 18。

表 18 Table 18 表 18 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 19。

表 19 Table 19 表 19 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 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 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。

7.2.2 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 18.
プレス品の外径及び厚さの公差は次の表18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 19.
丸棒切断品の外径及び厚さの公差は次の表19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）、サイズの製品を供給できます。

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。

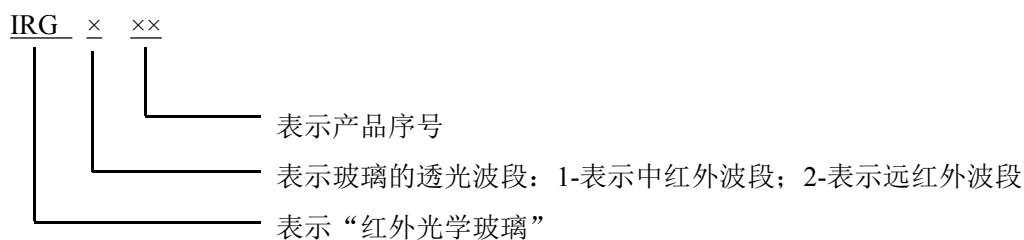
说明-红外材料

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



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： $\pm 1 \times 10^{-4}$ 。

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

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

$$n=A+BL+CL^2+D\lambda^2+E\lambda^4+F\lambda^6 \dots\dots\dots (2)$$

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

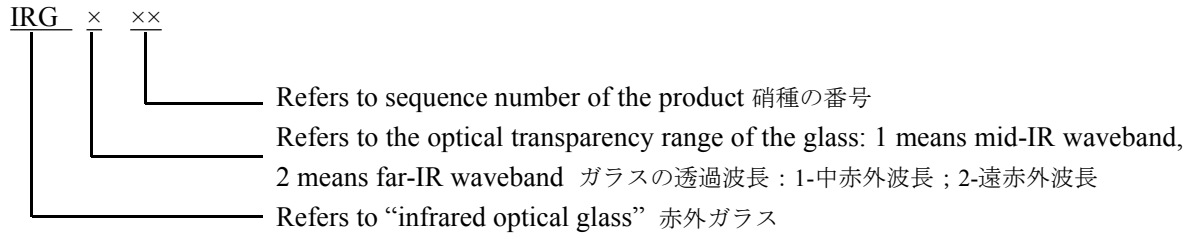
1 Classification and designation 種類と表示

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ラ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 $\pm 1 \times 10^{-4}$.

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： $\pm 1 \times 10^{-4}$ 。

$$n_\lambda = \frac{\sqrt{\sin^2 \phi + 2 \sin \phi \cos A \sin i + \sin^2 i}}{\sin A} \dots \dots \dots (1)$$

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

赤外ガラス 1.5~16 μ m、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。

$$n = A + BL + CL^2 + D\lambda^2 + E\lambda^4 + F\lambda^6 \dots \dots \dots (2)$$

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 v_4 和 $v_{10.6}$ 。 v_4 和 $v_{10.6}$ 的色散系数按公式（3）计算：

$$v_4 = \frac{n_4 - 1}{n_3 - n_5}$$

$$v_{10.6} = \frac{n_{10.6} - 1}{n_8 - n_{12.5}} \dots\dots\dots (3)$$

式中：

v_4 —表示 3~5μm 的红外色散系数；

$v_{10.6}$ —表示 8~12.5μm 的红外色散系数；

n_λ ($\lambda=3、4、5、8、10.6、12.5$)—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。

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

式中：

$\Delta n_{\text{abs.}}$ —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 ：

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

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 coefficients v_4 and $v_{10.6}$, of two air windows $3\mu\text{m}$ - $5\mu\text{m}$ and $8\mu\text{m}$ - $12.5\mu\text{m}$ are given. v_4 and $v_{10.6}$ 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。 $3\sim 5\mu\text{m}$ と $8\sim 12.5\mu\text{m}$ の 2 つの大気のウィンドウの赤外線分散係数 v_4 と $v_{10.6}$ がこのマニュアルで与えられています。 v_4 と $v_{10.6}$ の分散係数は、(3) の式で計算されます。

$$v_4 = \frac{n_4 - 1}{n_3 - n_5}$$

$$v_{10.6} = \frac{n_{10.6} - 1}{n_8 - n_{12.5}} \dots\dots\dots (3)$$

Where ここで:

v_4 —Infrared dispersion coefficient 赤外分散係数 ($3 \sim 5\mu\text{m}$);

$v_{10.6}$ —Infrared dispersion coefficient 赤外分散係数 ($8 \sim 12.5\mu\text{m}$);

n_λ ($\lambda=3, 4, 5, 8, 10.6, 12.5$)—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°C , 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atalogに、全部の屈折率が 22°C 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、 $-40^\circ\text{C} \sim +80^\circ\text{C}$ の温度範囲でのいかなる波長の屈折率を計算できます。

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

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°C);

T —Targeted temperature 目標温度 ($^\circ\text{C}$);

ΔT —Temperature difference $T - T_0$ 相対温度 T と参考温度 T_0 の差 ($^\circ\text{C}$);

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: $-40^\circ\text{C} \sim +80^\circ\text{C}$;

The applied wavelength range 波長範囲: $1\mu\text{m} \sim 14\mu\text{m}$.

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 15mm と 5mm 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 τ_λ を算出できます。

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

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 $v_{10.6}$ 与标准值的差异一般在以下公差范围内：
折射率 n_λ : $\pm 3 \times 10^{-4}$; $v_{10.6}$: $\pm 0.8\%$

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 $\leq 1\text{mm}$ 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 $\geq 2\text{mm}$ 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 100cm^3 玻璃中所含杂质 ($\Phi_{\text{杂质}} \geq 0.1\text{mm}$) 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 100cm^3 玻璃的总横截面积 Total cross sectional area S (mm^2)	$S < 0.05$	$0.05 \leq S < 0.2$	$0.2 \leq S < 0.4$	$0.4 \leq S < 0.6$	$0.6 \leq S < 1.2$

3 Dielectric constant 誘電率

Measure dielectric constant according to the recommended methods for capacitance 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（電線周波）、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 $v_{10.6}$ は標準値との偏差程度が生産ロットによって異なります。一般に以下の公差範囲内にあります。

Refractive index 屈折率 n_λ : $\pm 3 \times 10^{-4}$, $v_{10.6}$: $\pm 0.8\%$

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 $\Phi_{\text{impurity}} \geq 0.1 \text{ mm}$) 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（ $\Phi_{\text{異物}} \geq 0.1 \text{ mm}$ ）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 $\Phi 7\text{mm}$ ~ $\Phi 200\text{mm}$ 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 $\Phi 5\text{mm}$ ~ $\Phi 160\text{mm}$ 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 $\Phi 5\text{mm}$ ~ $\Phi 25\text{mm}$ 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 $\Phi 7\text{mm} \sim \Phi 200\text{mm}$ 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 $\Phi 7\text{ mm} \sim \Phi 200\text{ mm}$ のプレス品を安定に供給できます。

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 $\Phi 5\text{mm} \sim \Phi 160\text{mm}$ 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。お客様の要求で $\Phi 5\text{mm} \sim \Phi 160\text{mm}$ のレンズ完品を供給できます。

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 $\Phi 5\text{mm} \sim \Phi 25\text{mm}$ according to customers' requirements.

ガラスをプレスして、成型したものです。お客様の要求で $\Phi 5\text{ mm} \sim \Phi 25\text{ mm}$ の精密モールドレンズを供給できます。

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給できます。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給できます。

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	$n_d = 1.49700$	$v_d = 81.61$	$n_F - n_C = 0.006090$
		$n_e = 1.49845$	$v_e = 81.20$	$n_F - n_{C'} = 0.006139$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.47950	$P_{d,C}$	0.3054	RC (S)	1	2400	0.999	0.998
n_{1970}	1970.09	1.48263	$P_{e,d}$	0.2381	RA (S)	2	2200	0.999	0.998
n_{1530}	1529.58	1.48606	$P_{g,F}$	0.5386	D_W	1	2000	0.999	0.998
n_{1129}	1128.64	1.48910	$P'_{d,c'}$	0.2557	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.48965	$P'_{e,d}$	0.2362	R_{OH} (S)	2	1600	0.999	0.998
n_t	1013.98	1.49010	$P'_{g,F'}$	0.4789	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.49183			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.49301	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.49407					1000	0.999	0.998
n_C	656.27	1.49514					950	0.999	0.998
$n_{C'}$	643.85	1.49543					900	0.999	0.998
n_{He-Ne}	632.80	1.49571	$P_{F,e}$	0.0113	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.49694	$P_{g,F}$	0.0305	-50/-40	115	800	0.999	0.998
n_d	587.56	1.49700	$P_{C,t}$	-0.1080	-40/-30	118	750	0.999	0.998
n_e	546.07	1.49845	$P_{C,s}$	-0.0528	-30/-20	121	700	0.999	0.998
n_F	486.13	1.50123	Thermal Properties		-20/-10	123	650	0.999	0.998
$n_{F'}$	479.99	1.50157			-10/0	125	600	0.999	0.998
n_g	435.84	1.50451			0/10	127	550	0.999	0.998
n_h	404.66	1.50721			10/20	128	500	0.999	0.998
n_i	365.01	1.51173	$T_{10}^{14.5}$ ($^{\circ}C$)	421	20/30	130	480	0.999	0.998
			T_{10}^{13} ($^{\circ}C$)	442	30/40	133	460	0.999	0.998
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	124	40/50	136	440	0.999	0.998
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	152	50/60	138	420	0.999	0.998
			λ (W/(m·K))	0.74	60/70	140	400	0.999	0.998
					70/80	142	390	0.999	0.998
					80/90	144	380	0.999	0.998
			Mechanical Properties		90/100	145	370	0.995	0.993
					100/110	146	360	0.984	0.975
					110/120	147	350	0.970	0.948
					120/130	148	340	0.942	0.893
			μ	0.307	130/140	149	330	0.886	0.788
			σ_b (MPa)	33	140/150	150	320	0.788	0.621
			B ($10^{-12}/Pa$)	0.69	150/160	151	310	0.643	0.410

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		Solarization	
ρ (g/cm ³)	3.67	$\triangle\lambda$ (%)	-2.4

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	v _d = 68.63	n _F − n _C = 0.008638
		n _e = 1.59489	v _e = 68.25	n _{F'} − n _{C'} = 0.008716

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.57002	P _{d,C}	0.3022	RC (S)	1	2400	0.999	0.998		
n ₁₉₇₀	1970.09	1.57383	P _{e,d}	0.2396	RA (S)	1	2200	0.999	0.998		
n ₁₅₃₀	1529.58	1.57808	P _{g,F}	0.5441	D _W	1	2000	0.999	0.998		
n ₁₁₂₉	1128.64	1.58198	P' _{d,c'}	0.2524	D _A	3	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.58269	P' _{e,d}	0.2375	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.58328	P' _{g,F'}	0.4819	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.58561			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.58723	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.58873					1000	0.999	0.998		
n _C	656.27	1.59021					950	0.999	0.998		
n _{C'}	643.85	1.59062					900	0.999	0.998		
n _{He-Ne}	632.80	1.59101					850	0.999	0.998		
n _D	589.29	1.59275	P _{F,e}	0.0050	°C	α	800	0.999	0.998		
n _d	587.56	1.59282	P _{g,F}	0.0145	-50/-40	103	750	0.999	0.998		
n _e	546.07	1.59489	P _{C,t}	-0.0704	-40/-30	105	700	0.999	0.998		
n _F	486.13	1.59884	P _{C,s}	-0.0326	-30/-20	107	650	0.999	0.998		
n _{F'}	479.99	1.59934	Thermal Properties		-20/-10	108	600	0.999	0.998		
n _g	435.84	1.60354			T _g (°C)	584	-10/0	109	550	0.999	0.998
n _h	404.66	1.60740			T _s (°C)	608	0/10	110	500	0.999	0.998
n _i	365.01	1.61397			T ₁₀ ^{14.5} (°C)	564	10/20	111	480	0.999	0.998
					T ₁₀ ¹³ (°C)	575	20/30	112	460	0.999	0.998
					α _{-50/80°C} (10 ⁻⁷ /K)	113	440	0.999	0.998		
					α _{100/300°C} (10 ⁻⁷ /K)	136	420	0.998	0.996		
					λ (W/(m·K))	0.64	400	0.997	0.994		
							390	0.995	0.990		
Constants of Dispersion Formula							380	0.990	0.978		
A ₀	2.50210584E+00						370	0.978	0.956		
A ₁	-7.29437368E-03						360	0.955	0.909		
A ₂	1.22873858E-02						350	0.912	0.829		
A ₃	2.57463363E-04						340	0.839	0.702		
A ₄	-1.16391265E-05						330	0.728	0.530		
A ₅	6.15553004E-07						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 (×10 ⁻⁶ / °C)										

Coloration Code	
λ ₈₀ (λ ₇₀)/λ ₅	360/290
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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		v _d = 75.50		n _F − n _C = 0.007289							
			n _e = 1.55206		v _e = 75.12		n _{F'} − n _{C'} = 0.007349							
Refractive Indices			Relative Partial Dispersion			Chemical Properties (grade)			Internal Transmittance					
	λ (nm)	n _λ							λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.53051	P _{d,C}	0.3046	RC (S)	1	2400	0.979	0.958					
n ₁₉₇₀	1970.09	1.53391	P _{e,d}	0.2387	RA (S)	1	2200	0.984	0.968					
n ₁₅₃₀	1529.58	1.53766	P _{g,F}	0.5392	D _W	1	2000	0.991	0.982					
n ₁₁₂₉	1128.64	1.54106	P' _{d,c'}	0.2545	D _A	2	1800	0.995	0.989					
n ₁₀₆₄	1064.00	1.54168	P' _{e,d}	0.2368	R _{OH} (S)	2	1600	0.998	0.996					
n _t	1013.98	1.54220	P' _{g,F'}	0.4790	RP (S)	2	1400	0.999	0.998					
n _s	852.11	1.54420			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.54558	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998				
n _r	706.52	1.54684						P _{F,e}	0.0083	°C	α	1000	0.999	0.998
n _C	656.27	1.54810						P _{g,F}	0.0210	-50/-40	112	950	0.999	0.998
n _{C'}	643.85	1.54845						P _{C,t}	-0.0965	-40/-30	114	900	0.999	0.998
n _{He-Ne}	632.80	1.54878	P _{C,s}	-0.0465	-30/-20	115	850	0.999	0.998					
n _D	589.29	1.55025	Thermal Properties			-20/-10	118	800	0.999	0.998				
n _d	587.56	1.55032				T _g (°C)	553	-10/0	120	750	0.999	0.998		
n _e	546.07	1.55206	T _s (°C)	576	0/10	120	700	0.999	0.998					
n _F	486.13	1.55539	T ₁₀ ^{14.5} (°C)	509	10/20	122	650	0.999	0.998					
n _{F'}	479.99	1.55580	T ₁₀ ¹³ (°C)	531	20/30	124	600	0.999	0.998					
n _g	435.84	1.55932	α _{-50/80°C} (10 ⁻⁷ /K)	122	30/40	124	550	0.999	0.998					
n _h	404.66	1.56256	α _{100/300°C} (10 ⁻⁷ /K)	145	40/50	126	500	0.999	0.998					
n _i	365.01	1.56803	λ (W/(m·K))	0.56	50/60	126	480	0.999	0.998					
					60/70	129	460	0.999	0.998					
Constants of Dispersion Formula					70/80	129	440	0.999	0.998					
A ₀	2.37490887E+00		Mechanical Properties			80/90	130	420	0.999	0.998				
A ₁	-6.34594354E-03					HK (10 ⁷ Pa)	385	90/100	131	400	0.999	0.998		
A ₂	1.00559237E-02		F _A	420	100/110	132	390	0.998	0.996					
A ₃	2.32696930E-04		E (GPa)	75.8	110/120	135	380	0.997	0.994					
A ₄	-1.51093626E-05		G (GPa)	29.1	120/130	136	370	0.995	0.990					
A ₅	7.74351892E-07		μ	0.306	130/140	138	360	0.989	0.978					
Density		Solarization	σ _b (MPa)	66	140/150	138	350	0.976	0.952					
			ρ (g/cm ³)	4.13	△λ (%)	-0.4	B (10 ⁻¹² /Pa)	0.43	150/160	142	340	0.953	0.908	
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										330	0.912	0.832	
	dn/dt relative (×10 ⁻⁶ / °C)										320	0.850	0.723	
	t	s	C	C'	He-Ne	d	e	F	F'	g	310	0.766	0.587	
	-60 ~ -40	-7.1	-6.8	-6.6	-6.5	-6.5	-6.4	-6.3	-6.2	-6.1	-5.8	300	0.671	0.450
	-40 ~ -20	-6.8	-6.5	-6.4	-6.3	-6.3	-6.2	-6.2	-6.1	-6.0	-5.6	290	0.580	0.336
	-20 ~ 0	-6.4	-6.2	-6.3	-6.2	-6.2	-6.2	-6.1	-5.9	-5.8	-5.5	280	0.503	0.253
	0 ~ 20	-6.4	-6.3	-6.1	-6.1	-6.1	-5.9	-5.8	-5.6	-5.6	-5.3	Coloration Code		
	20 ~ 40	-6.4	-6.3	-6.0	-6.0	-6.0	-5.8	-5.6	-5.5	-5.4	-5.0	λ ₈₀ (λ ₇₀)/λ ₅		340/285
	40 ~ 60	-6.2	-6.1	-5.8	-5.8	-5.8	-5.6	-5.5	-5.4	-5.3	-4.9	Coloration of Internal Transmittance		
	60 ~ 80	-6.0	-6.0	-5.8	-5.7	-5.6	-5.5	-5.3	-5.2	-5.1	-4.8	λτ ₈₀ /λτ ₅		327/280
Constants of dn/dt											Coloration of Internal Transmittance			
80 ~ 100	-6.0	-5.8	-5.6	-5.6	-5.5	-5.4	-5.2	-4.9	-4.9	-4.7	D ₀	D ₁	D ₂	
100 ~ 120	-5.9	-5.7	-5.6	-5.5	-5.5	-5.4	-5.1	-4.9	-4.8	-4.5	-1.79E-05	1.92E-08	-3.61E-11	
120 ~ 140	-5.8	-5.5	-5.4	-5.4	-5.4	-5.2	-5.0	-4.9	-4.8	-4.2	E ₀	E ₁	λ _{TK}	
140 ~ 160	-5.5	-5.3	-5.2	-5.2	-5.2	-5.1	-4.9	-4.8	-4.7	-4.0	4.81E-07	3.20E-10	2.11E-01	

H-FK90		459902	n _d = 1.45860		v _d = 90.19		n _F − n _C = 0.005085							
			n _e = 1.45981		v _e = 89.77		n _{F'} − n _{C'} = 0.005122							
Refractive Indices			Relative Partial Dispersion			Chemical Properties (grade)			Internal Transmittance					
	λ (nm)	n _λ							λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.44358	P _{d,C}	0.3068	RC (S)	1	2400	0.999	0.998					
n ₁₉₇₀	1970.09	1.44630	P _{e,d}	0.2380	RA (S)	2	2200	0.999	0.998					
n ₁₅₃₀	1529.58	1.44928	P _{g,F}	0.5388	D _W	2	2000	0.999	0.998					
n ₁₁₂₉	1128.64	1.45191	P' _{d,c'}	0.2558	D _A	3	1800	0.999	0.998					
n ₁₀₆₄	1064.00	1.45238	P' _{e,d}	0.2362	R _{OH} (S)	4	1600	0.999	0.998					
n _t	1013.98	1.45277	P' _{g,F'}	0.4783	RP (S)	2	1400	0.999	0.998					
n _s	852.11	1.45425			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.45524	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998				
n _r	706.52	1.45615						P _{F,e}	0.0139	°C	α	1000	0.999	0.998
n _C	656.27	1.45704						P _{g,F}	0.0450	-50/-40	123	950	0.999	0.998
n _{C'}	643.85	1.45729						P _{C,t}	-0.1374	-40/-30	126	900	0.999	0.998
n _{He-Ne}	632.80	1.45752	P _{C,s}	-0.0682	-30/-20	128	850	0.999	0.998					
n _D	589.29	1.45855	Thermal Properties			-20/-10	130	800	0.999	0.998				
n _d	587.56	1.45860				T _g (°C)	442	-10/0	132	750	0.999	0.998		
n _e	546.07	1.45981	T _s (°C)	467	0/10	133	700	0.999	0.998					
n _F	486.13	1.46212	T ₁₀ ^{14.5} (°C)	423	10/20	135	650	0.999	0.998					
n _{F'}	479.99	1.46241	T ₁₀ ¹³ (°C)	436	20/30	138	600	0.999	0.998					
n _g	435.84	1.46486	α _{-50/80°C} (10 ⁻⁷ /K)	134	30/40	140	550	0.999	0.998					
n _h	404.66	1.46710	α _{100/300°C} (10 ⁻⁷ /K)	164	40/50	143	500	0.999	0.998					
n _i	365.01	1.47085	λ (W/(m·K))	0.71	50/60	144	480	0.999	0.998					
					60/70	145	460	0.999	0.998					
Constants of Dispersion Formula					70/80	146	440	0.999	0.998					
A ₀	2.10866977E+00		Mechanical Properties			80/90	147	420	0.999	0.998				
A ₁	-4.81589397E-03					HK (10 ⁷ Pa)	354	90/100	149	400	0.999	0.998		
A ₂	7.02478609E-03					F _A	459	100/110	150	390	0.999	0.998		
A ₃	-2.48667024E-05					E (GPa)	68.9	110/120	151	380	0.999	0.998		
A ₄	1.78185408E-05		G (GPa)	26.2	120/130	153	370	0.999	0.998					
A ₅	-1.09874507E-06		μ	0.313	130/140	155	360	0.998	0.996					
Density		Solarization		σ _b (MPa)	48	140/150	157	350	0.997	0.994				
ρ (g/cm ³)	3.64			B (10 ⁻¹² /Pa)	0.60	150/160	160	340	0.993	0.986				
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										330	0.984	0.968	
	dn/dt relative (×10 ⁻⁶ / °C)										320	0.967	0.935	
	t	s	C	C'	He-Ne	d	e	F	F'	g	310	0.935	0.874	
	-60 ~ -40	-7.0	-6.7	-6.5	-6.4	-6.2	-6.0	-5.9	-5.6	-5.3	300	0.883	0.779	
	-40 ~ -20	-7.2	-6.8	-6.5	-6.5	-6.4	-6.2	-6.0	-5.8	-5.5	290	0.809	0.654	
	-20 ~ 0	-7.3	-6.9	-6.7	-6.7	-6.6	-6.4	-6.3	-6.0	-5.7	280	0.721	0.520	
	0 ~ 20	-7.3	-7.0	-6.8	-6.8	-6.7	-6.5	-6.5	-6.1	-6.0	Coloration Code			
	20 ~ 40	-7.5	-7.1	-7.0	-6.9	-6.8	-6.5	-6.5	-6.2	-6.2	λ ₈₀ (λ ₇₀)/λ ₅		310/260	
	40 ~ 60	-7.6	-7.3	-7.2	-7.2	-7.1	-6.7	-6.6	-6.5	-6.5	Coloration of Internal Transmittance			
	60 ~ 80	-7.9	-7.6	-7.5	-7.5	-7.4	-7.0	-7.0	-6.8	-6.7	λτ ₈₀ /λτ ₅		300/260	
80 ~ 100	-8.0	-7.8	-7.7	-7.6	-7.4	-7.2	-7.1	-6.9	-6.8	Constants of dn/dt				
100 ~ 120	-8.1	-8.1	-8.0	-7.9	-7.8	-7.6	-7.4	-7.2	-7.2	-7.0	D ₀	D ₁	D ₂	
120 ~ 140	-8.2	-8.0	-8.0	-8.0	-7.9	-7.8	-7.7	-7.5	-7.5	-7.3	-2.37E-05	5.32E-09	-4.63E-11	
140 ~ 160	-8.4	-8.3	-8.3	-8.2	-8.2	-8.0	-8.0	-7.9	-7.8	-7.6	E ₀	E ₁	λ _{TK}	
											9.51E-07	-1.08E-09	2.02E-08	

H-FK95	437951	n _d = 1.43700	v _d = 95.10	n _F − n _C = 0.004595
		n _e = 1.43810	v _e = 94.66	n _{F'} − n _{C'} = 0.004628

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.42310	P _{d,C}	0.3069	RC (S)	1	2400	0.999	0.998		
n ₁₉₇₀	1970.09	1.42566	P _{e,d}	0.2394	RA (S)	3	2200	0.999	0.998		
n ₁₅₃₀	1529.58	1.42846	P _{g,F}	0.5332	D _W	2	2000	0.999	0.998		
n ₁₁₂₉	1128.64	1.43091	P' _{d,c'}	0.2550	D _A	3	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.43134	P' _{e,d}	0.2377	R _{OH} (S)	4	1600	0.999	0.998		
n _t	1013.98	1.43170	P' _{g,F'}	0.4754	RP (S)	3	1400	0.999	0.998		
n _s	852.11	1.43306			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.43396	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.43478					1000	0.999	0.998		
n _C	656.27	1.43559					950	0.999	0.998		
n _{C'}	643.85	1.43582					900	0.999	0.998		
n _{He-Ne}	632.80	1.43603					850	0.999	0.998		
n _D	589.29	1.43696	P _{F,e}	0.0171	°C	α	800	0.999	0.998		
n _d	587.56	1.43700	P _{g,F}	0.0475	-50/-40	129	750	0.999	0.998		
n _e	546.07	1.43810	P _{C,t}	-0.1544	-40/-30	131	700	0.999	0.998		
n _F	486.13	1.44019	P _{C,s}	-0.0780	-30/-20	132	650	0.999	0.998		
n _{F'}	479.99	1.44044	Thermal Properties		-20/-10	134	600	0.999	0.998		
n _g	435.84	1.44264			Tg (°C)	409	-10/0	134	550	0.999	0.998
n _h	404.66	1.44466			Ts (°C)	443	0/10	137	500	0.999	0.998
n _i	365.01	1.44803			T ₁₀ ^{14.5} (°C)	377	10/20	140	480	0.999	0.998
					T ₁₀ ¹³ (°C)	390	20/30	140	460	0.998	0.997
					α _{-50/80°C} (10 ⁻⁷ /K)	139	30/40	143	440	0.998	0.997
			α _{100/300°C} (10 ⁻⁷ /K)	170	40/50	145	420	0.998	0.997		
			λ (W/(m·K))	0.97	50/60	145	400	0.998	0.997		
Constants of Dispersion Formula					60/70	147	390	0.998	0.997		
			Mechanical Properties		70/80	149	380	0.998	0.997		
HK (10 ⁷ Pa)	358	80/90			150	370	0.997	0.995			
F _A	449	90/100			152	360	0.994	0.988			
E (GPa)	71.4	100/110			154	350	0.986	0.973			
G (GPa)	26.8	110/120			156	340	0.965	0.932			
μ	0.333	120/130			159	330	0.925	0.856			
Density			Solarization		130/140	160	320	0.845	0.714		
					σ _b (MPa)	32	140/150	164	310	0.716	0.513
ρ (g/cm ³)	3.56	△λ (%)	-3.2	B (10 ⁻¹² /Pa)	0.59	150/160	168	300	0.535	0.286	
Range of Temperature	Temperature Coefficients of Refractive Index							290	0.367	0.135	
						dn/dt relative (×10 ⁻⁶ / °C)					280

H-QK3L	487704	n _d = 1.48749	v _d = 70.44	n _F − n _C = 0.006921
		n _e = 1.48914	v _e = 70.24	n _{F'} − n _{C'} = 0.006964

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.46249	P _{d,C}	0.3092	RC (S)	1	2400	0.925	0.856		
n ₁₉₇₀	1970.09	1.46773	P _{e,d}	0.2384	RA (S)	3	2200	0.943	0.889		
n ₁₅₃₀	1529.58	1.47329	P _{g,F}	0.5303	D _W	4	2000	0.986	0.972		
n ₁₁₂₉	1128.64	1.47783	P' _{d,c'}	0.2585	D _A	4	1800	0.995	0.990		
n ₁₀₆₄	1064.00	1.47859	P' _{e,d}	0.2369	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.47919	P' _{g,F'}	0.4710	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.48141			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.48284	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.48411					1000	0.999	0.998		
n _C	656.27	1.48535					950	0.999	0.998		
n _{C'}	643.85	1.48569					900	0.999	0.998		
n _{He-Ne}	632.80	1.48601					850	0.999	0.998		
n _D	589.29	1.48743	P _{F,e}	0.0009	°C	α	800	0.999	0.998		
n _d	587.56	1.48749	P _{g,F}	0.0037	-50/-40	87	750	0.999	0.998		
n _e	546.07	1.48914	P _{C,t}	0.0086	-40/-30	88	700	0.999	0.998		
n _F	486.13	1.49227	P _{C,s}	-0.0002	-30/-20	89	650	0.999	0.998		
n _{F'}	479.99	1.49266	Thermal Properties		-20/-10	90	600	0.999	0.998		
n _g	435.84	1.49594			Tg (°C)	500	-10/0	91	550	0.999	0.998
n _h	404.66	1.49896			Ts (°C)	580	0/10	92	500	0.999	0.998
n _i	365.01	1.50405			T ₁₀ ^{14.5} (°C)	424	10/20	92	480	0.999	0.998
					20/30	93	460	0.999	0.998		
					30/40	93	440	0.999	0.998		
					40/50	94	420	0.999	0.998		
					50/60	94	400	0.999	0.998		
Constants of Dispersion Formula					60/70	95	390	0.999	0.998		
					70/80	96	380	0.999	0.998		
					80/90	96	370	0.999	0.998		
					90/100	97	360	0.999	0.998		
A ₀	2.18954799E+00		Mechanical Properties		100/110	97	350	0.998	0.996		
A ₁	-9.65634602E-03				110/120	98	340	0.996	0.992		
A ₂	8.30751905E-03				120/130	99	330	0.989	0.979		
A ₃	3.65672497E-04				130/140	100	320	0.987	0.975		
A ₄	-3.54722930E-05		E (GPa)	61.9	140/150	101	310	0.965	0.932		
A ₅	1.87564584E-06		G (GPa)	25.3	150/160	102	300	0.920	0.846		
			μ	0.225							
			σ _b (MPa)	50							
			B (10 ⁻¹² /Pa)	2.71							
Density		Solarization		Temperature Coefficients of Refractive Index							
ρ (g/cm ³)	2.48										
		△λ (%)	-10.9	dn/dt relative (×10 ⁻⁶ / °C)							
Range of Temperature											

Coloration Code	
λ ₈₀ (λ ₇₀)/λ ₅	300/265
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.59349$	$v_d = 67.00$	$n_F - n_C = 0.008858$
		$n_e = 1.59561$	$v_e = 66.74$	$n_{F'} - n_{C'} = 0.008924$

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H-PK60A	593670	$n_d = 1.59349$	$v_d = 67.00$	$n_F - n_C = 0.008858$
		$n_e = 1.59561$	$v_e = 66.74$	$n_F - n_{C'} = 0.008924$

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	-2.8	-2.6	-2.4	-2.3	-2.3	-2.1	-1.9	-1.7	-1.6	-1.2
-40 ~ -20	-2.5	-2.4	-2.2	-2.2	-2.2	-2.0	-1.8	-1.6	-1.4	-1.0
-20 ~ 0	-2.4	-2.4	-2.1	-2.1	-2.1	-1.9	-1.6	-1.4	-1.3	-0.9
0 ~ 20	-2.2	-2.2	-2.0	-2.0	-2.0	-1.8	-1.5	-1.3	-1.2	-0.8
20 ~ 40	-2.2	-2.1	-1.9	-1.9	-1.9	-1.7	-1.4	-1.2	-1.0	-0.7
40 ~ 60	-2.0	-1.9	-1.7	-1.6	-1.6	-1.5	-1.4	-1.1	-0.9	-0.6
60 ~ 80	-1.9	-1.8	-1.6	-1.5	-1.5	-1.4	-1.3	-1.0	-0.8	-0.5
80 ~ 100	-1.8	-1.7	-1.5	-1.5	-1.5	-1.3	-1.1	-0.9	-0.8	-0.4
100 ~ 120	-1.8	-1.6	-1.4	-1.3	-1.3	-1.2	-1.1	-0.8	-0.7	-0.3
120 ~ 140	-1.7	-1.5	-1.3	-1.3	-1.3	-1.2	-1.1	-0.8	-0.7	-0.2
140 ~ 160	-1.6	-1.5	-1.3	-1.3	-1.3	-1.1	-1.0	-0.7	-0.5	-0.1

Coloration Code		
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/270	
Coloration of Internal Transmittance		
$\lambda\tau_{80}/\lambda\tau_5$	328/267	
Constants of dn/dt		
D ₀	D ₁	D ₂
-8.44E-06	1.49E-08	-2.04E-11
E ₀	E ₁	λ_{TK}
7.08E-07	-1.08E-10	6.42E-13

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

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H-PK63	603654	n _d = 1.60300	v _d = 65.44	n _F − n _C = 0.009214
		n _e = 1.60520	v _e = 65.20	n _{F'} − n _{C'} = 0.009282

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42	1.57538	P _{d,C}	0.3050	RC (S)	1	2400	0.804	0.646					
n ₁₉₇₀	1970.09	1.58054	P _{e,d}	0.2388	RA (S)	1	2200	0.854	0.730					
n ₁₅₃₀	1529.58	1.58614	P _{g,F}	0.5372	D _W	1	2000	0.931	0.867					
n ₁₁₂₉	1128.64	1.59099	P' _{d,c'}	0.2543	D _A	4	1800	0.967	0.935					
n ₁₀₆₄	1064.00	1.59183	P' _{e,d}	0.2370	R _{OH} (S)	2	1600	0.990	0.980					
n _t	1013.98	1.59252	P' _{g,F'}	0.4773	RP (S)	2	1400	0.995	0.990					
n _s	852.11	1.59517			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.59696	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998					
n _r	706.52	1.59858					1000	0.999	0.998					
n _C	656.27	1.60019					950	0.999	0.998					
n _{C'}	643.85	1.60064					900	0.999	0.998					
n _{He-Ne}	632.80	1.60106	P _{F,e}	0.0018	°C	α	850	0.999	0.998					
n _D	589.29	1.60292	P _{g,F}	0.0023	-50/-40	73	800	0.999	0.998					
n _d	587.56	1.60300	P _{C,t}	-0.0248	-40/-30	76	750	0.999	0.998					
n _e	546.07	1.60520	P _{C,s}	-0.0126	-30/-20	77	700	0.999	0.998					
n _F	486.13	1.60940	Thermal Properties		-20/-10	79	650	0.999	0.998					
n _{F'}	479.99	1.60992			T _g (°C)	604	-10/0	81	600	0.999	0.998			
n _g	435.84	1.61435	T _s (°C)		639	0/10	81	550	0.999	0.998				
n _h	404.66	1.61845			T ₁₀ ^{14.5} (°C)	561	10/20	82	500	0.999	0.998			
n _i	365.01	1.62538	T ₁₀ ¹³ (°C)		588	20/30	82	480	0.999	0.998				
					α _{-50/80°C} (10 ⁻⁷ /K)	93	30/40	83	460	0.999	0.998			
			α _{100/300°C} (10 ⁻⁷ /K)		110	40/50	83	440	0.999	0.998				
					λ (W/(m·K))	0.48	50/60	84	420	0.997	0.994			
Constants of Dispersion Formula					60/70	84	400	0.994	0.988					
					70/80	84	390	0.990	0.981					
A ₀	2.53403512E+00		Mechanical Properties		80/90	85	380	0.984	0.974					
A ₁	-1.00840331E-02				HK (10 ⁷ Pa)	361	90/100	86	370	0.973	0.961			
A ₂	1.24087634E-02		F _A		351	100/110	87	360	0.961	0.936				
A ₃	4.77201613E-04				E (GPa)	64.8	110/120	87	350	0.941	0.899			
A ₄	-4.35207709E-05		G (GPa)		24.7	120/130	89	340	0.907	0.835				
A ₅	2.38050740E-06				μ	0.309	130/140	90	330	0.848	0.728			
Density		Solarization		σ _b (MPa)	42	140/150	91	320	0.754	0.575				
				B (10 ⁻¹² /Pa)	1.05	150/160	92	310	0.620	0.390				
ρ (g/cm ³)	3.64	△λ (%)	-2.6								300	0.457	0.212	
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										Coloration Code			
														dn/dt relative (×10 ⁻⁶ / °C)
	t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance			
	-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	λτ ₈₀ /λτ ₅		
	-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	333/274		
	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	Constants of dn/dt		
	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	D ₀	D ₁	D ₂	
100 ~ 120	-3.6	-3.6	-3.4	-3.4	-3.4	-3.2	-3.0	-2.8	-2.7	-2.6	-1.10E-05	1.08E-08	-2.38E-11	
120 ~ 140	-3.7	-3.5	-3.4	-3.4	-3.4	-3.2	-3.1	-2.8	-2.7	-2.6	E ₀	E ₁	λ _{TK}	
140 ~ 160	-3.6	-3.6	-3.4	-3.4	-3.4	-3.3	-3.1	-2.8	-2.7	-2.6	2.86E-07	3.72E-10	2.46E-01	

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

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.59263	$P_{d,C}$	0.3050	RC (S)	1	2400	0.957	0.916
n_{1970}	1970.09	1.59750	$P_{e,d}$	0.2380	RA (S)	3	2200	0.979	0.958
n_{1530}	1529.58	1.60283	$P_{g,F}$	0.5420	D_W	1	2000	0.995	0.990
n_{1129}	1128.64	1.60756	$P'_{d,c'}$	0.2544	D_A	4	1800	0.999	0.998
n_{1064}	1064.00	1.60841	$P'_{e,d}$	0.2360	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.60912	$P'_{g,F'}$	0.4813	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.61182			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.61366	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.61534					1000	0.999	0.998
n_C	656.27	1.61701					950	0.999	0.998
$n_{C'}$	643.85	1.61748	$P_{F,e}$	0.0026	$^{\circ}C$	α	900	0.999	0.998
n_{He-Ne}	632.80	1.61792	$P_{g,F}$	0.0045	-50/-40	94	850	0.999	0.998
n_D	589.29	1.61988	$P_{C,t}$	-0.0367	-40/-30	96	800	0.999	0.998
n_d	587.56	1.61997	$P_{C,s}$	-0.0189	-30/-20	97	750	0.999	0.998
n_e	546.07	1.62228	Thermal Properties		-20/-10	98	700	0.999	0.998
n_F	486.13	1.62672			-10/0	99	650	0.999	0.998
$n_{F'}$	479.99	1.62727			0/10	99	600	0.999	0.998
n_g	435.84	1.63198	T_g ($^{\circ}C$)	568	10/20	100	550	0.999	0.998
n_h	404.66	1.63633	T_s ($^{\circ}C$)	594	20/30	100	500	0.999	0.998
n_i	365.01	1.64372	$T_{10}^{14.5}$ ($^{\circ}C$)	515	30/40	102	480	0.997	0.992
			T_{10}^{13} ($^{\circ}C$)	555	40/50	102	460	0.995	0.986
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	103	50/60	103	440	0.993	0.980
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	118	60/70	103	420	0.991	0.974
			λ (W/(m·K))	0.61	70/80	104	400	0.989	0.967
					80/90	104	390	0.982	0.952
			Mechanical Properties		90/100	105	380	0.966	0.922
					100/110	105	370	0.943	0.871
					110/120	106	360	0.897	0.785
			HK (10^7Pa)	420	120/130	107	350	0.821	0.655
			F_A	315	130/140	108	340	0.711	0.489
			E (GPa)	77.8	140/150	109	330	0.577	0.320
			G (GPa)	29.5	150/160	110	320	0.437	0.183
			μ	0.317			310	0.320	0.097
			σ_b (MPa)	38			300	0.235	0.053
			B ($10^{-12}/Pa$)	1.03			290		
							280		

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		Solarization	
ρ (g/cm ³)	3.52	$\triangle\lambda$ (%)	-1.9

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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			v _d = 71.30			n _F − n _C = 0.007981																
						n _e = 1.57097			v _e = 70.90			n _{F'} − n _{C'} = 0.008053																
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance														
			λ (nm)			n _λ			P _{d,C}		0.3032		RC (S)		1		λ (nm)		τ5mm		τ10mm							
n ₂₃₂₅			2325.42						P _{e,d}		0.2381		RA (S)		1		2400		0.999		0.998							
n ₁₉₇₀			1970.09						P _{g,F}		0.5450		D _W		1		2200		0.999		0.998							
n ₁₅₃₀			1529.58			1.55914			P' _{d,c'}		0.2533		D _A		1		2000		0.999		0.998							
n ₁₁₂₉			1128.64			1.55976			P' _{e,d}		0.2359		R _{OH} (S)		1		1800		0.999		0.998							
n ₁₀₆₄			1064.00			1.56028			P' _{g,F'}		0.4843		RP (S)		2		1600		0.999		0.998							
n _t			1013.98			1.56240							CR		1		1400		0.999		0.998							
n _s			852.11			1.56389			Expansion Coefficient α (×10 ⁻⁷ /K)						1200		0.999		0.998									
n _{A'}			768.19			1.56527													1060		0.999		0.998					
n _r			706.52			1.56665													1000		0.999		0.998					
n _C			656.27			1.56703													950		0.999		0.998					
n _{C'}			643.85			1.56739			P _{F,e}		0.0077		°C		α		900		0.999		0.998							
n _{He-Ne}			632.80			1.56900			P _{g,F}		0.0199		-50/-40		118		850		0.999		0.998							
n _D			589.29			1.56907			P _{C,t}		-0.0875		-40/-30		119		800		0.999		0.998							
n _d			587.56			1.57097			P _{C,s}		-0.0390		-30/-20		120		750		0.999		0.998							
n _e			546.07			1.57463			Thermal Properties						700		0.999		0.998									
n _F			486.13			1.57508													-20/-10		121		650		0.999		0.998	
n _{F'}			479.99			1.57898									T _g (°C)		483		-10/0		124		600		0.999		0.998	
n _g			435.84			1.58260									T _s (°C)		514		0/10		124		550		0.999		0.998	
n _h			404.66			1.58869			T ₁₀ ^{14.5} (°C)		442		10/20		126		500		0.999		0.998							
n _i			365.01						T ₁₀ ¹³ (°C)		463		20/30		128		480		0.999		0.998							
									α _{-50/80°C} (10 ⁻⁷ /K)		126		30/40		129		460		0.999		0.998							
									α _{100/300°C} (10 ⁻⁷ /K)		152		40/50		131		440		0.999		0.998							
									λ (W/(m·K))		0.46		50/60		132		420		0.999		0.998							
													60/70		132		400		0.999		0.998							
Constants of Dispersion Formula						Mechanical Properties						70/80		134		390		0.999		0.998								
A ₀			2.42613257E+00									HK (10 ⁷ Pa)		359		80/90		135		380		0.997		0.994				
A ₁			-4.57004276E-03									F _A		435		90/100		137		370		0.995		0.990				
A ₂			1.39177172E-02									E (GPa)		65.5		100/110		138		360		0.991		0.983				
A ₃			-6.13250165E-04			G (GPa)		25.0		110/120		140		350		0.982		0.965										
A ₄			1.09104778E-04			μ		0.313		120/130		141		340		0.970		0.940										
A ₅			-5.55700744E-06			σ _b (MPa)				130/140		144		330		0.933		0.871										
Density			Solarization			B (10 ⁻¹² /Pa)		0.23		140/150		147		320		0.879		0.773										
ρ (g/cm ³)		4.27								150/160		149		310		0.769		0.592										
Range of Temperature (°C)											Temperature Coefficients of Refractive Index																	
											dn/dt relative (×10 ⁻⁶ / °C)																	
											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																	
											λ ₈₀ (λ ₇₀)/λ ₅					330/275												
											Coloration of Internal Transmittance																	
											λτ ₈₀ /λτ 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	v _d = 60.46	n _F − n _C = 0.008454
		n _e = 1.51314	v _e = 60.21	n _{F'} − n _{C'} = 0.008523

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.48663	P _{d,C}	0.3041	RC (S)	3	2400	0.861	0.741		
n ₁₉₇₀	1970.09	1.49101	P _{e,d}	0.2391	RA (S)	1	2200	0.898	0.807		
n ₁₅₃₀	1529.58	1.49582	P _{g,F}	0.5432	D _W	2	2000	0.951	0.904		
n ₁₁₂₉	1128.64	1.50010	P' _{d,c'}	0.2535	D _A	1	1800	0.978	0.957		
n ₁₀₆₄	1064.00	1.50087	P' _{e,d}	0.2371	R _{OH} (S)	1	1600	0.995	0.990		
n _t	1013.98	1.50151	P' _{g,F'}	0.4824	RP (S)	1	1400	0.996	0.992		
n _s	852.11	1.50394			CR		1200	0.999	0.998		
n _{A'}	768.19	1.50558	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.50707					1000	0.999	0.998		
n _C	656.27	1.50855					950	0.999	0.998		
n _{C'}	643.85	1.50896					900	0.999	0.998		
n _{He-Ne}	632.80	1.50934					850	0.999	0.998		
n _D	589.29	1.51105	P _{F,e}	0.0000	°C	α	800	0.999	0.998		
n _d	587.56	1.51112	P _{g,F}	0.0000	-50/-40	76	750	0.999	0.998		
n _e	546.07	1.51314	P _{C,t}	0.0000	-40/-30	79	700	0.999	0.998		
n _F	486.13	1.51700	P _{C,s}	0.0001	-30/-20	81	650	0.999	0.998		
n _{F'}	479.99	1.51748	Thermal Properties		-20/-10	82	600	0.999	0.998		
n _g	435.84	1.52159			T _g (°C)	530	-10/0	83	550	0.999	0.998
n _h	404.66	1.52540			T _s (°C)	619	0/10	84	500	0.998	0.997
n _i	365.01	1.53188			T ₁₀ ^{14.5} (°C)	473	10/20	84	480	0.998	0.997
					T ₁₀ ¹³ (°C)	522	20/30	85	460	0.998	0.997
					30/40	85	440	0.998	0.997		
					40/50	86	420	0.998	0.997		
					50/60	87	400	0.998	0.997		
Constants of Dispersion Formula					60/70	87	390	0.998	0.997		
					70/80	88	380	0.998	0.996		
A ₀	2.25095310E+00		Mechanical Properties		80/90	88	370	0.998	0.996		
A ₁	-7.97694290E-03				90/100	89	360	0.997	0.994		
A ₂	1.21729170E-02				100/110	89	350	0.994	0.989		
A ₃	-9.99979160E-05				110/120	90	340	0.990	0.981		
A ₄	4.17761640E-05				120/130	91	330	0.982	0.964		
A ₅	-2.09126230E-06				130/140	92	320	0.951	0.905		
Density		Solarization				140/150	94	310	0.875	0.766	
ρ (g/cm ³)	2.53					150/160	94	300	0.696	0.485	
		△λ (%)	-3.5	B (10 ⁻¹² /Pa)		3.05	290	0.404	0.163		
Range of Temperature	Temperature Coefficients of Refractive Index						280				
	dn/dt relative (×10 ⁻⁶ / °C)										

H-K9L	517642	n _d = 1.51680	v _d = 64.20	n _F − n _C = 0.008050
		n _e = 1.51872	v _e = 64.00	n _{F'} − n _{C'} = 0.008105

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.48969	P _{d,C}	0.3081	RC (S)	1	2400	0.907	0.823		
n ₁₉₇₀	1970.09	1.49515	P _{e,d}	0.2385	RA (S)	1	2200	0.933	0.870		
n ₁₅₃₀	1529.58	1.50098	P _{g,F}	0.5379	D _W	2	2000	0.980	0.960		
n ₁₁₂₉	1128.64	1.50585	P' _{d,c'}	0.2566	D _A	1	1800	0.992	0.985		
n ₁₀₆₄	1064.00	1.50668	P' _{e,d}	0.2369	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.50735	P' _{g,F'}	0.4787	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.50983			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.51145	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
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	P _{F,e}	-0.0013	°C	α	850	0.999	0.998		
n _d	587.56	1.51680	P _{g,F}	0.0009	-50/-40	67	800	0.999	0.998		
n _e	546.07	1.51872	P _{C,t}	0.0146	-40/-30	69	750	0.999	0.998		
n _F	486.13	1.52237	P _{C,s}	0.0033	-30/-20	70	700	0.999	0.998		
n _{F'}	479.99	1.52282	Thermal Properties		-20/-10	71	650	0.999	0.998		
n _g	435.84	1.52670			Tg (°C)	582	-10/0	72	600	0.999	0.998
n _h	404.66	1.53027			Ts (°C)	630	0/10	73	550	0.999	0.998
n _i	365.01	1.53629			T ₁₀ ^{14.5} (°C)	519	10/20	73	500	0.999	0.998
					T ₁₀ ¹³ (°C)	548	20/30	74	480	0.999	0.998
			α _{-50/80°C} (10 ⁻⁷ /K)	73	30/40	75	460	0.999	0.998		
			α _{100/300°C} (10 ⁻⁷ /K)	92	40/50	75	440	0.999	0.998		
			λ (W/(m·K))	1.22	50/60	76	420	0.999	0.998		
Constants of Dispersion Formula					60/70	77	400	0.999	0.998		
			Mechanical Properties		70/80	78	390	0.998	0.997		
					80/90	79	380	0.997	0.995		
					90/100	79	370	0.997	0.994		
					100/110	80	360	0.996	0.993		
A ₀	2.27223852E+00	F _A			100	110/120	81	350	0.990	0.980	
A ₁	-1.01682613E-02	E (GPa)	76.9	120/130	82	340	0.980	0.960			
A ₂	1.03945607E-02	G (GPa)	32.3	130/140	84	330	0.964	0.929			
A ₃	2.29862391E-04	μ	0.189	140/150	85	320	0.927	0.859			
A ₄	-4.30423477E-06	σ _b (MPa)	92	150/160	87	310	0.851	0.724			
A ₅	5.00107200E-08	B (10 ⁻¹² /Pa)	2.53			300	0.722	0.521			
Density		Solarization		Temperature Coefficients of Refractive Index		290	0.543	0.295			
ρ (g/cm ³)	2.49					dn/dt relative (×10 ⁻⁶ / °C)		280	0.274	0.075	
Range of Temperature											

H-K9LGT	517642	n _d = 1.51680	v _d = 64.20	n _F − n _C = 0.008050
		n _e = 1.51872	v _e = 64.00	n _{F'} − n _{C'} = 0.008105

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.48969	P _{d,C}	0.3081	RC (S)	1	2400	0.851	0.725			
n ₁₉₇₀	1970.09	1.49515	P _{e,d}	0.2385	RA (S)	1	2200	0.888	0.788			
n ₁₅₃₀	1529.58	1.50098	P _{g,F}	0.5379	D _W	2	2000	0.954	0.911			
n ₁₁₂₉	1128.64	1.50585	P' _{d,c'}	0.2566	D _A	1	1800	0.980	0.960			
n ₁₀₆₄	1064.00	1.50668	P' _{e,d}	0.2369	R _{OH} (S)	1	1600	0.994	0.988			
n _t	1013.98	1.50735	P' _{g,F'}	0.4787	RP (S)	1	1400	0.989	0.978			
n _s	852.11	1.50983			CR	1	1200	0.999	0.998			
n _{A'}	768.19	1.51145	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998			
n _r	706.52	1.51290					1000	0.999	0.998			
n _C	656.27	1.51432					950	0.999	0.998			
n _{C'}	643.85	1.51472					900	0.999	0.998			
n _{He-Ne}	632.80	1.51509	P _{F,e}	-0.0013	°C	α	850	0.999	0.998			
n _D	589.29	1.51673	P _{g,F}	0.0009	-50/-40	67	800	0.999	0.998			
n _d	587.56	1.51680	P _{C,t}	0.0146	-40/-30	69	750	0.999	0.998			
n _e	546.07	1.51872	P _{C,s}	0.0033	-30/-20	70	700	0.999	0.998			
n _F	486.13	1.52237	Thermal Properties		-20/-10	71	650	0.999	0.998			
n _{F'}	479.99	1.52282			Tg (°C)	582	-10/0	72	600	0.999	0.998	
n _g	435.84	1.52670			Ts (°C)	630	550	0.999	0.998			
n _h	404.66	1.53027			T ₁₀ ^{14.5} (°C)	519	500	0.999	0.998			
n _i	365.01	1.53629			T ₁₀ ¹³ (°C)	548	480	0.999	0.998			
					α _{-50/80°C} (10 ⁻⁷ /K)	73	460	0.999	0.998			
					α _{100/300°C} (10 ⁻⁷ /K)	92	440	0.999	0.998			
					λ (W/(m·K))	1.22	420	0.999	0.998			
							400	0.999	0.998			
Constants of Dispersion Formula							390	0.998	0.997			
							380	0.997	0.995			
A ₀	2.27223852E+00		Mechanical Properties				80/90	79	370	0.997	0.995	
A ₁	-1.01682613E-02				HK (10 ⁷ Pa)	581	90/100	79	360	0.996	0.993	
A ₂	1.03945607E-02				F _A	100	100/110	80	350	0.993	0.986	
A ₃	2.29862391E-04				E (GPa)	76.9	110/120	81	340	0.986	0.973	
A ₄	-4.30423477E-06				G (GPa)	32.3	120/130	82	330	0.972	0.945	
A ₅	5.00107200E-08				μ	0.189	130/140	84	320	0.941	0.885	
Density		Solarization				σ _b (MPa)	92	140/150	85	310	0.877	0.769
						B (10 ⁻¹² /Pa)	2.53	150/160	87	300	0.742	0.550
	ρ (g/cm ³)	2.49										
Range of Temperature (°C)	Temperature Coefficients of Refractive Index											
	dn/dt relative (×10 ⁻⁶ / °C)											
	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												
λ ₈₀ (λ ₇₀)/λ ₅								310/280				
Coloration of Internal Transmittance												
λτ ₈₀ /λτ ₅								312/279				
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	v _d = 58.95	n _F − n _C = 0.008790
		n _e = 1.52027	v _e = 58.69	n _{F'} − n _{C'} = 0.008865

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.49188	P _{d,C}	0.3060	RC (S)	1	2400	0.862	0.745		
n ₁₉₇₀	1970.09	1.49679	P _{e,d}	0.2378	RA (S)	1	2200	0.902	0.814		
n ₁₅₃₀	1529.58	1.50212	P _{g,F}	0.5461	D _W	1	2000	0.960	0.920		
n ₁₁₂₉	1128.64	1.50673	P' _{d,c'}	0.2549	D _A	1	1800	0.984	0.968		
n ₁₀₆₄	1064.00	1.50754	P' _{e,d}	0.2358	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.50821	P' _{g,F'}	0.4839	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.51074			CR		1200	0.999	0.998		
n _{A'}	768.19	1.51243	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.51397					1000	0.999	0.998		
n _C	656.27	1.51549					950	0.999	0.998		
n _{C'}	643.85	1.51592					900	0.999	0.998		
n _{He-Ne}	632.80	1.51633					850	0.999	0.998		
n _D	589.29	1.51810	P _{C,t}	0.0024	-50/-40	81	800	0.999	0.998		
n _d	587.56	1.51818	P _{C,s}	-0.0015	-40/-30	84	750	0.999	0.998		
n _e	546.07	1.52027	Thermal Properties		-30/-20	86	700	0.999	0.998		
n _F	486.13	1.52428			-20/-10	87	650	0.999	0.998		
n _{F'}	479.99	1.52479			-10/0	88	600	0.999	0.998		
n _g	435.84	1.52908			0/10	89	550	0.999	0.998		
n _h	404.66	1.53306			10/20	90	500	0.999	0.998		
n _i	365.01	1.53987	T ₁₀ ^{14.5} (°C)	460	20/30	90	480	0.999	0.998		
			T ₁₀ ¹³ (°C)	495	30/40	91	460	0.999	0.998		
			α _{-50/80°C} (10 ⁻⁷ /K)	88	40/50	91	440	0.999	0.998		
			α _{100/300°C} (10 ⁻⁷ /K)	110	50/60	92	420	0.999	0.998		
			λ (W/(m·K))	1.16	60/70	93	400	0.999	0.998		
					70/80	94	390	0.999	0.998		
Constants of Dispersion Formula			Mechanical Properties		80/90	95	380	0.994	0.988		
					HK (10 ⁷ Pa)	454	90/100	96	370	0.987	0.974
					F _A	118	100/110	97	360	0.974	0.944
					E (GPa)	73.1	110/120	98	350	0.945	0.889
					G (GPa)	29.7	120/130	100	340	0.875	0.758
			μ	0.230	130/140	101	330	0.711	0.499		
			σ _b (MPa)	90	140/150	103	320	0.392	0.149		
			B (10 ⁻¹² /Pa)	2.55	150/160	105	310	0.085	0.012		
							300				
							290				
							280				
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										
	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											
λ ₈₀ (λ ₇₀)/λ ₅								345/315			
Coloration of Internal Transmittance											
λτ ₈₀ /λτ 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	v _d = 55.47	n _F − n _C = 0.009619
		n _e = 1.53588	v _e = 55.17	n _{F'} − n _{C'} = 0.009713

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.50814	P _{d,C}	0.3025	RC (S)	1	2400	0.874	0.764
n ₁₉₇₀	1970.09	1.51249	P _{e,d}	0.2381	RA (S)	1	2200	0.898	0.806
n ₁₅₃₀	1529.58	1.51727	P _{g,F}	0.5479	D _W	1	2000	0.955	0.909
n ₁₁₂₉	1128.64	1.52160	P' _{d,e'}	0.2522	D _A	1	1800	0.977	0.953
n ₁₀₆₄	1064.00	1.52239	P' _{e,d}	0.2358	R _{OH} (S)	1	1600	0.994	0.988
n _t	1013.98	1.52305	P' _{g,F'}	0.4859	RP (S)	2	1400	0.999	0.998
n _s	852.11	1.52562			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.52740	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.52904					1000	0.999	0.998
n _C	656.27	1.53068					950	0.999	0.998
n _{C'}	643.85	1.53114					900	0.999	0.998
n _{He-Ne}	632.80	1.53157	P _{F,e}	-0.0001	°C	α	850	0.999	0.998
n _D	589.29	1.53350	P _{g,F}	-0.0036	-50/-40	83	800	0.999	0.998
n _d	587.56	1.53359	P _{C,t}	-0.0157	-40/-30	86	750	0.999	0.998
n _e	546.07	1.53588	P _{C,s}	-0.0075	-30/-20	88	700	0.999	0.998
n _F	486.13	1.54030	Thermal Properties		-20/-10	89	650	0.999	0.998
n _{F'}	479.99	1.54085			-10/0	91	600	0.999	0.998
n _g	435.84	1.54557	T _g (°C)	495	0/10	92	550	0.999	0.998
n _h	404.66	1.54996	T _s (°C)	549	10/20	93	500	0.999	0.998
n _i	365.01	1.55752	T ₁₀ ^{14.5} (°C)	450	20/30	94	480	0.999	0.998
			T ₁₀ ¹³ (°C)	488	30/40	94	460	0.999	0.998
			α _{-50/80°C} (10 ⁻⁷ /K)	98	40/50	94	440	0.999	0.998
			α _{100/300°C} (10 ⁻⁷ /K)	113	50/60	95	420	0.998	0.996
			λ (W/(m·K))	1.01	60/70	96	400	0.997	0.994
					70/80	97	390	0.994	0.989
			Mechanical Properties		80/90	99	380	0.990	0.980
					90/100	100	370	0.980	0.960
			HK (10 ⁷ Pa)	485	100/110	102	360	0.956	0.914
			F _A	98	110/120	104	350	0.905	0.820
			E (GPa)	69.7	120/130	106	340	0.797	0.635
			G (GPa)	27.4	130/140	108	330	0.574	0.329
			μ	0.271	140/150	109	320	0.260	0.067
			σ _b (MPa)	79	150/160	112	310		
			B (10 ⁻¹² /Pa)	2.75			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	2.73	△λ (%)	-0.5

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	355/320
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 58.63	n _F − n _C = 0.008921
		n _e = 1.52520	v _e = 58.39	n _{F'} − n _{C'} = 0.008995

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.49748	P _{d,C}	0.3027	RC (S)	2	2400	0.900	0.810		
n ₁₉₇₀	1970.09	1.50215	P _{e,d}	0.2388	RA (S)	1	2200	0.915	0.837		
n ₁₅₃₀	1529.58	1.50724	P _{g,F}	0.5403	D _W	2	2000	0.963	0.927		
n ₁₁₂₉	1128.64	1.51167	P' _{d,c'}	0.2524	D _A	1	1800	0.984	0.968		
n ₁₀₆₄	1064.00	1.51246	P' _{e,d}	0.2368	R _{OH} (S)	1	1600	0.998	0.996		
n _t	1013.98	1.51310	P' _{g,F'}	0.4792	RP (S)	1	1400	0.998	0.996		
n _s	852.11	1.51559			CR	2	1200	0.998	0.996		
n _{A'}	768.19	1.51728	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.998	0.996		
n _r	706.52	1.51883					1000	0.998	0.996		
n _C	656.27	1.52037					950	0.998	0.996		
n _{C'}	643.85	1.52080					900	0.998	0.996		
n _{He-Ne}	632.80	1.52120					850	0.998	0.996		
n _D	589.29	1.52299	P _{F,e}	0.0006	°C	α	800	0.998	0.996		
n _d	587.56	1.52307	P _{g,F}	-0.0059	-50/-40	79	750	0.998	0.997		
n _e	546.07	1.52520	P _{C,t}	-0.0093	-40/-30	80	700	0.999	0.998		
n _F	486.13	1.52929	P _{C,s}	-0.0053	-30/-20	82	650	0.999	0.998		
n _{F'}	479.99	1.52980	Thermal Properties		-20/-10	83	600	0.999	0.998		
n _g	435.84	1.53411			Tg (°C)	564	-10/0	83	550	0.999	0.998
n _h	404.66	1.53811			Ts (°C)	610	0/10	84	500	0.999	0.998
n _i	365.01	1.54495			T ₁₀ ^{14.5} (°C)	497	10/20	84	480	0.999	0.998
					T ₁₀ ¹³ (°C)	530	20/30	85	460	0.999	0.998
					30/40	85	440	0.999	0.998		
					40/50	86	420	0.999	0.998		
					50/60	87	400	0.999	0.998		
Constants of Dispersion Formula					60/70	87	390	0.999	0.998		
					70/80	88	380	0.999	0.998		
A ₀	2.28724008E+00		Mechanical Properties		80/90	88	370	0.996	0.992		
A ₁	-8.66259828E-03				90/100	90	360	0.989	0.978		
A ₂	1.09312658E-02				100/110	91	350	0.970	0.941		
A ₃	6.19326901E-04				110/120	92	340	0.926	0.857		
A ₄	-6.62977052E-05				120/130	92	330	0.826	0.682		
A ₅	3.74341463E-06		μ	0.218	130/140	94	320	0.648	0.420		
Density		Solarization		σ _b (MPa)	52	140/150	95	310	0.375	0.141	
ρ (g/cm ³)	2.52			B (10 ⁻¹² /Pa)	2.50	150/160	96	300	0.107	0.011	
Range of Temperature	Temperature Coefficients of Refractive Index								290		
	dn/dt relative (×10 ⁻⁶ / °C)								280		

H-BaK2		540597	n _d = 1.53996		v _d = 59.72		n _F − n _C = 0.009041						
			n _e = 1.54212		v _e = 59.45		n _{F'} − n _{C'} = 0.009119						
Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42	1.51376					2400	0.917	0.842				
n ₁₉₇₀	1970.09	1.51856					2200	0.937	0.880				
n ₁₅₃₀	1529.58	1.52378					2000	0.974	0.947				
n ₁₁₂₉	1128.64	1.52833					1800	0.987	0.976				
n ₁₀₆₄	1064.00	1.52914	1600	0.999	0.998								
n _t	1013.98	1.52981	1400	0.999	0.998								
n _s	852.11	1.53235	1200	0.999	0.998								
n _{A'}	768.19	1.53407	1060	0.999	0.998								
n _r	706.52	1.53565	1000	0.999	0.998								
n _C	656.27	1.53721	950	0.999	0.998								
n _{C'}	643.85	1.53765	900	0.999	0.998								
n _{He-Ne}	632.80	1.53806	850	0.999	0.998								
n _D	589.29	1.53988	800	0.999	0.998								
n _d	587.56	1.53996	750	0.999	0.998								
n _e	546.07	1.54212	700	0.999	0.998								
n _F	486.13	1.54625	650	0.999	0.998								
n _{F'}	479.99	1.54677	600	0.999	0.998								
n _g	435.84	1.55117	550	0.999	0.998								
n _h	404.66	1.55525	500	0.999	0.998								
n _i	365.01	1.56225	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								
Constants of Dispersion Formula			Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		Thermal Properties						
A ₀	2.33787692E+00	T _g (°C)								560			
A ₁	-8.98050049E-03	T _s (°C)								623			
A ₂	1.15593975E-02	T ₁₀ ^{14.5} (°C)								491			
A ₃	4.92789833E-04	T ₁₀ ¹³ (°C)								534			
A ₄	-4.58314132E-05	α _{-50/80°C} (10 ⁻⁷ /K)								78			
A ₅	2.77373664E-06	α _{100/300°C} (10 ⁻⁷ /K)		93									
			λ (W/(m·K))		1.02	Mechanical Properties		Density					
Density		Solarization		HK (10 ⁷ Pa)							532		
ρ (g/cm ³)	2.85	△λ (%)		-29.0							F _A		103
											E (GPa)		71.1
				G (GPa)							28.1	100/110	
				μ		0.266	110/120		84				
				σ _b (MPa)		79	120/130		88				
				B (10 ⁻¹² /Pa)		2.51	130/140		89				
							140/150		90				
							150/160		92				

H-BaK7B		569560	n _d = 1.56883		v _d = 56.04		n _F − n _C = 0.010150								
			n _e = 1.57125		v _e = 55.78		n _{F'} − n _{C'} = 0.010242								
Refractive Indices			Relative Partial Dispersion			Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ						λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42	1.54079	P _{d,C}	0.3034	RC (S)	1	2400	0.934	0.872						
n ₁₉₇₀	1970.09	1.54574	P _{e,d}	0.2384	RA (S)	1	2200	0.953	0.908						
n ₁₅₃₀	1529.58	1.55115	P _{g,F}	0.5488	D _W	1	2000	0.979	0.958						
n ₁₁₂₉	1128.64	1.55598	P' _{d,c'}	0.2529	D _A	1	1800	0.988	0.976						
n ₁₀₆₄	1064.00	1.55686	P' _{e,d}	0.2363	R _{OH} (S)	1	1600	0.997	0.994						
n _t	1013.98	1.55758	P' _{g,F'}	0.4872	RP (S)	1	1400	0.999	0.998						
n _s	852.11	1.56036			CR	2	1200	0.999	0.998						
n _{A'}	768.19	1.56227	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998					
n _r	706.52	1.56401						P _{F,e}	-0.0011	°C	α	1000	0.999	0.998	
n _C	656.27	1.56575						P _{g,F}	-0.0017	-50/-40	62	950	0.999	0.998	
n _{C'}	643.85	1.56624						P _{C,t}	-0.0067	-40/-30	62	900	0.999	0.998	
n _{He-Ne}	632.80	1.56670						P _{C,s}	-0.0039	-30/-20	63	850	0.999	0.998	
n _D	589.29	1.56874	Thermal Properties			-20/-10	63	800	0.999	0.998					
n _d	587.56	1.56883				T _g (°C)	587	-10/0	65	750	0.999	0.998			
n _e	546.07	1.57125	T _s (°C)	646	0/10	66	700	0.999	0.998						
n _F	486.13	1.57590	T ₁₀ ^{14.5} (°C)	530	10/20	67	650	0.999	0.998						
n _{F'}	479.99	1.57648	T ₁₀ ¹³ (°C)	565	20/30	67	600	0.999	0.998						
n _g	435.84	1.58147	α _{-50/80°C} (10 ⁻⁷ /K)	68	30/40	68	550	0.999	0.998						
n _h	404.66	1.58611	α _{100/300°C} (10 ⁻⁷ /K)	88	40/50	74	500	0.999	0.998						
n _i	365.01	1.59408	λ (W/(m·K))	1.08	50/60	74	480	0.999	0.998						
					60/70	76	460	0.998	0.996						
Constants of Dispersion Formula			Mechanical Properties			70/80	76	440	0.997	0.994					
						80/90	78	420	0.996	0.992					
A ₀	2.42201339E+00		HK (10 ⁷ Pa)	553	90/100	79	400	0.994	0.990						
A ₁	-9.34171338E-03		F _A	123	100/110	79	390	0.992	0.986						
A ₂	1.36739157E-02		E (GPa)	80.1	110/120	80	380	0.988	0.980						
A ₃	3.76328562E-04		G (GPa)	33.1	120/130	82	370	0.982	0.965						
A ₄	-1.74732935E-05		μ	0.210	130/140	83	360	0.961	0.928						
A ₅	1.22001270E-06		σ _b (MPa)	78	140/150	84	350	0.917	0.845						
Density		Solarization	B (10 ⁻¹² /Pa)	2.52	150/160	85	340	0.808	0.654						
			ρ (g/cm ³)	2.85	△λ (%)	-0.5	330	0.560	0.315						
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										Coloration Code				
	dn/dt relative (×10 ⁻⁶ / °C)										λ ₈₀ (λ ₇₀)/λ ₅		355/320		
	t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance				
	-60 ~ -40	3.0	3.2	3.3	3.4	3.4	3.5	3.8	4.2	4.2	4.4	λτ ₈₀ /λτ ₅		347/321	
	-40 ~ -20	3.1	3.3	3.4	3.4	3.5	3.7	3.9	4.2	4.3	4.5	Constants of dn/dt			
	-20 ~ 0	3.1	3.3	3.4	3.5	3.5	3.6	3.8	4.2	4.2	4.5	D ₀	D ₁	D ₂	
	0 ~ 20	3.0	3.4	3.4	3.5	3.5	3.6	3.8	4.2	4.3	4.5	3.18E-06	1.21E-08	-2.72E-11	
	20 ~ 40	3.0	3.3	3.4	3.5	3.6	3.6	3.8	4.2	4.2	4.6	E ₀	E ₁	λ _{TK}	
	40 ~ 60	3.0	3.3	3.5	3.6	3.6	3.6	3.8	4.3	4.3	4.7	4.09E-07	3.53E-10	2.69E-01	
	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				

H-BaK8	573575	n _d = 1.57250	v _d = 57.49	n _F − n _C = 0.009959
		n _e = 1.57487	v _e = 57.20	n _{F'} − n _{C'} = 0.010051

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.54549	P _{d,C}	0.3032	RC (S)	1	2400	0.931	0.866			
n ₁₉₇₀	1970.09	1.55016	P _{e,d}	0.2380	RA (S)	3	2200	0.952	0.910			
n ₁₅₃₀	1529.58	1.55531	P _{g,F}	0.5482	D _W	1	2000	0.984	0.966			
n ₁₁₂₉	1128.64	1.55993	P' _{d,c'}	0.2527	D _A	2	1800	0.992	0.985			
n ₁₀₆₄	1064.00	1.56078	P' _{e,d}	0.2358	R _{OH} (S)	1	1600	0.999	0.998			
n _t	1013.98	1.56148	P' _{g,F'}	0.4865	RP (S)	1	1400	0.999	0.998			
n _s	852.11	1.56419			CR		1200	0.999	0.998			
n _{A'}	768.19	1.56606	Deviation of Relative Partial Dispersions				1060	0.999	0.998			
n _r	706.52	1.56777					1000	0.999	0.998			
n _C	656.27	1.56948				P _{F,e}	0.0004		950	0.999	0.998	
n _{C'}	643.85	1.56996				P _{g,F}	0.0001		900	0.999	0.998	
n _{He-Ne}	632.80	1.57041				P _{C,t}	-0.0154	°C	α	850	0.999	0.998
n _D	589.29	1.57241	P _{C,s}	-0.0072	-50/-40	66	800	0.999	0.998			
n _d	587.56	1.57250	Thermal Properties			-40/-30	68	750	0.999	0.998		
n _e	546.07	1.57487					-30/-20	69	700	0.999	0.998	
n _F	486.13	1.57944				T _g (°C)	614	-20/-10	70	650	0.999	0.998
n _{F'}	479.99	1.58001				T _s (°C)	664	-10/0	71	600	0.999	0.998
n _g	435.84	1.58490				T ₁₀ ^{14.5} (°C)	549	0/10	72	550	0.999	0.998
n _h	404.66	1.58941	T ₁₀ ¹³ (°C)	592	10/20	72	500	0.999	0.998			
n _i	365.01	1.59715	α _{-50/80°C} (10 ⁻⁷ /K)	73	20/30	73	480	0.999	0.998			
			α _{100/300°C} (10 ⁻⁷ /K)	86	30/40	74	460	0.999	0.998			
			λ (W/(m·K))	0.94	40/50	74	440	0.999	0.998			
Constants of Dispersion Formula					50/60	74	420	0.999	0.998			
						60/70	75	400	0.999	0.998		
						70/80	75	390	0.999	0.998		
						80/90	76	380	0.997	0.995		
						90/100	77	370	0.995	0.990		
A ₀	2.43375651E+00		Mechanical Properties			100/110	77	360	0.991	0.983		
A ₁	-8.82982376E-03					HK (10 ⁷ Pa)	527	110/120	78	350	0.983	0.967
A ₂	1.35916939E-02					F _A	127	120/130	79	340	0.964	0.930
A ₃	3.60922117E-04					E (GPa)	72.3	130/140	80	330	0.930	0.866
A ₄	-1.79584197E-05					G (GPa)	29.1	140/150	82	320	0.863	0.744
A ₅	1.11930116E-06		μ	0.243	150/160	83	310	0.751	0.558			
Density			Solarization					300	0.576	0.329		
								290	0.344	0.120		
ρ (g/cm ³)	3.17	△λ (%)	-13.3	B (10 ⁻¹² /Pa)			Range of Temperature			Temperature Coefficients of Refractive Index		
dn/dt relative (×10 ⁻⁶ / °C)												
									280			

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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

H-ZK3A	589613	n _d = 1.58913	v _d = 61.25	n _F − n _C = 0.009618
		n _e = 1.59142	v _e = 61.01	n _{F'} − n _{C'} = 0.009694

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.55975	P _{d,C}	0.3057	RC (S)	1	2400	0.917	0.842		
n ₁₉₇₀	1970.09	1.56532	P _{e,d}	0.2381	RA (S)	3	2200	0.973	0.947		
n ₁₅₃₀	1529.58	1.57133	P _{g,F}	0.5417	D _W	2	2000	0.991	0.982		
n ₁₁₂₉	1128.64	1.57650	P' _{d,c'}	0.2548	D _A	3	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.57741	P' _{e,d}	0.2362	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.57815	P' _{g,F'}	0.4817	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.58095			CR	4a	1200	0.999	0.998		
n _{A'}	768.19	1.58282	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.58451					1000	0.999	0.998		
n _C	656.27	1.58619					950	0.999	0.998		
n _{C'}	643.85	1.58666					900	0.999	0.998		
n _{He-Ne}	632.80	1.58709					850	0.999	0.998		
n _D	589.29	1.58903	P _{F,e}	0.0000	°C	α	800	0.999	0.998		
n _d	587.56	1.58913	P _{g,F}	-0.0002	-50/-40	48	750	0.999	0.998		
n _e	546.07	1.59142	P _{C,t}	-0.0010	-40/-30	50	700	0.999	0.998		
n _F	486.13	1.59581	P _{C,s}	-0.0026	-30/-20	53	650	0.999	0.998		
n _{F'}	479.99	1.59635	Thermal Properties		-20/-10	54	600	0.999	0.998		
n _g	435.84	1.60102			T _g (°C)	678	-10/0	56	550	0.999	0.998
n _h	404.66	1.60533			T _s (°C)	733	0/10	56	500	0.999	0.998
n _i	365.01	1.61266			T ₁₀ ^{14.5} (°C)	609	10/20	56	480	0.999	0.998
					T ₁₀ ¹³ (°C)	650	20/30	57	460	0.999	0.998
					30/40	57	440	0.999	0.996		
					40/50	58	420	0.998	0.996		
					50/60	58	400	0.997	0.994		
					60/70	59	390	0.992	0.985		
					70/80	59	380	0.990	0.980		
Constants of Dispersion Formula			Mechanical Properties		80/90	60	370	0.989	0.978		
A ₀	2.48859886E+00				90/100	61	360	0.972	0.945		
A ₁	-1.07631038E-02				100/110	62	350	0.949	0.900		
A ₂	1.30844889E-02				110/120	62	340	0.906	0.821		
A ₃	3.33048453E-04				120/130	63	330	0.833	0.694		
A ₄	-1.29820178E-05		G (GPa)	32.7	130/140	63	320	0.720	0.518		
A ₅	6.37252025E-07		μ	0.244	140/150	65	310	0.564	0.318		
Density		Solarization		σ _b (MPa)	72	150/160	66	300	0.387	0.150	
ρ (g/cm ³)	3.31			B (10 ⁻¹² /Pa)	2.06			290	0.210	0.044	
								280	0.114	0.013	
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

H-ZK6	613586	n _d = 1.61272	v _d = 58.58	n _F − n _C = 0.010460
		n _e = 1.61521	v _e = 58.30	n _{F'} − n _{C'} = 0.010552

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.58370	P _{d,C}	0.3040	RC (S)	1	2400	0.922	0.844		
n ₁₉₇₀	1970.09	1.58884	P _{e,d}	0.2380	RA (S)	3	2200	0.967	0.927		
n ₁₅₃₀	1529.58	1.59446	P _{g,F}	0.5459	D _W	1	2000	0.993	0.986		
n ₁₁₂₉	1128.64	1.59947	P' _{d,c'}	0.2530	D _A	3	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.60038	P' _{e,d}	0.2360	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.60112	P' _{g,F'}	0.4843	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.60399			CR	2	1200	0.999	0.998		
n _{A'}	768.19	1.60595	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.60774					1000	0.999	0.998		
n _C	656.27	1.60954					P _{F,e}	0.0001	950	0.999	0.998
n _{C'}	643.85	1.61005					P _{g,F}	-0.0004	900	0.999	0.998
n _{He-Ne}	632.80	1.61052					P _{C,t}	-0.0190	850	0.999	0.998
n _D	589.29	1.61263	P _{C,s}	-0.0104	800	0.999	0.998				
n _d	587.56	1.61272	Thermal Properties		750	0.999	0.998				
n _e	546.07	1.61521			700	0.999	0.998				
n _F	486.13	1.62000			650	0.999	0.998				
n _{F'}	479.99	1.62060			600	0.999	0.998				
n _g	435.84	1.62571			550	0.999	0.998				
n _h	404.66	1.63044	T _g (°C)	672	500	0.999	0.998				
n _i	365.01	1.63849	T _s (°C)	713	480	0.999	0.998				
			T ₁₀ ^{14.5} (°C)	597	460	0.999	0.998				
			T ₁₀ ¹³ (°C)	644	440	0.999	0.998				
			α _{-50/80°C} (10 ⁻⁷ /K)	63							
			α _{100/300°C} (10 ⁻⁷ /K)	81							

H-ZK7	613606	n _d = 1.61309	v _d = 60.58	n _F − n _C = 0.010120
		n _e = 1.61551	v _e = 60.34	n _{F'} − n _{C'} = 0.010201

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.58169	P _{d,C}	0.3043	RC (S)	1	2400	0.841	0.707		
n ₁₉₇₀	1970.09	1.58773	P _{e,d}	0.2391	RA (S)	3	2200	0.925	0.857		
n ₁₅₃₀	1529.58	1.59423	P _{g,F}	0.5405	D _W	2	2000	0.981	0.963		
n ₁₁₂₉	1128.64	1.59978	P' _{d,c'}	0.2539	D _A	4	1800	0.992	0.986		
n ₁₀₆₄	1064.00	1.60074	P' _{e,d}	0.2372	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.60153	P' _{g,F'}	0.4803	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.60449			CR	3	1200	0.999	0.998		
n _{A'}	768.19	1.60646	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.60824					1000	0.999	0.998		
n _C	656.27	1.61001					950	0.999	0.998		
n _{C'}	643.85	1.61050					900	0.999	0.998		
n _{He-Ne}	632.80	1.61096					850	0.999	0.998		
n _D	589.29	1.61300	P _{F,e}	-0.0002	°C	α	800	0.999	0.998		
n _d	587.56	1.61309	P _{g,F}	-0.0025	-50/-40	52	750	0.999	0.998		
n _e	546.07	1.61551	P _{C,t}	0.0043	-40/-30	54	700	0.999	0.998		
n _F	486.13	1.62013	P _{C,s}	-0.0003	-30/-20	56	650	0.999	0.998		
n _{F'}	479.99	1.62070	Thermal Properties		-20/-10	57	600	0.999	0.998		
n _g	435.84	1.62560			T _g (°C)	651	-10/0	57	550	0.999	0.998
n _h	404.66	1.63013	T _s (°C)		685	0/10	58	500	0.999	0.998	
n _i	365.01	1.63783	T ₁₀ ^{14.5} (°C)		582	10/20	59	480	0.999	0.998	
			T ₁₀ ¹³ (°C)		623	20/30	60	460	0.998	0.996	
			α _{-50/80°C} (10 ⁻⁷ /K)		59	30/40	61	440	0.998	0.996	
			α _{100/300°C} (10 ⁻⁷ /K)		73	40/50	61	420	0.997	0.995	
			λ (W/(m·K))		1.03	50/60	62	400	0.997	0.994	
Constants of Dispersion Formula					60/70	63	390	0.994	0.989		
					70/80	63	380	0.989	0.979		
A ₀	2.56343719E+00		Mechanical Properties		80/90	64	370	0.983	0.966		
A ₁	-1.18778982E-02				HK (10 ⁷ Pa)	539	90/100	64	360	0.967	0.935
A ₂	1.36592937E-02		F _A		149	100/110	65	350	0.936	0.877	
A ₃	4.36395177E-04		E (GPa)		86.2	110/120	65	340	0.885	0.784	
A ₄	-2.37642691E-05		G (GPa)		33.8	120/130	66	330	0.806	0.650	
A ₅	1.12532867E-06		μ		0.275	130/140	68	320	0.687	0.472	
Density		Solarization		σ _b (MPa)		74	140/150	69	310	0.529	0.280
ρ (g/cm ³)	3.50			B (10 ⁻¹² /Pa)		2.00	150/160	71	300	0.348	0.123
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										
								280			
								290	0.181	0.037	

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	350/290
Coloration of Internal Transmittance	
λτ ₈₀ /λτ ₅	341/292

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-ZK9A	620603	n _d = 1.62041	v _d = 60.34	n _F − n _C = 0.010281
		n _e = 1.62286	v _e = 60.10	n _{F'} − n _{C'} = 0.010363

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.58878	P _{d,C}	0.3054	RC (S)	1	2400	0.864	0.746
n ₁₉₇₀	1970.09	1.59483	P _{e,d}	0.2383	RA (S)	2	2200	0.944	0.891
n ₁₅₃₀	1529.58	1.60134	P _{g,F}	0.5398	D _W	2	2000	0.995	0.990
n ₁₁₂₉	1128.64	1.60692	P' _{d,e'}	0.2548	D _A	4	1800	0.999	0.998
n ₁₀₆₄	1064.00	1.60789	P' _{e,d}	0.2364	R _{OH} (S)	3	1600	0.999	0.998
n _t	1013.98	1.60868	P' _{g,F'}	0.4796	RP (S)	2	1400	0.999	0.998
n _s	852.11	1.61168			CR	4a	1200	0.999	0.998
n _{A'}	768.19	1.61367	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.61548					1000	0.999	0.998
n _C	656.27	1.61727					950	0.999	0.998
n _{C'}	643.85	1.61777					900	0.999	0.998
n _{He-Ne}	632.80	1.61824	Thermal Properties		°C	α	850	0.999	0.998
n _D	589.29	1.62032					800	0.999	0.998
n _d	587.56	1.62041					750	0.999	0.998
n _e	546.07	1.62286					700	0.999	0.998
n _F	486.13	1.62755	Mechanical Properties		-20/-10	62	650	0.999	0.998
n _{F'}	479.99	1.62813			-10/0	63	600	0.999	0.998
n _g	435.84	1.63310			0/10	64	550	0.999	0.998
n _h	404.66	1.63768			10/20	64	500	0.999	0.998
n _i	365.01	1.64549			20/30	65	480	0.998	0.996
					30/40	65	460	0.997	0.995
					40/50	66	440	0.996	0.993
					50/60	66	420	0.996	0.992
					60/70	67	400	0.994	0.988
					70/80	67	390	0.991	0.982
					80/90	68	380	0.986	0.972
					90/100	68	370	0.976	0.952
					100/110	69	360	0.955	0.912
					110/120	70	350	0.917	0.841
					120/130	71	340	0.857	0.734
					130/140	72	330	0.757	0.573
					140/150	73	320	0.620	0.385
					150/160	74	310	0.447	0.200
							300	0.272	0.074
							290		
							280		

Range of Temperature (°C)	Temperature Coefficients of Refractive Index										Coloration Code	
	dn/dt relative (×10 ⁻⁶ / °C)										λ ₈₀ (λ ₇₀)/λ ₅	
	t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance	
-60 ~ -40	1.8	2.1	2.2	2.2	2.2	2.4	2.5	2.6	2.6	2.7	λτ ₈₀ /λτ ₅	
-40 ~ -20	1.9	2.2	2.2	2.2	2.3	2.4	2.6	2.6	2.7	2.7	345/297	
-20 ~ 0	1.9	2.2	2.3	2.3	2.4	2.5	2.7	2.7	2.8	2.8	Constants of dn/dt	
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	D ₀	D ₁
40 ~ 60	2.1	2.3	2.5	2.5	2.5	2.6	2.8	3.0	3.1	3.1	7.48E-07	1.25E-08
60 ~ 80	2.2	2.3	2.5	2.5	2.6	2.7	2.9	3.0	3.2	3.3	E ₀	E ₁
80 ~ 100	2.2	2.5	2.5	2.5	2.6	2.8	3.0	3.2	3.4	3.6	4.11E-07	7.77E-10
100 ~ 120	2.4	2.6	2.6	2.6	2.7	2.8	3.0	3.3	3.5	3.6	λ _{TK}	
120 ~ 140	2.5	2.6	2.7	2.7	2.7	2.8	3.2	3.3	3.5	3.7	7.84E-02	
140 ~ 160	2.5	2.6	2.7	2.7	2.7	2.9	3.3	3.5	3.7	3.9		

H-ZK10	622567	n _d = 1.62210	v _d = 56.71	n _F − n _C = 0.010970
		n _e = 1.62470	v _e = 56.38	n _{F'} − n _{C'} = 0.011080

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance									
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm							
n ₂₃₂₅	2325.42	1.59235	P _{d,C}	0.3036	RC (S)	1	2400	0.912	0.832							
n ₁₉₇₀	1970.09	1.59753	P _{e,d}	0.2370	RA (S)	3	2200	0.962	0.925							
n ₁₅₃₀	1529.58	1.60321	P _{g,F}	0.5479	D _W	1	2000	0.995	0.990							
n ₁₁₂₉	1128.64	1.60830	P' _{d,c'}	0.2536	D _A	4	1800	0.999	0.998							
n ₁₀₆₄	1064.00	1.60923	P' _{e,d}	0.2347	R _{OH} (S)	2	1600	0.999	0.998							
n _t	1013.98	1.61000	P' _{g,F'}	0.4856	RP (S)	1	1400	0.999	0.998							
n _s	852.11	1.61297			CR	4a	1200	0.999	0.998							
n _{A'}	768.19	1.61501	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998							
n _r	706.52	1.61689					1000	0.999	0.998							
n _C	656.27	1.61877					950	0.999	0.998							
n _{C'}	643.85	1.61929					900	0.999	0.998							
n _{He-Ne}	632.80	1.61979	P _{F,e}	0.0005	°C	α	850	0.999	0.998							
n _D	589.29	1.62199	P _{g,F}	-0.0015	-50/-40	55	800	0.999	0.998							
n _d	587.56	1.62210	P _{C,t}	-0.0155	-40/-30	57	750	0.999	0.998							
n _e	546.07	1.62470	P _{C,s}	-0.0078	-30/-20	58	700	0.999	0.998							
n _F	486.13	1.62974	Thermal Properties		-20/-10	59	650	0.999	0.998							
n _{F'}	479.99	1.63037			Tg (°C)	664	-10/0	60	600	0.999	0.998					
n _g	435.84	1.63575	Ts (°C)		704	0/10	61	550	0.999	0.998						
n _h	404.66	1.64074	T ₁₀ ^{14.5} (°C)		597	10/20	62	500	0.999	0.998						
n _i	365.01	1.64931	T ₁₀ ¹³ (°C)		635	20/30	63	480	0.999	0.998						
			α _{-50/80°C} (10 ⁻⁷ /K)		64	30/40	64	460	0.999	0.998						
			α _{100/300°C} (10 ⁻⁷ /K)		78	40/50	65	440	0.999	0.998						
			λ (W/(m·K))		0.94	50/60	65	420	0.997	0.995						
						60/70	66	400	0.995	0.992						
Constants of Dispersion Formula						70/80	67	390	0.990	0.984						
						80/90	68	380	0.983	0.968						
A ₀	2.58741488E+00		Mechanical Properties		HK (10 ⁷ Pa)	528	90/100	69	370	0.969	0.941					
A ₁	-1.01011954E-02				F _A	147	100/110	69	360	0.933	0.876					
A ₂	1.49670832E-02		E (GPa)		79.5	110/120	70	350	0.867	0.757						
A ₃	5.68916443E-04		G (GPa)		31.9	120/130	71	340	0.730	0.537						
A ₄	-4.40176529E-05		μ		0.248	130/140	72	330	0.473	0.228						
A ₅	2.64008379E-06		σ _b (MPa)		75	140/150	73	320	0.154	0.027						
Density		Solarization		B (10 ⁻¹² /Pa)		1.80	150/160	74	310							
ρ (g/cm ³)	3.63			△λ (%)	-1.0					300						
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										290					
	dn/dt relative (×10 ⁻⁶ / °C)										280					
	t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration Code					
	-60 ~ -40	1.3	1.5	1.7	1.8	1.9	2.0	2.1	2.5	2.6	3.0	λ ₈₀ (λ ₇₀)/λ ₅		360/320		
	-40 ~ -20	1.3	1.5	1.7	1.8	1.9	2.1	2.2	2.6	2.7	3.2	Coloration of Internal Transmittance				
	-20 ~ 0	1.3	1.5	1.7	1.8	2.0	2.1	2.3	2.6	2.7	3.2	λτ ₈₀ /λτ ₅		353/322		
	0 ~ 20	1.3	1.5	1.7	1.8	2.0	2.1	2.3	2.6	2.7	3.2	Constants of dn/dt				
20 ~ 40	1.3	1.6	1.8	1.9	2.0	2.2	2.4	2.7	2.8	3.3	D ₀				D ₁	D ₂
40 ~ 60	1.5	1.7	1.8	1.9	2.0	2.2	2.4	2.8	2.8	3.4	-7.55E-07				1.29E-08	-2.51E-11
60 ~ 80	1.6	1.8	1.9	2.0	2.1	2.3	2.6	2.8	2.9	3.6	E ₀				E ₁	λ _{TK}
80 ~ 100	1.6	1.9	2.0	2.1	2.2	2.4	2.7	2.9	3.0	3.7	5.33E-07	3.07E-10	2.48E-01			
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						

H-ZK10N		623570	n _d = 1.62280		v _d = 56.98		n _F – n _C = 0.010931					
			n _e = 1.62541		v _e = 56.74		n _{F'} – n _{C'} = 0.011023					
Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
	n ₂₃₂₅	2325.42	1.59301	P _{d,C}	0.3037	RC (S)	1	2400	0.914	0.825		
	n ₁₉₇₀	1970.09	1.59824	P _{e,d}	0.2388	RA (S)	3	2200	0.963	0.923		
	n ₁₅₃₀	1529.58	1.60395	P _{g,F}	0.5462	D _W	1	2000	0.996	0.984		
	n ₁₁₂₉	1128.64	1.60905	P' _{d,c'}	0.2522	D _A	4	1800	0.999	0.998		
	n ₁₀₆₄	1064.00	1.60998	P' _{e,d}	0.2368	R _{OH} (S)	2	1600	0.999	0.998		
	n _t	1013.98	1.61074	P' _{g,F'}	0.4853	RP (S)	2	1400	0.999	0.998		
	n _s	852.11	1.61371			CR	2	1200	0.999	0.998		
	n _{A'}	768.19	1.61574	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
	n _r	706.52	1.61761					1000	0.999	0.998		
	n _C	656.27	1.61948					950	0.999	0.998		
	n _{C'}	643.85	1.62002					900	0.999	0.998		
	n _{He-Ne}	632.80	1.62051	ΔP _{F,e}	-0.0004	°C	α	850	0.999	0.998		
	n _D	589.29	1.62270	ΔP _{g,F}	-0.0028	-50/-40	57	800	0.999	0.998		
	n _d	587.56	1.62280	ΔP _{C,t}	-0.0167	-40/-30	59	750	0.999	0.998		
	n _e	546.07	1.62541	ΔP _{C,s}	-0.0093	-30/-20	61	700	0.999	0.998		
	n _F	486.13	1.63042	Thermal Properties		-20/-10	62	650	0.999	0.998		
	n _{F'}	479.99	1.63104			Tg (°C)	661	-10/0	62	600	0.999	0.998
	n _g	435.84	1.63639			Ts (°C)	708	0/10	63	550	0.999	0.998
	n _h	404.66	1.64136			T ₁₀ ^{14.5} (°C)	595	10/20	64	500	0.999	0.998
	n _i	365.01	1.64991			T ₁₀ ¹³ (°C)	638	20/30	64	480	0.999	0.998
						α _{-50/80°C} (10 ⁻⁷ /K)	66	30/40	65	460	0.997	0.995
Constants of Dispersion Formula			Mechanical Properties		α _{100/300°C} (10 ⁻⁷ /K)	80	40/50	66	440	0.997	0.995	
					λ (W/(m·K))	0.80	50/60	67	420	0.996	0.993	
A ₀	2.59016969E+00				60/70	67	400	0.994	0.992			
A ₁	-1.02103680E-02				70/80	68	390	0.991	0.981			
A ₂	1.46213934E-02				80/90	69	380	0.986	0.972			
A ₃	6.92375177E-04				90/100	70	370	0.971	0.943			
Density			Solarization		F _A	153	100/110	71	360	0.942	0.888	
					E (GPa)	81.9	110/120	72	350	0.860	0.740	
ρ (g/cm ³)			△λ (%)		G (GPa)	32.4	120/130	73	340	0.740	0.547	
					μ	0.265	130/140	74	330	0.515	0.265	
Range of Temperature (°C)			Solarization		σ _b (MPa)	62	140/150	76	320	0.221	0.049	
					B (10 ⁻¹² /Pa)	1.88	150/160	77	310			
Temperature Coefficients of Refractive Index			Solarization		Coloration Code							
											Coloration of Internal Transmittance	
Constants of dn/dt												
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H-ZK11	639555	n _d = 1.63854	v _d = 55.45	n _F − n _C = 0.011516
		n _e = 1.64129	v _e = 55.18	n _{F'} − n _{C'} = 0.011621

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.60803	P _{d,C}	0.3031	RC (S)	1	2400	0.902	0.815
n ₁₉₇₀	1970.09	1.61325	P _{e,d}	0.2388	RA (S)	2	2200	0.964	0.930
n ₁₅₃₀	1529.58	1.61900	P _{g,F}	0.5505	D _W	1	2000	0.994	0.989
n ₁₁₂₉	1128.64	1.62419	P' _{d,e'}	0.2521	D _A	3	1800	0.999	0.998
n ₁₀₆₄	1064.00	1.62514	P' _{e,d}	0.2366	R _{OH} (S)	2	1600	0.999	0.998
n _t	1013.98	1.62593	P' _{g,F'}	0.4888	RP (S)	2	1400	0.999	0.998
n _s	852.11	1.62900			CR	4a	1200	0.999	0.998
n _{A'}	768.19	1.63114	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.63310					1000	0.999	0.998
n _C	656.27	1.63505					950	0.999	0.998
n _{C'}	643.85	1.63561					900	0.999	0.998
n _{He-Ne}	632.80	1.63613	Thermal Properties		°C	α	850	0.999	0.998
n _D	589.29	1.63844					800	0.999	0.998
n _d	587.56	1.63854					750	0.999	0.998
n _e	546.07	1.64129					700	0.999	0.998
n _F	486.13	1.64657	Mechanical Properties		-20/-10	70	650	0.999	0.998
n _{F'}	479.99	1.64723			-10/0	72	600	0.999	0.998
n _g	435.84	1.65291			0/10	73	550	0.999	0.998
n _h	404.66	1.65819			10/20	73	500	0.999	0.998
n _i	365.01	1.66725			20/30	73	480	0.998	0.996
					30/40	74	460	0.995	0.993
					40/50	74	440	0.995	0.990
					50/60	75	420	0.993	0.986
					60/70	75	400	0.988	0.976
					70/80	76	390	0.981	0.962
					80/90	77	380	0.968	0.937
					90/100	78	370	0.945	0.893
					100/110	78	360	0.898	0.806
					110/120	79	350	0.801	0.642
					120/130	80	340	0.616	0.379
					130/140	81	330	0.326	0.106
					140/150	82	320	0.067	0.004
					150/160	83	310		
							300		
							290		
							280		

-60 ~ -40	1.3	1.5	1.7	1.8	1.9	1.9	2.1	2.3	2.5	2.9	Coloration Code			
-40 ~ -20	1.3	1.5	1.7	1.8	1.9	2.0	2.2	2.5	2.7	2.9	$\lambda_{80}(\lambda_{70})/\lambda_5$		365/325	
-20 ~ 0	1.3	1.5	1.7	1.8	2.0	2.0	2.3	2.6	2.7	2.9	Coloration of Internal Transmittance			
0 ~ 20	1.3	1.5	1.7	1.8	2.0	2.0	2.4	2.7	2.8	3.0	$\lambda\tau_{80}/\lambda\tau_5$			358/326
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	Constants of dn/dt			
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	D ₀	D ₁	D ₂	
100 ~ 120	1.6	1.9	1.9	1.9	2.0	2.2	2.7	2.9	3.0	3.4	-8.12E-07	1.25E-08	-2.55E-11	
120 ~ 140	1.8	1.9	1.9	2.0	2.1	2.3	2.7	2.9	3.0	3.4	E ₀	E ₁	λ_{TK}	
140 ~ 160	1.8	1.9	2.0	2.0	2.1	2.3	2.7	3.0	3.1	3.4	5.57E-07	2.06E-10	1.96E-01	

H-ZK14			603606			n _d = 1.60311			v _d = 60.60			n _F − n _C = 0.009952															
						n _e = 1.60548			v _e = 60.35			n _{F'} − n _{C'} = 0.010033															
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance													
		λ (nm)		n _λ		P _{d,C}		0.3055		RC (S)		3		λ (nm)		τ5mm		τ10mm									
n ₂₃₂₅		2325.42		1.57307		P _{e,d}		0.2381		RA (S)		3		2400		0.879		0.774									
n ₁₉₇₀		1970.09		1.57874		P _{g,F}		0.5406		D _W		2		2200		0.939		0.880									
n ₁₅₃₀		1529.58		1.58486		P' _{d,c'}		0.2542		D _A		4		2000		0.983		0.967									
n ₁₁₂₉		1128.64		1.59014		P' _{e,d}		0.2362		R _{OH} (S)		2		1800		0.993		0.984									
n ₁₀₆₄		1064.00		1.59106		P' _{g,F'}		0.4804		RP (S)		2		1600		0.999		0.996									
n _t		1013.98		1.59182						CR		4b		1400		0.999		0.997									
n _s		852.11		1.59469		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1200		0.999		0.998									
n _{A'}		768.19		1.59661										P _{F,e}		0.0004		°C		α		1060		0.999		0.998	
n _r		706.52		1.59835										P _{g,F}		-0.0023		-50/-40		50		1000		0.999		0.998	
n _C		656.27		1.60007										P _{C,t}		-0.0048		-40/-30		52		950		0.999		0.998	
n _{C'}		643.85		1.60056		P _{C,s}		-0.0052						900		0.999		0.998									
n _{He-Ne}		632.80		1.60101		Thermal Properties								850		0.999		0.998									
n _D		589.29		1.60302										T _g (°C)		666		-30/-20		54		800		0.999		0.998	
n _d		587.56		1.60311										T _s (°C)		704		-20/-10		55		750		0.999		0.998	
n _e		546.07		1.60548										T ₁₀ ^{14.5} (°C)		583		-10/0		56		700		0.999		0.998	
n _F		486.13		1.61003		Mechanical Properties								650		0.999		0.998									
n _{F'}		479.99		1.61059										T ₁₀ ¹³ (°C)		625		0/10		57		600		0.999		0.998	
n _g		435.84		1.61541										α _{-50/80°C} (10 ⁻⁷ /K)		57		10/20		58		550		0.999		0.998	
n _h		404.66		1.61987										α _{100/300°C} (10 ⁻⁷ /K)		73		20/30		59		500		0.999		0.998	
n _i		365.01		1.62743										30/40		59		480		0.999		0.998					
														40/50		60		460		0.997		0.995					
														50/60		61		440		0.997		0.995					
Constants of Dispersion Formula														60/70		61		420		0.997		0.995					
														70/80		62		400		0.996		0.995					
A ₀		2.53182995E+00				Mechanical Properties								390		0.994		0.990									
A ₁		-1.10534989E-02												HK (10 ⁷ Pa)		567		80/90		62		380		0.992		0.985	
A ₂		1.34222293E-02												90/100		63		370		0.985		0.976					
A ₃		4.21021754E-04												100/110		63		360		0.976		0.957					
A ₄		-2.24912138E-05												110/120		64		350		0.954		0.916					
A ₅		1.01669782E-06												120/130		65		340		0.919		0.852					
														130/140		66		330		0.862		0.747					
														140/150		67		320		0.762		0.588					
														150/160		68		310		0.615		0.385					
																		300		0.419		0.180					
																		290		0.210		0.050					
																		280									
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code															
		dn/dt relative (×10 ⁻⁶ / °C)																									
		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	Coloration of Internal Transmittance														
		-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	λτ ₈₀ /λτ ₅						334/290								
		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	Constants of dn/dt														
		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							D ₀		D ₁		D ₂				
80 ~ 100	3.2	3.3	3.3	3.4	3.5	3.7	4.1	4.1	4.2	4.6	2.35E-06								1.42E-08		-1.91E-11						
100 ~ 120	3.3	3.4	3.4	3.5	3.5	3.7	4.4	4.3	4.4	4.9	E ₀		E ₁		λ _{TK}												
120 ~ 140	3.5	3.5	3.5	3.6	3.6	3.9	4.5	4.4	4.5	5.0	3.40E-07		4.95E-10		2.58E-01												
140 ~ 160	3.5	3.6	3.7	3.7	3.8	4.1	4.5	4.6	4.7	5.2																	

H-ZK20	617539	n _d = 1.61720	v _d = 53.91	n _F − n _C = 0.011448
		n _e = 1.61993	v _e = 53.62	n _{F'} − n _{C'} = 0.011561

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.58879	P _{d,C}	0.3014	RC (S)	1	2400	0.911	0.830		
n ₁₉₇₀	1970.09	1.59335	P _{e,d}	0.2385	RA (S)	3	2200	0.957	0.916		
n ₁₅₃₀	1529.58	1.59844	P _{g,F}	0.5503	D _W	1	2000	0.987	0.974		
n ₁₁₂₉	1128.64	1.60320	P' _{d,c'}	0.2508	D _A	3	1800	0.995	0.990		
n ₁₀₆₄	1064.00	1.60410	P' _{e,d}	0.2361	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.60485	P' _{g,F'}	0.4878	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.60781			CR	3	1200	0.999	0.998		
n _{A'}	768.19	1.60989	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.61181					1000	0.999	0.998		
n _C	656.27	1.61375					950	0.999	0.998		
n _{C'}	643.85	1.61430					900	0.999	0.998		
n _{He-Ne}	632.80	1.61481					850	0.999	0.998		
n _D	589.29	1.61710	P _{F,e}	-0.0001	°C	α	800	0.999	0.998		
n _d	587.56	1.61720	P _{g,F}	-0.0037	-50/-40	77	750	0.999	0.998		
n _e	546.07	1.61993	P _{C,t}	-0.0239	-40/-30	79	700	0.999	0.998		
n _F	486.13	1.62520	P _{C,s}	-0.0109	-30/-20	81	650	0.999	0.998		
n _{F'}	479.99	1.62586	Thermal Properties		-20/-10	82	600	0.999	0.998		
n _g	435.84	1.63150			T _g (°C)	555	-10/0	82	550	0.999	0.998
n _h	404.66	1.63676			T _s (°C)	592	0/10	83	500	0.999	0.998
n _i	365.01	1.64578			T ₁₀ ^{14.5} (°C)	501	10/20	84	480	0.999	0.998
					T ₁₀ ¹³ (°C)	535	20/30	85	460	0.999	0.998
					α _{-50/80°C} (10 ⁻⁷ /K)	87	440	0.999	0.998		
					α _{100/300°C} (10 ⁻⁷ /K)	99	420	0.998	0.996		
					λ (W/(m·K))	0.85	400	0.997	0.994		
							390	0.996	0.992		
Constants of Dispersion Formula			Mechanical Properties		70/80	88	380	0.994	0.989		
A ₀	2.56855897E+00				80/90	89	370	0.988	0.976		
A ₁	-8.74295850E-03				90/100	91	360	0.977	0.952		
A ₂	1.59604033E-02				100/110	92	350	0.954	0.905		
A ₃	4.91034285E-04				110/120	93	340	0.907	0.821		
A ₄	-2.77331960E-05		G (GPa)	30.9	120/130	93	330	0.830	0.689		
A ₅	1.72056496E-06			μ	0.241	130/140	95	320	0.711	0.508	
Density		Solarization		σ _b (MPa)	57	140/150	97	310	0.551	0.307	
ρ (g/cm ³)	3.60			△λ (%)	-11.8	B (10 ⁻¹² /Pa)	2.06	150/160	98	300	0.371
Range of Temperature	Temperature Coefficients of Refractive Index						290	0.209	0.046		
	dn/dt relative (×10 ⁻⁶ / °C)						280	0.093	0.011		

Coloration Code	
λ ₈₀ (λ ₇₀)/λ ₅	350/295
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 58.12	n _F − n _C = 0.010719
		n _e = 1.62555	v _e = 57.87	n _{F'} − n _{C'} = 0.010809

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.59235	P _{d,C}	0.3041	RC (S)	3	2400	0.882	0.778		
n ₁₉₇₀	1970.09	1.59795	P _{e,d}	0.2388	RA (S)	3	2200	0.948	0.899		
n ₁₅₃₀	1529.58	1.60402	P _{g,F}	0.5448	D _W	2	2000	0.980	0.960		
n ₁₁₂₉	1128.64	1.60931	P' _{d,c'}	0.2535	D _A	4	1800	0.988	0.976		
n ₁₀₆₄	1064.00	1.61026	P' _{e,d}	0.2368	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.61103	P' _{g,F'}	0.4839	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.61401			CR	2	1200	0.999	0.998		
n _{A'}	768.19	1.61603	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.61787					1000	0.999	0.998		
n _C	656.27	1.61973					950	0.999	0.998		
n _{C'}	643.85	1.62025					900	0.999	0.998		
n _{He-Ne}	632.80	1.62074					850	0.999	0.998		
n _D	589.29	1.62290	P _{F,e}	-0.0010	°C	α	800	0.999	0.998		
n _d	587.56	1.62299	P _{g,F}	-0.0022	-50/-40	61	750	0.999	0.998		
n _e	546.07	1.62555	P _{C,t}	-0.0101	-40/-30	63	700	0.999	0.998		
n _F	486.13	1.63045	P _{C,s}	-0.0063	-30/-20	65	650	0.999	0.998		
n _{F'}	479.99	1.63106	Thermal Properties		-20/-10	66	600	0.999	0.998		
n _g	435.84	1.63629			T _g (°C)	664	-10/0	66	550	0.999	0.998
n _h	404.66	1.64113			T _s (°C)	706	0/10	67	500	0.999	0.998
n _i	365.01	1.64946			T ₁₀ ^{14.5} (°C)	605	10/20	67	480	0.997	0.995
					T ₁₀ ¹³ (°C)	651	20/30	68	460	0.996	0.994
					30/40	68	440	0.996	0.992		
					40/50	69	420	0.996	0.992		
					50/60	69	400	0.992	0.985		
					60/70	70	390	0.988	0.976		
					70/80	70	380	0.982	0.965		
Constants of Dispersion Formula			Mechanical Properties		80/90	70	370	0.962	0.926		
A ₀	2.59254654E+00				90/100	71	360	0.924	0.854		
A ₁	-1.10129354E-02				100/110	71	350	0.850	0.723		
A ₂	1.38896553E-02				110/120	72	340	0.698	0.487		
A ₃	8.21371542E-04				120/130	73	330	0.421	0.177		
A ₄	-8.84083953E-05		G (GPa)	33.3	130/140	74	320	0.071	0.005		
A ₅	5.19951049E-06		μ	0.279	140/150	75	310				
Density		Solarization		σ _b (MPa)	87	150/160	76	300			
ρ (g/cm ³)	3.61			B (10 ⁻¹² /Pa)	1.81						
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

Coloration Code	
λ ₈₀ (λ ₇₀)/λ ₅	360/320
Coloration of Internal Transmittance	
λτ ₈₀ /λτ ₅	355/323

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			v _d = 56.65			n _F − n _C = 0.010721															
						n _e = 1.60994			v _e = 56.38			n _{F'} − n _{C'} = 0.010819															
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance													
		λ (nm)		n _λ										λ (nm)		τ5mm		τ10mm									
n ₂₃₂₅		2325.42		1.57933		P _{d,C}		0.3022		RC (S)		1		2400		0.917		0.841									
n ₁₉₇₀		1970.09		1.58405		P _{e,d}		0.2388		RA (S)		3		2200		0.952		0.904									
n ₁₅₃₀		1529.58		1.58926		P _{g,F}		0.5475		D _W		1		2000		0.983		0.966									
n ₁₁₂₉		1128.64		1.59403		P' _{d,c'}		0.2523		D _A		3		1800		0.993		0.986									
n ₁₀₆₄		1064.00		1.59491		P' _{e,d}		0.2366		R _{OH} (S)		2		1600		0.999		0.998									
n _t		1013.98		1.59564		P' _{g,F'}		0.4862		RP (S)		2		1400		0.999		0.998									
n _s		852.11		1.59850						CR		4c		1200		0.999		0.998									
n _{A'}		768.19		1.60048		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1060		0.999		0.998									
n _r		706.52		1.60230										P _{F,e}		0.0000		°C		α		1000		0.999		0.998	
n _C		656.27		1.60414										P _{g,F}		-0.0020		-50/-40		72		950		0.999		0.998	
n _{C'}		643.85		1.60465										P _{C,t}		-0.0218		-40/-30		75		900		0.999		0.998	
n _{He-Ne}		632.80		1.60513		P _{C,s}		-0.0103						-30/-20		77		700		0.999		0.998					
n _D		589.29		1.60729		Thermal Properties								-20/-10		78		650		0.999		0.998					
n _d		587.56		1.60738						T _g (°C)		594		-10/0		79		600		0.999		0.998					
n _e		546.07		1.60994		T _s (°C)		637		0/10		80		550		0.999		0.998									
n _F		486.13		1.61486		T ₁₀ ^{14.5} (°C)		532		10/20		80		500		0.999		0.998									
n _{F'}		479.99		1.61547		T ₁₀ ¹³ (°C)		570		20/30		81		480		0.999		0.998									
n _g		435.84		1.62073		α _{-50/80°C} (10 ⁻⁷ /K)		80		30/40		82		460		0.999		0.998									
n _h		404.66		1.62562		α _{100/300°C} (10 ⁻⁷ /K)		95		40/50		82		440		0.999		0.998									
n _i		365.01		1.63393		λ (W/(m·K))		0.87		50/60		83		420		0.997		0.995									
										60/70		84		400		0.995		0.991									
Constants of Dispersion Formula										70/80		85		390		0.992		0.986									
										80/90		86		380		0.990		0.981									
A ₀		2.54047355E+00				Mechanical Properties				90/100		89		370		0.983		0.968									
A ₁		-9.05535161E-03								HK (10 ⁷ Pa)		489		100/110		90		360		0.971		0.944					
A ₂		1.49621725E-02				F _A		210		110/120		91		350		0.948		0.898									
A ₃		3.92388778E-04				E (GPa)		83.7		120/130		92		340		0.903		0.813									
A ₄		-1.51543800E-05				G (GPa)		31.5		130/140		94		330		0.824		0.673									
A ₅		7.76341926E-07				μ		0.328		140/150		96		320		0.698		0.482									
Density			Solarization			σ _b (MPa)		84		150/160		97		310		0.515		0.262									
ρ (g/cm ³)		3.47				B (10 ⁻¹² /Pa)		1.77						300		0.312		0.095									
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										290		0.145		0.021											
		dn/dt relative (×10 ⁻⁶ / °C)																									
		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	Coloration Code														
		-40 ~ -20	0.9	1.1	1.2	1.2	1.3	1.3	1.6	1.8	1.9	2.3	λ ₈₀ (λ ₇₀)/λ ₅		345/290												
		-20 ~ 0	0.9	1.0	1.2	1.2	1.2	1.3	1.6	1.8	1.9	2.3	Coloration of Internal Transmittance														
		0 ~ 20	0.8	1.0	1.1	1.2	1.2	1.2	1.6	1.8	1.9	2.3	λτ ₈₀ /λτ ₅		339/292												
		20 ~ 40	0.8	1.1	1.2	1.3	1.3	1.3	1.7	1.9	1.9	2.3	Constants of dn/dt														
		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	D ₀		D ₁		D ₂										
		120 ~ 140	1.3	1.4	1.7	1.7	1.7	1.8	2.3	2.4	2.5	3.0	-1.74E-06		1.22E-08		-1.24E-11										
		140 ~ 160	1.3	1.5	1.8	1.8	1.9	1.9	2.3	2.6	2.7	3.1	E ₀		E ₁		λ _{TK}										
												4.12E-07		3.48E-10		2.52E-01											

H-LaK1	660574	n _d = 1.65950	v _d = 57.35	n _F − n _C = 0.011500
		n _e = 1.66224	v _e = 57.13	n _{F'} − n _{C'} = 0.011592

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.62649	P _{d,C}	0.3043	RC (S)	1	2400	0.873	0.762		
n ₁₉₇₀	1970.09	1.63247	P _{e,d}	0.2383	RA (S)	1	2200	0.954	0.910		
n ₁₅₃₀	1529.58	1.63901	P _{g,F}	0.5443	D _W	3	2000	0.993	0.986		
n ₁₁₂₉	1128.64	1.64475	P' _{d,c'}	0.2545	D _A	4	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.64577	P' _{e,d}	0.2364	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.64660	P' _{g,F'}	0.4848	RP (S)	3	1400	0.999	0.998		
n _s	852.11	1.64983			CR	3	1200	0.999	0.998		
n _{A'}	768.19	1.65202	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.65403					1000	0.999	0.998		
n _C	656.27	1.65600					950	0.999	0.998		
n _{C'}	643.85	1.65655					900	0.999	0.998		
n _{He-Ne}	632.80	1.65707					850	0.999	0.998		
n _D	589.29	1.65939	P _{F,e}	-0.0012	°C	α	800	0.999	0.998		
n _d	587.56	1.65950	P _{g,F}	-0.0040	-50/-40	59	750	0.999	0.998		
n _e	546.07	1.66224	P _{C,t}	-0.0006	-40/-30	61	700	0.999	0.998		
n _F	486.13	1.66750	P _{C,s}	-0.0015	-30/-20	63	650	0.999	0.998		
n _{F'}	479.99	1.66814	Thermal Properties		-20/-10	64	600	0.999	0.998		
n _g	435.84	1.67376			Tg (°C)	651	-10/0	64	550	0.999	0.998
n _h	404.66	1.67897			Ts (°C)	685	0/10	65	500	0.999	0.998
n _i	365.01	1.68783			T ₁₀ ^{14.5} (°C)	588	10/20	65	480	0.999	0.998
					20/30	66	460	0.999	0.998		
					30/40	67	440	0.999	0.998		
					40/50	67	420	0.997	0.995		
					50/60	67	400	0.995	0.992		
					60/70	68	390	0.993	0.987		
					70/80	68	380	0.990	0.981		
					80/90	69	370	0.981	0.970		
					90/100	70	360	0.968	0.947		
					100/110	71	350	0.950	0.910		
					110/120	72	340	0.918	0.852		
					120/130	73	330	0.868	0.762		
					130/140	74	320	0.796	0.641		
					140/150	75	310	0.697	0.495		
					150/160	76	300	0.581	0.346		
							290	0.460	0.217		
							280	0.343	0.122		

H-LaK2	691547	n _d = 1.69100	v _d = 54.70	n _F − n _C = 0.012633
		n _e = 1.69401	v _e = 54.48	n _{F'} − n _{C'} = 0.012739

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42	1.65330	P _{d,C}	0.3048	RC (S)	1	2400	0.766	0.579					
n ₁₉₇₀	1970.09	1.66043	P _{e,d}	0.2383	RA (S)	3	2200	0.919	0.846					
n ₁₅₃₀	1529.58	1.66812	P _{g,F}	0.5438	D _W	1	2000	0.973	0.955					
n ₁₁₂₉	1128.64	1.67471	P' _{d,c'}	0.2543	D _A	3	1800	0.989	0.986					
n ₁₀₆₄	1064.00	1.67587	P' _{e,d}	0.2363	R _{OH} (S)	1	1600	0.999	0.998					
n _t	1013.98	1.67681	P' _{g,F'}	0.4828	RP (S)	3	1400	0.999	0.998					
n _s	852.11	1.68039			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.68280	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998				
n _r	706.52	1.68499								1000	0.999	0.998		
n _C	656.27	1.68715						P _{F,e}	-0.0033			950	0.999	0.998
n _{C'}	643.85	1.68776						P _{g,F}	-0.0089	°C	α	900	0.999	0.998
n _{He-Ne}	632.80	1.68833						P _{C,t}	0.0133	-50/-40	52	850	0.999	0.998
n _D	589.29	1.69088	P _{C,s}	0.0034	-40/-30	54	800	0.999	0.998					
n _d	587.56	1.69100	Thermal Properties			-30/-20	56	750	0.999	0.998				
n _e	546.07	1.69401						-20/-10	57	700	0.999	0.998		
n _F	486.13	1.69978				T _g (°C)	630	-10/0	57	650	0.999	0.998		
n _{F'}	479.99	1.70050				T _s (°C)	661	0/10	58	600	0.999	0.998		
n _g	435.84	1.70665				T ₁₀ ^{14.5} (°C)	585	10/20	58	550	0.999	0.998		
n _h	404.66	1.71235	T ₁₀ ¹³ (°C)	602	20/30	59	500	0.999	0.998					
n _i	365.01	1.72209	α _{-50/80°C} (10 ⁻⁷ /K)	57	30/40	59	480	0.999	0.998					
			α _{100/300°C} (10 ⁻⁷ /K)	73	40/50	59	460	0.999	0.998					
			λ (W/(m·K))	0.94	50/60	60	440	0.999	0.995					
Constants of Dispersion Formula					60/70	60	420	0.999	0.991					
			Mechanical Properties			70/80	61	400	0.994	0.985				
						80/90	61	390	0.987	0.979				
						90/100	62	380	0.980	0.965				
						100/110	62	370	0.969	0.943				
A ₀	2.80955685E+00					F _A	94	110/120	63	360	0.948	0.906		
A ₁	-1.46673580E-02		E (GPa)	107.4	120/130	64	350	0.916	0.838					
A ₂	1.68842607E-02		G (GPa)	41.7	130/140	64	340	0.867	0.757					
A ₃	9.16821494E-04		μ	0.287	140/150	65	330	0.801	0.645					
A ₄	-7.97191507E-05		σ _b (MPa)	92	150/160	66	320	0.712	0.509					
A ₅	4.19772399E-06		B (10 ⁻¹² /Pa)	1.96			310	0.599	0.360					
Density			Range of Temperature			Temperature Coefficients of Refractive Index			300	0.449	0.202			
						dn/dt relative (×10 ⁻⁶ / °C)			290	0.245	0.063			
									280					
ρ (g/cm ³)		3.63	Solarization			Coloration Code			Coloration of Internal Transmittance					
△λ (%)		-0.8												
D ₀		D ₁	D ₂	He-Ne			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
E ₀		E ₁	λ _{TK}	e			Coloration of Internal Transmittance							
4.05E-07		-4.14E-11	1.83E-01											
F ₀		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							
2.98E-06		1.59E-08	-3.12E-11											
F'		F' ₁	F' ₂	F'			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
g		g ₁	g ₂	g			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
d		d ₁	d ₂	d			Constants of dn/dt							
2.98E-06		1.59E-08	-3.12E-11											
e		e ₁	e ₂	e			Coloration of Internal Transmittance							
2.98E-06		1.59E-08	-3.12E-11											
F		F ₁	F ₂	F			λτ ₈₀ /λτ ₅							

H-LaK2H	692545	n _d = 1.69211	v _d = 54.54	n _F − n _C = 0.012690
		n _e = 1.69514	v _e = 54.29	n _{F'} − n _{C'} = 0.012804

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42	1.65358	P _{d,C}	0.3026	RC (S)	1	2400	0.754	0.568					
n ₁₉₇₀	1970.09	1.66092	P _{e,d}	0.2388	RA (S)	3	2200	0.915	0.837					
n ₁₅₃₀	1529.58	1.66884	P _{g,F}	0.5414	D _W	1	2000	0.980	0.960					
n ₁₁₂₉	1128.64	1.67561	P' _{d,c'}	0.2523	D _A	3	1800	0.990	0.980					
n ₁₀₆₄	1064.00	1.67679	P' _{e,d}	0.2366	R _{OH} (S)	1	1600	0.999	0.998					
n _t	1013.98	1.67775	P' _{g,F'}	0.4803	RP (S)	3	1400	0.999	0.998					
n _s	852.11	1.68140			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.68384	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998				
n _r	706.52	1.68606								1000	0.999	0.998		
n _C	656.27	1.68827						P _{F,e}	-0.0015			950	0.999	0.998
n _{C'}	643.85	1.68888						P _{g,F}	-0.0116	°C	α	900	0.999	0.998
n _{He-Ne}	632.80	1.68945						P _{C,t}	0.0246	-50/-40	52	850	0.999	0.998
n _D	589.29	1.69201	P _{C,s}	0.0101	-40/-30	54	800	0.999	0.998					
n _d	587.56	1.69211	Thermal Properties			-30/-20	55	750	0.999	0.998				
n _e	546.07	1.69514						-20/-10	56	700	0.999	0.998		
n _F	486.13	1.70096				T _g (°C)	636	-10/0	56	650	0.999	0.998		
n _{F'}	479.99	1.70168				T _s (°C)	662	0/10	57	600	0.999	0.998		
n _g	435.84	1.70783				T ₁₀ ^{14.5} (°C)	599	10/20	58	550	0.999	0.998		
n _h	404.66	1.71355	T ₁₀ ¹³ (°C)	635	20/30	60	500	0.999	0.998					
n _i	365.01	1.72334	α _{-50/80°C} (10 ⁻⁷ /K)	59	30/40	61	480	0.999	0.998					
			α _{100/300°C} (10 ⁻⁷ /K)	74	40/50	61	460	0.999	0.998					
								440	0.997	0.995				

H-LaK3	747510	n _d = 1.74693	v _d = 50.95	n _F − n _C = 0.014660
		n _e = 1.75042	v _e = 50.72	n _{F'} − n _{C'} = 0.014794

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.70600	P _{d,C}	0.3022	RC (S)	1	2400	0.779	0.612		
n ₁₉₇₀	1970.09	1.71332	P _{e,d}	0.2381	RA (S)	1	2200	0.931	0.868		
n ₁₅₃₀	1529.58	1.72133	P _{g,F}	0.5505	D _W	1	2000	0.986	0.963		
n ₁₁₂₉	1128.64	1.72838	P' _{d,c'}	0.2521	D _A	3	1800	0.997	0.994		
n ₁₀₆₄	1064.00	1.72965	P' _{e,d}	0.2359	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.73069	P' _{g,F'}	0.4894	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.73471			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.73747	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.73998					1000	0.999	0.998		
n _C	656.27	1.74250					950	0.999	0.998		
n _{C'}	643.85	1.74320					900	0.999	0.998		
n _{He-Ne}	632.80	1.74386					850	0.999	0.998		
n _D	589.29	1.74680	P _{F,e}	-0.0023	°C	α	800	0.999	0.998		
n _d	587.56	1.74693	P _{g,F}	-0.0085	-50/-40	49	750	0.999	0.998		
n _e	546.07	1.75042	P _{C,t}	0.0186	-40/-30	51	700	0.999	0.998		
n _F	486.13	1.75716	P _{C,s}	0.0087	-30/-20	53	650	0.999	0.998		
n _{F'}	479.99	1.75799	Thermal Properties		-20/-10	54	600	0.999	0.998		
n _g	435.84	1.76523			T _g (°C)	674	-10/0	54	550	0.999	0.998
n _h	404.66	1.77195			T _s (°C)	695	0/10	54	500	0.999	0.998
n _i	365.01	1.78350			T ₁₀ ^{14.5} (°C)	603	10/20	55	480	0.999	0.998
					T ₁₀ ¹³ (°C)	641	20/30	56	460	0.999	0.997
					30/40	56	440	0.999	0.997		
					40/50	56	420	0.997	0.994		
					50/60	57	400	0.994	0.990		
					60/70	57	390	0.990	0.981		
					70/80	57	380	0.987	0.974		
Constants of Dispersion Formula					80/90	58	370	0.980	0.959		
A ₀	2.98964410E+00		Mechanical Properties		90/100	58	360	0.968	0.935		
A ₁	-1.53853950E-02				HK (10 ⁷ Pa)	769	100/110	59	350	0.946	0.891
A ₂	2.14098946E-02				F _A	50	110/120	59	340	0.907	0.817
A ₃	7.35181833E-04				E (GPa)	120.3	120/130	60	330	0.850	0.724
A ₄	-3.80789614E-05				G (GPa)	45.3	130/140	61	320	0.767	0.589
A ₅	2.29046629E-06		μ	0.328	140/150	62	310	0.640	0.410		
			σ _b (MPa)	96	150/160	63	300	0.420	0.180		
Density		Solarization		B (10 ⁻¹² /Pa)	1.56		280	0.155	0.034		
ρ (g/cm ³)	4.10			△λ (%)	-0.4						
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

Coloration Code	
λ ₈₀ (λ ₇₀)/λ ₅	370/300
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.64000$	$v_d = 60.20$	$n_F - n_C = 0.010631$
		$n_e = 1.64254$	$v_e = 60.00$	$n_F - n_{C'} = 0.010709$

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H-LaK5A	678555	$n_d = 1.67790$	$v_d = 55.52$	$n_F - n_C = 0.012211$
		$n_e = 1.68081$	$v_e = 55.26$	$n_F - n_{C'} = 0.012319$

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H-LaK6	694533	n _d = 1.69350	v _d = 53.31	n _F − n _C = 0.013008
		n _e = 1.69660	v _e = 53.11	n _{F'} − n _{C'} = 0.013115

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.65451	P _{d,C}	0.3037	RC (S)	2	2400	0.752	0.566		
n ₁₉₇₀	1970.09	1.66191	P _{e,d}	0.2383	RA (S)	3	2200	0.915	0.837		
n ₁₅₃₀	1529.58	1.66989	P _{g,F}	0.5450	D _W	1	2000	0.983	0.966		
n ₁₁₂₉	1128.64	1.67672	P' _{d,c'}	0.2531	D _A	3	1800	0.998	0.996		
n ₁₀₆₄	1064.00	1.67791	P' _{e,d}	0.2364	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.67889	P' _{g,F'}	0.4842	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.68258			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.68506	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.68731					1000	0.999	0.998		
n _C	656.27	1.68955					950	0.999	0.998		
n _{C'}	643.85	1.69018					900	0.999	0.998		
n _{He-Ne}	632.80	1.69076					850	0.999	0.998		
n _D	589.29	1.69337	P _{F,e}	-0.0026	°C	α	800	0.999	0.998		
n _d	587.56	1.69350	P _{g,F}	-0.0100	-50/-40	46	750	0.999	0.998		
n _e	546.07	1.69660	P _{C,t}	0.0211	-40/-30	47	700	0.999	0.998		
n _F	486.13	1.70256	P _{C,s}	0.0075	-30/-20	49	650	0.999	0.998		
n _{F'}	479.99	1.70330	Thermal Properties		-20/-10	50	600	0.999	0.998		
n _g	435.84	1.70965			T _g (°C)	646	-10/0	51	550	0.999	0.998
n _h	404.66	1.71556			T _s (°C)	674	0/10	52	500	0.999	0.998
n _i	365.01	1.72565			T ₁₀ ^{14.5} (°C)	580	10/20	52	480	0.999	0.998
					T ₁₀ ¹³ (°C)	625	20/30	53	460	0.999	0.998
					30/40	54	440	0.999	0.998		
					40/50	54	420	0.994	0.989		
					50/60	55	400	0.990	0.985		
					60/70	55	390	0.987	0.977		
					70/80	56	380	0.981	0.966		
Constants of Dispersion Formula			Mechanical Properties		80/90	56	370	0.971	0.946		
A ₀	2.81648072E+00				90/100	57	360	0.955	0.910		
A ₁	-1.52313167E-02				100/110	58	350	0.924	0.856		
A ₂	1.76168363E-02				110/120	58	340	0.879	0.771		
A ₃	8.07769313E-04				120/130	59	330	0.810	0.654		
A ₄	-5.32742539E-05		E (GPa)	109.8	130/140	60	320	0.707	0.499		
A ₅	2.58509025E-06		G (GPa)	42.0	140/150	61	310	0.551	0.300		
			μ	0.309	150/160	62	300	0.301	0.089		
Density		Solarization		σ _b (MPa)	87		290				
ρ (g/cm ³)	3.57			B (10 ⁻¹² /Pa)	1.96		280				
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

H-LaK7			713539			n _d = 1.71300			v _d = 53.94			n _F − n _C = 0.013219															
						n _e = 1.71615			v _e = 53.72			n _{F'} − n _{C'} = 0.013332															
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance													
		λ (nm)		n _λ										λ (nm)		τ5mm		τ10mm									
n ₂₃₂₅		2325.42		1.67450		P _{d,C}		0.3041		RC (S)		1		2400		0.774		0.600									
n ₁₉₇₀		1970.09		1.68160		P _{e,d}		0.2383		RA (S)		2		2200		0.924		0.854									
n ₁₅₃₀		1529.58		1.68930		P _{g,F}		0.5469		D _W		1		2000		0.986		0.972									
n ₁₁₂₉		1128.64		1.69601		P' _{d,c'}		0.2535		D _A		3		1800		0.999		0.998									
n ₁₀₆₄		1064.00		1.69720		P' _{e,d}		0.2363		R _{OH} (S)		1		1600		0.999		0.998									
n _t		1013.98		1.69818		P' _{g,F'}		0.4860		RP (S)		2		1400		0.999		0.998									
n _s		852.11		1.70190						CR		1		1200		0.999		0.998									
n _{A'}		768.19		1.70441		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1060		0.999		0.998									
n _r		706.52		1.70670										P _{F,e}		-0.0028		°C		α		1000		0.999		0.998	
n _C		656.27		1.70898										P _{g,F}		-0.0071		-50/-40		53		950		0.999		0.998	
n _{C'}		643.85		1.70962										P _{C,t}		0.0155		-40/-30		54		900		0.999		0.998	
n _{He-Ne}		632.80		1.71021										-30/-20		56		850		0.999		0.998					
n _D		589.29		1.71287										-20/-10		57		700		0.999		0.998					
n _d		587.56		1.71300										-10/0		57		650		0.999		0.998					
n _e		546.07		1.71615										0/10		58		600		0.999		0.998					
n _F		486.13		1.72220		Thermal Properties								10/20		61		550		0.999		0.998					
n _{F'}		479.99		1.72295		T _g (°C)				640				20/30		62		480		0.999		0.998					
n _g		435.84		1.72943		T _s (°C)				665				30/40		62		460		0.998		0.996					
n _h		404.66		1.73545		T ₁₀ ^{14.5} (°C)				573				40/50		63		440		0.997		0.993					
n _i		365.01		1.74574		T ₁₀ ¹³ (°C)				619				50/60		64		420		0.995		0.990					
						α _{-50/80°C} (10 ⁻⁷ /K)				61				60/70		64		400		0.993		0.984					
						α _{100/300°C} (10 ⁻⁷ /K)				77				70/80		65		390		0.990		0.977					
						λ (W/(m·K))				0.77				80/90		65		380		0.987		0.964					
														90/100		66		370		0.975		0.939					
Constants of Dispersion Formula														100/110		67		360		0.950		0.899					
A ₀		2.87989018E+00												110/120		67		350		0.914		0.833					
A ₁		-1.46958687E-02												120/130		68		340		0.860		0.738					
A ₂		1.89956868E-02												130/140		69		330		0.785		0.614					
A ₃		6.06495285E-04												140/150		70		320		0.687		0.473					
A ₄		-2.91346717E-05												150/160		71		310		0.577		0.334					
A ₅		1.65584289E-06																300		0.464		0.217					
Density			Solarization			Temperature Coefficients of Refractive Index					320		0.687		0.473												
ρ (g/cm ³)		3.78									△λ (%)		-1.7		310		0.577		0.334								
Range of Temperature (°C)		dn/dt relative (×10 ⁻⁶ / °C)									300		0.464		0.217												
		t	s	C	C'	He-Ne	d	e	F	F'	g	290		0.355		0.128											
-60 ~ -40		3.6	3.8	4.0	4.1	4.1	4.2	4.3	4.7	4.7	5.1	280		0.248		0.063											
-40 ~ -20		3.6	3.8	4.0	4.0	4.1	4.3	4.3	4.8	4.9	5.2					Coloration Code											
-20 ~ 0		3.7	3.9	4.1	4.1	4.1	4.3	4.5	4.8	4.9	5.3	λ ₈₀ (λ ₇₀)/λ ₅		360/270													
0 ~ 20		3.7	3.9	4.1	4.1	4.1	4.4	4.5	5.0	5.1	5.4					Coloration of Internal Transmittance											
20 ~ 40		3.7	3.9	4.1	4.1	4.2	4.4	4.6	5.0	5.1	5.5	λτ ₈₀ /λτ ₅		337/268													
40 ~ 60		3.7	3.9	4.2	4.2	4.2	4.5	4.7	5.1	5.2	5.6					Constants of dn/dt											
60 ~ 80		3.8	4.0	4.3	4.3	4.4	4.7	4.9	5.3	5.3	5.7	D ₀		D ₁		D ₂											
80 ~ 100		3.9	4.1	4.5	4.5	4.5	4.8	5.0	5.4	5.4	5.8	3.18E-06		1.31E-08		-1.47E-11											
100 ~ 120		4.1	4.3	4.7	4.7	4.8	5.1	5.3	5.4	5.4	6.0	E ₀		E ₁		λ _{TK}											
120 ~ 140		4.2	4.4	4.8	4.8	4.9	5.3	5.4	5.6	5.6	6.2	5.57E-07		3.42E-10		1.46E-01											
140 ~ 160		4.3	4.5	5.0	5.0	5.1	5.4	5.6	5.7	5.7	6.5																

H-LaK8A	720503	n _d = 1.72000	v _d = 50.34	n _F − n _C = 0.014302
		n _e = 1.72341	v _e = 50.10	n _{F'} − n _{C'} = 0.014439

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance										
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm								
n ₂₃₂₅	2325.42	1.68225	P _{d,C}	0.3021	RC (S)	1	2400	0.828	0.686								
n ₁₉₇₀	1970.09	1.68879	P _{e,d}	0.2384	RA (S)	3	2200	0.946	0.895								
n ₁₅₃₀	1529.58	1.69593	P _{g,F}	0.5503	D _W	1	2000	0.991	0.982								
n ₁₁₂₉	1128.64	1.70232	P' _{d,c'}	0.2521	D _A	3	1800	0.999	0.998								
n ₁₀₆₄	1064.00	1.70349	P' _{e,d}	0.2362	R _{OH} (S)	1	1600	0.999	0.998								
n _t	1013.98	1.70446	P' _{g,F'}	0.4883	RP (S)	2	1400	0.999	0.998								
n _s	852.11	1.70823			CR	1	1200	0.999	0.998								
n _{A'}	768.19	1.71084	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998								
n _r	706.52	1.71325					1000	0.999	0.998								
n _C	656.27	1.71568					950	0.999	0.998								
n _{C'}	643.85	1.71636					900	0.999	0.998								
n _{He-Ne}	632.80	1.71700	P _{F,e}	-0.0030	°C	α	850	0.999	0.998								
n _D	589.29	1.71987	P _{g,F}	-0.0097	-50/-40	63	800	0.999	0.998								
n _d	587.56	1.72000	P _{C,t}	0.0005	-40/-30	66	750	0.999	0.998								
n _e	546.07	1.72341	P _{C,s}	-0.0003	-30/-20	68	700	0.999	0.998								
n _F	486.13	1.72998	Thermal Properties		-20/-10	68	650	0.999	0.998								
n _{F'}	479.99	1.73080			-10/0	69	600	0.999	0.998								
n _g	435.84	1.73785			0/10	70	550	0.999	0.998								
n _h	404.66	1.74443			10/20	71	500	0.999	0.998								
n _i	365.01	1.75588			20/30	71	480	0.999	0.998								
					30/40	72	460	0.998	0.996								
			Mechanical Properties		40/50	72	440	0.997	0.994								
Constants of Dispersion Formula					50/60	73	420	0.995	0.990								
					60/70	73	400	0.992	0.983								
A ₀	2.89933470E+00				70/80	74	390	0.987	0.974								
A ₁	-1.34878716E-02				80/90	74	380	0.979	0.959								
A ₂	1.90766692E-02		HK (10 ⁷ Pa)	606	90/100	75	370	0.965	0.931								
A ₃	1.36400166E-03		F _A	108	100/110	75	360	0.945	0.880								
A ₄	-1.50217455E-04		E (GPa)	107.5	110/120	76	350	0.900	0.804								
A ₅	9.16048470E-06		G (GPa)	40.9	120/130	77	340	0.812	0.689								
Density			μ	0.313	130/140	79	330	0.717	0.530								
			σ _b (MPa)	76	140/150	80	320	0.581	0.330								
			B (10 ⁻¹² /Pa)	1.73	150/160	81	310	0.326	0.110								
ρ (g/cm ³)	3.87	Solarization		Temperature Coefficients of Refractive Index													
Range of Temperature (°C)											dn/dt relative (×10 ⁻⁶ / °C)						
		t	s								C	C'	He-Ne	d	e	F	F'
-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										λ ₈₀ (λ ₇₀)/λ ₅		370/305					
Coloration of Internal Transmittance										λτ ₈₀ /λτ 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	v _d = 50.34	n _F − n _C = 0.014302
		n _e = 1.72341	v _e = 50.10	n _{F'} − n _{C'} = 0.014439

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42		P _{d,C}	0.3014	RC (S)	1	2400	0.876	0.768				
n ₁₉₇₀	1970.09		P _{e,d}	0.2384	RA (S)	3	2200	0.965	0.932				
n ₁₅₃₀	1529.58		P _{g,F}	0.5517	D _W	1	2000	0.986	0.973				
n ₁₁₂₉	1128.64	1.70247	P' _{d,c'}	0.2507	D _A	3	1800	0.995	0.990				
n ₁₀₆₄	1064.00	1.70360	P' _{e,d}	0.2362	R _{OH} (S)	1	1600	0.998	0.997				
n _t	1013.98	1.70455	P' _{g,F'}	0.4896	RP (S)	2	1400	0.999	0.998				
n _s	852.11	1.70826			CR	1	1200	0.999	0.998				
n _{A'}	768.19	1.71086	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998				
n _r	706.52	1.71327							1000	0.999	0.998		
n _C	656.27	1.71569					P _{F,e}	-0.0016			950	0.999	0.998
n _{C'}	643.85	1.71638					P _{g,F}	-0.0083	°C	α	900	0.999	0.998
n _{He-Ne}	632.80	1.71701					P _{C,t}	-0.0051	-50/-40	66	850	0.999	0.998
n _D	589.29	1.71987	P _{C,s}	-0.0017	-40/-30	68	800	0.999	0.998				
n _d	587.56	1.72000	Thermal Properties		-30/-20	69	750	0.999	0.998				
n _e	546.07	1.72341			-20/-10	70	650	0.999	0.998				
n _F	486.13	1.73000			T _g (°C)	651	600	0.999	0.998				
n _{F'}	479.99	1.73082			T _s (°C)	680	550	0.999	0.998				
n _g	435.84	1.73789			T ₁₀ ^{14.5} (°C)	589	500	0.999	0.997				
n _h	404.66	1.74450	T ₁₀ ¹³ (°C)	617	20/30	74	480	0.998	0.996				
n _i	365.01	1.75588	α _{-50/80°C} (10 ⁻⁷ /K)	74	30/40	75	460	0.997	0.994				
			α _{100/300°C} (10 ⁻⁷ /K)	88	40/50	75	440	0.996	0.992				
			λ (W/(m·K))	0.83	50/60	76	420	0.994	0.989				
Constants of Dispersion Formula					60/70	77	400	0.992	0.984				
			Mechanical Properties		70/80	78	390	0.989	0.978				
					80/90	79	380	0.984	0.968				
					90/100	79	370	0.975	0.950				
					100/110	80	360	0.958	0.919				
A ₀	2.89634931E+00	HK (10 ⁷ Pa)			606	110/120	81	350	0.931	0.868			
A ₁	-1.17449806E-02	F _A	156	120/130	83	340	0.890	0.792					
A ₂	2.12156990E-02	E (GPa)	103.9	130/140	84	330	0.821	0.674					
A ₃	6.32018297E-04	G (GPa)	39.9	140/150	85	320	0.724	0.524					
A ₄	-3.39053843E-05	μ	0.301	150/160	87	310	0.570	0.325					
A ₅	2.46626102E-06	σ _b (MPa)	90			300	0.336	0.113					
		B (10 ⁻¹² /Pa)	1.67			290							
						280							
Range of Temperature	Temperature Coefficients of Refractive Index												
	dn/dt relative (×10 ⁻⁶ / °C)												

H-LaK9	699511	n _d = 1.69930	v _d = 51.11	n _F − n _C = 0.013682
		n _e = 1.70256	v _e = 50.82	n _{F'} − n _{C'} = 0.013825

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.66716	P _{d,C}	0.2997	RC (S)	1	2400	0.916	0.838		
n ₁₉₇₀	1970.09	1.67189	P _{e,d}	0.2383	RA (S)	3	2200	0.969	0.939		
n ₁₅₃₀	1529.58	1.67730	P _{g,F}	0.5569	D _W	2	2000	0.987	0.974		
n ₁₁₂₉	1128.64	1.68265	P' _{d,c'}	0.2495	D _A	3	1800	0.994	0.988		
n ₁₀₆₄	1064.00	1.68370	P' _{e,d}	0.2358	R _{OH} (S)	1	1600	0.998	0.995		
n _t	1013.98	1.68458	P' _{g,F'}	0.4940	RP (S)	3	1400	0.999	0.998		
n _s	852.11	1.68810			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.69058	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.69288					1000	0.999	0.998		
n _C	656.27	1.69520					950	0.999	0.998		
n _{C'}	643.85	1.69585					900	0.999	0.998		
n _{He-Ne}	632.80	1.69646					850	0.999	0.998		
n _D	589.29	1.69918	P _{F,e}	-0.0001	°C	α	800	0.999	0.998		
n _d	587.56	1.69930	P _{g,F}	-0.0018	-50/-40	79	750	0.999	0.998		
n _e	546.07	1.70256	P _{C,t}	-0.0116	-40/-30	80	700	0.999	0.998		
n _F	486.13	1.70888	P _{C,s}	-0.0041	-30/-20	81	650	0.999	0.998		
n _{F'}	479.99	1.70967	Thermal Properties		-20/-10	82	600	0.999	0.998		
n _g	435.84	1.71650			T _g (°C)	654	-10/0	83	550	0.999	0.998
n _h	404.66	1.72288			T _s (°C)	695	0/10	85	500	0.996	0.992
n _i	365.01	1.73368			T ₁₀ ^{14.5} (°C)	618	10/20	85	480	0.994	0.988
					T ₁₀ ¹³ (°C)	645	20/30	87	460	0.991	0.983
			α _{-50/80°C} (10 ⁻⁷ /K)	85	30/40	88	440	0.991	0.983		
			α _{100/300°C} (10 ⁻⁷ /K)	95	40/50	88	440	0.989	0.978		
			λ (W/(m·K))	0.66	50/60	90	420	0.987	0.974		
Constants of Dispersion Formula					60/70	91	400	0.982	0.964		
			Mechanical Properties		70/80	91	390	0.976	0.953		
HK (10 ⁷ Pa)	511	80/90			91	380	0.966	0.934			
F _A	253	90/100			93	370	0.948	0.899			
E (GPa)	84.5	100/110			94	360	0.918	0.842			
G (GPa)	32.3	110/120			94	350	0.868	0.754			
			μ	0.309	120/130	96	340	0.792	0.627		
			σ _b (MPa)	81	130/140	96	330	0.685	0.469		
Density		Solarization	B (10 ⁻¹² /Pa)	1.37	140/150	96	320	0.540	0.292		
ρ (g/cm ³)	4.26		△λ (%)	-0.4	150/160	98	310	0.366	0.134		
Range of Temperature	Temperature Coefficients of Refractive Index							300	0.200	0.040	
								290			
	dn/dt relative (×10 ⁻⁶ / °C)							280			

Coloration Code	
λ ₈₀ (λ ₇₀)/λ ₅	370/310
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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				v _d = 55.89				n _F − n _C = 0.011650														
				n _e = 1.65391				v _e = 55.62				n _{F'} − n _{C'} = 0.011757														
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance												
			λ (nm)			n _λ			P _{d,C}		0.3030		RC (S)		1		λ (nm)		τ5mm		τ10mm					
n ₂₃₂₅			2325.42			1.61921			P _{e,d}		0.2386		RA (S)		2		2400		0.891		0.794					
n ₁₉₇₀			1970.09			1.62487			P _{g,F}		0.5433		D _W		1		2200		0.966		0.933					
n ₁₅₃₀			1529.58			1.63105			P' _{d,c'}		0.2526		D _A		4		2000		0.990		0.980					
n ₁₁₂₉			1128.64			1.63650			P' _{e,d}		0.2365		R _{OH} (S)		1		1800		0.995		0.990					
n ₁₀₆₄			1064.00			1.63749			P' _{g,F'}		0.4814		RP (S)		2		1600		0.999		0.998					
n _t			1013.98			1.63830							CR		2		1400		0.999		0.998					
n _s			852.11			1.64144			Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1200		0.999		0.998					
n _{A'}			768.19			1.64361											1060		0.999		0.998					
n _r			706.52			1.64560											1000		0.999		0.998					
n _C			656.27			1.64760											950		0.999		0.998					
n _{C'}			643.85			1.64816											900		0.999		0.998					
n _{He-Ne}			632.80			1.64869			P _{F,e}		-0.0010		°C		α		850		0.999		0.998					
n _D			589.29			1.65103			P _{g,F}		-0.0074		-50/-40		59		800		0.999		0.998					
n _d			587.56			1.65113			P _{C,t}		-0.0127		-40/-30		61		750		0.999		0.998					
n _e			546.07			1.65391			P _{C,s}		-0.0058		-30/-20		62		700		0.999		0.998					
n _F			486.13			1.65925			Thermal Properties				-20/-10		63		650		0.999		0.998					
n _{F'}			479.99			1.65992							T _g (°C)		656		-10/0		63		600		0.999		0.998	
n _g			435.84			1.66558							T _s (°C)		687		0/10		64		550		0.999		0.998	
n _h			404.66			1.67083							T ₁₀ ^{14.5} (°C)		589		10/20		65		500		0.999		0.998	
n _i			365.01			1.67985							T ₁₀ ¹³ (°C)		629		20/30		65		480		0.999		0.998	
									α _{50/80°C} (10 ⁻⁷ /K)		67		30/40		66		460		0.999		0.998					
									α _{100/300°C} (10 ⁻⁷ /K)		82		40/50		67		440		0.998		0.995					
									λ (W/(m·K))		0.80		50/60		68		420		0.996		0.992					
													60/70		68		400		0.994		0.989					
													70/80		69		390		0.991		0.985					
Constants of Dispersion Formula						Mechanical Properties				80/90		69		380		0.988		0.979								
A ₀			2.68014719E+00							HK (10 ⁷ Pa)		552		90/100		70		370		0.982		0.968				
A ₁			-1.13022222E-02							F _A		170		100/110		71		360		0.971		0.945				
A ₂			1.49971961E-02							E (GPa)		90.3		110/120		72		350		0.952		0.910				
A ₃			1.08435000E-03							G (GPa)		34.4		120/130		73		340		0.920		0.849				
A ₄			-1.25822106E-04			μ		0.311		130/140		74		330		0.867		0.756								
A ₅			7.18648482E-06			σ _b (MPa)		54		140/150		75		320		0.790		0.628								
						B (10 ⁻¹² /Pa)		1.90		150/160		76		310		0.684		0.469								
														300		0.551		0.305								
														290		0.401		0.163								
														280		0.249		0.064								
														Coloration Code												
														λ ₈₀ (λ ₇₀)/λ ₅		350/275										
														Coloration of Internal Transmittance												
														λτ ₈₀ /λτ 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			v _d = 56.24			n _F − n _C = 0.011576															
						n _e = 1.65376			v _e = 56.02			n _{F'} − n _{C'} = 0.011670															
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance													
		λ (nm)		n _λ										λ (nm)		τ5mm		τ10mm									
n ₂₃₂₅		2325.42				P _{d,C}		0.3049		RC (S)		1		2400		0.789		0.623									
n ₁₉₇₀		1970.09				P _{e,d}		0.2384		RA (S)		1		2200		0.933		0.871									
n ₁₅₃₀		1529.58				P _{g,F}		0.5434		D _W		1		2000		0.980		0.961									
n ₁₁₂₉		1128.64				P' _{d,c'}		0.2545		D _A		3		1800		0.993		0.985									
n ₁₀₆₄		1064.00		1.63688		P' _{e,d}		0.2365		R _{OH} (S)		1		1600		0.997		0.994									
n _t		1013.98		1.63776		P' _{g,F'}		0.4833		RP (S)		2		1400		0.995		0.991									
n _s		852.11		1.64113						CR		1		1200		0.999		0.998									
n _{A'}		768.19		1.64340		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1060		0.999		0.998									
n _r		706.52		1.64543										P _{F,e}		-0.0022		°C		α		1000		0.999		0.998	
n _C		656.27		1.64747										P _{g,F}		-0.0068		-50/-40		32		950		0.999		0.998	
n _{C'}		643.85		1.64803										P _{C,t}		0.0262		-40/-30		34		900		0.999		0.998	
n _{He-Ne}		632.80		1.64856										-30/-20		36		850		0.999		0.998					
n _D		589.29		1.65089		Thermal Properties								-20/-10		36		650		0.999		0.998					
n _d		587.56		1.65100						T _g (°C)		689		-10/0		36		600		0.999		0.998					
n _e		546.07		1.65376						T _s (°C)		723		0/10		37		550		0.999		0.998					
n _F		486.13		1.65905						T ₁₀ ^{14.5} (°C)		646		10/20		39		500		0.999		0.998					
n _{F'}		479.99		1.65970										20/30		40		480		0.999		0.998					
n _g		435.84		1.66534										30/40		41		460		0.998		0.997					
n _h		404.66		1.67056										40/50		41		440		0.998		0.996					
n _i		365.01		1.67944										50/60		42		420		0.997		0.993					
														60/70		42		400		0.993		0.987					
														70/80		42		390		0.989		0.978					
Constants of Dispersion Formula						Mechanical Properties				80/90		43		380		0.983		0.967									
										HK (10 ⁷ Pa)		680		90/100		45		370		0.973		0.947					
A ₀		2.67752226E+00				F _A		75		100/110		46		360		0.956		0.913									
A ₁		-1.24341775E-02				E (GPa)		104.6		110/120		48		350		0.926		0.858									
A ₂		1.81020008E-02				G (GPa)		40.4		120/130		49		340		0.883		0.781									
A ₃		-1.38622158E-04				μ		0.296		130/140		51		330		0.817		0.667									
A ₄		6.22866969E-05				σ _b (MPa)		121		140/150		52		320		0.732		0.536									
A ₅		-3.07013984E-06				B (10 ⁻¹² /Pa)		2.27		150/160		54		310		0.627		0.393									
Density		3.34		Solarization		Temperature Coefficients of Refractive Index																					
ρ (g/cm ³)																											

H-LaK12			697562			n _d = 1.69680			v _d = 56.19			n _F − n _C = 0.012400																		
						n _e = 1.69975			v _e = 55.98			n _{F'} − n _{C'} = 0.012500																		
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance																
			λ (nm)			n _λ			P _{d,C}		0.3056		RC (S)		1		λ (nm)		τ5mm		τ10mm									
n ₂₃₂₅			2325.42			1.65825			P _{e,d}		0.2379		RA (S)		2		2400		0.795		0.614									
n ₁₉₇₀			1970.09			1.66578			P _{g,F}		0.5395		D _W		1		2200		0.953		0.898									
n ₁₅₃₀			1529.58			1.67381			P' _{d,c'}		0.2552		D _A		4		2000		0.988		0.969									
n ₁₁₂₉			1128.64			1.68059			P' _{e,d}		0.2360		R _{OH} (S)		1		1800		0.999		0.998									
n ₁₀₆₄			1064.00			1.68176			P' _{g,F'}		0.4792		RP (S)		2		1600		0.999		0.998									
n _t			1013.98			1.68271							CR		1		1400		0.999		0.998									
n _s			852.11			1.68629			Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1200		0.999		0.998									
n _{A'}			768.19			1.68869											P _{F,e}		-0.0027		°C		α		1060		0.999		0.998	
n _r			706.52			1.69087											P _{g,F}		-0.0108		-50/-40		53		1000		0.999		0.998	
n _C			656.27			1.69301											P _{C,t}		0.0182		-40/-30		55		950		0.999		0.998	
n _{C'}			643.85			1.69361			P _{C,s}		0.0067		-30/-20		57		900		0.999		0.998									
n _{He-Ne}			632.80			1.69418			Thermal Properties								850		0.999		0.998									
n _D			589.29			1.69668											T _g (°C)		673		-20/-10		58		800		0.999		0.998	
n _d			587.56			1.69680											T _s (°C)		696		0/10		59		750		0.999		0.998	
n _e			546.07			1.69975											T ₁₀ ^{14.5} (°C)		611		10/20		59		700		0.999		0.998	
n _F			486.13			1.70541			Mechanical Properties								650		0.999		0.998									
n _{F'}			479.99			1.70611											T ₁₀ ¹³ (°C)		638		20/30		60		600		0.999		0.998	
n _g			435.84			1.71210											α _{-50/80°C} (10 ⁻⁷ /K)		56		30/40		60		550		0.999		0.998	
n _h			404.66			1.71764											α _{100/300°C} (10 ⁻⁷ /K)		72		40/50		60		500		0.999		0.998	
n _i			365.01			1.72713			λ (W/(m·K))		1.07		50/60		61		480		0.999		0.998									
													60/70		61		460		0.999		0.998									
													70/80		61		440		0.999		0.994									
Constants of Dispersion Formula														80/90		62		420		0.999		0.989								
A ₀			2.83112539E+00											90/100		62		400		0.999		0.984								
A ₁			-1.55847682E-02											100/110		63		390		0.997		0.978								
A ₂			1.58070931E-02											110/120		64		380		0.992		0.967								
A ₃			1.24470183E-03											120/130		65		370		0.983		0.948								
A ₄			-1.41192909E-04											130/140		66		360		0.968		0.918								
A ₅			7.83660883E-06											140/150		67		350		0.942		0.858								
														150/160		67		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 (°C)			Temperature Coefficients of Refractive Index																											
			dn/dt relative (×10 ⁻⁶ / °C)																											
			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																	
			Coloration Code																											
			λ ₈₀ (λ ₇₀)/λ ₅										360/270																	
			Coloration of Internal Transmittance																											
			λτ ₈₀ /λτ 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	v _d = 58.40	n _F − n _C = 0.011157
		n _e = 1.65426	v _e = 58.15	n _{F'} − n _{C'} = 0.011251

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.61677	P _{d,C}	0.3047	RC (S)	1	2400	0.840	0.706		
n ₁₉₇₀	1970.09	1.62349	P _{e,d}	0.2384	RA (S)	3	2200	0.954	0.910		
n ₁₅₃₀	1529.58	1.63071	P _{g,F}	0.5432	D _W	3	2000	0.991	0.982		
n ₁₁₂₉	1128.64	1.63688	P' _{d,c'}	0.2542	D _A	4	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.63795	P' _{e,d}	0.2364	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.63882	P' _{g,F'}	0.4817	RP (S)	3	1400	0.999	0.998		
n _s	852.11	1.64210			CR	2	1200	0.999	0.998		
n _{A'}	768.19	1.64428	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.64625					1000	0.999	0.998		
n _C	656.27	1.64820					950	0.999	0.998		
n _{C'}	643.85	1.64874					900	0.999	0.998		
n _{He-Ne}	632.80	1.64924					850	0.999	0.998		
n _D	589.29	1.65150	P _{F,e}	-0.0017	°C	α	800	0.999	0.998		
n _d	587.56	1.65160	P _{g,F}	-0.0034	-50/-40	57	750	0.999	0.998		
n _e	546.07	1.65426	P _{C,t}	0.0176	-40/-30	59	700	0.999	0.998		
n _F	486.13	1.65935	P _{C,s}	0.0062	-30/-20	60	650	0.999	0.998		
n _{F'}	479.99	1.65999	Thermal Properties		-20/-10	61	600	0.999	0.998		
n _g	435.84	1.66541			T _g (°C)	622	-10/0	62	550	0.999	0.998
n _h	404.66	1.67043			T _s (°C)	659	0/10	63	500	0.999	0.998
n _i	365.01	1.67894			T ₁₀ ^{14.5} (°C)	570	10/20	64	480	0.997	0.996
					T ₁₀ ¹³ (°C)	615	20/30	64	460	0.995	0.994
					30/40	65	440	0.993	0.992		
					40/50	65	420	0.991	0.990		
					50/60	66	400	0.989	0.988		
					60/70	66	390	0.986	0.985		
					70/80	67	380	0.982	0.979		
					80/90	68	370	0.974	0.968		
Constants of Dispersion Formula					90/100	68	360	0.969	0.949		
A ₀	2.68404972E+00				100/110	69	350	0.948	0.916		
A ₁	-1.34999767E-02				110/120	70	340	0.920	0.863		
A ₂	1.56364220E-02				120/130	71	330	0.881	0.783		
A ₃	3.91605064E-04				130/140	73	320	0.816	0.672		
A ₄	-8.87810681E-06				140/150	74	310	0.725	0.531		
A ₅	2.90663584E-07				150/160	75	300	0.607	0.377		
							290	0.482	0.241		
							280	0.357	0.136		

H-LaK51	697555	n _d = 1.69680	v _d = 55.46	n _F − n _C = 0.012564
		n _e = 1.69980	v _e = 55.25	n _{F'} − n _{C'} = 0.012667

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.65840	P _{d,C}	0.3048	RC (S)	1	2400	0.757	0.575		
n ₁₉₇₀	1970.09	1.66575	P _{e,d}	0.2388	RA (S)	3	2200	0.923	0.846		
n ₁₅₃₀	1529.58	1.67368	P _{g,F}	0.5420	D _W	1	2000	0.986	0.960		
n ₁₁₂₉	1128.64	1.68042	P' _{d,c'}	0.2542	D _A	3	1800	0.999	0.993		
n ₁₀₆₄	1064.00	1.68159	P' _{e,d}	0.2368	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.68254	P' _{g,F'}	0.4808	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.68616			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.68859	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.69079					1000	0.999	0.998		
n _C	656.27	1.69297					950	0.999	0.998		
n _{C'}	643.85	1.69358					900	0.999	0.998		
n _{He-Ne}	632.80	1.69415					850	0.999	0.998		
n _D	589.29	1.69669	P _{F,e}	-0.0035	°C	α	800	0.999	0.998		
n _d	587.56	1.69680	P _{g,F}	-0.0095	-50/-40	52	750	0.999	0.998		
n _e	546.07	1.69980	P _{C,t}	0.0213	-40/-30	53	700	0.999	0.998		
n _F	486.13	1.70553	P _{C,s}	0.0085	-30/-20	54	650	0.999	0.998		
n _{F'}	479.99	1.70625	Thermal Properties		-20/-10	55	600	0.999	0.998		
n _g	435.84	1.71234			Tg (°C)	650	-10/0	56	550	0.999	0.998
n _h	404.66	1.71800			Ts (°C)	676	0/10	56	500	0.999	0.998
n _i	365.01	1.72765			T ₁₀ ^{14.5} (°C)	591	10/20	57	480	0.999	0.998
					T ₁₀ ¹³ (°C)	625	20/30	57	460	0.999	0.998
					30/40	58	440	0.999	0.998		
					40/50	58	420	0.997	0.993		
					50/60	58	400	0.992	0.987		
					60/70	59	390	0.990	0.980		
					70/80	59	380	0.985	0.971		
Constants of Dispersion Formula			Mechanical Properties		80/90	59	370	0.975	0.951		
A ₀	2.82930828E+00				90/100	60	360	0.957	0.918		
A ₁	-1.51991877E-02				100/110	61	350	0.928	0.862		
A ₂	1.69710302E-02				110/120	61	340	0.885	0.787		
A ₃	9.14047795E-04				120/130	62	330	0.827	0.683		
A ₄	-8.69746514E-05		G (GPa)	43.9	130/140	63	320	0.748	0.561		
A ₅	4.85293775E-06		μ	0.255	140/150	64	310	0.643	0.417		
Density		Solarization		σ _b (MPa)	64	150/160	65	300	0.553	0.308	
ρ (g/cm ³)	3.69			B (10 ⁻¹² /Pa)	1.70			290	0.451	0.206	
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										
								280	0.328	0.110	

Range of Temperature (°C)	Temperature Coefficients of Refractive Index										Coloration Code	
	dn/dt relative (×10 ⁻⁶ / °C)										λ ₈₀ (λ ₇₀)/λ ₅	
	t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance	
-60 ~ -40	3.9	4.1	4.2	4.3	4.4	4.5	4.7	5.0	5.0	5.4	λτ ₈₀ /λτ ₅	
-40 ~ -20	3.9	4.2	4.3	4.3	4.4	4.5	4.7	5.1	5.1	5.4	342/277	
-20 ~ 0	3.9	4.2	4.3	4.3	4.4	4.5	4.7	5.1	5.2	5.4	Constants of dn/dt	
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	D ₀	D ₁
40 ~ 60	4.1	4.4	4.5	4.6	4.7	4.7	4.9	5.4	5.4	5.8	4.02E-06	1.29E-08
60 ~ 80	4.1	4.4	4.6	4.7	4.6	4.9	5.0	5.5	5.5	5.9	E ₀	E ₁
80 ~ 100	4.2	4.4	4.7	4.8	4.8	5.0	5.0	5.5	5.5	6.0	λ _{TK}	
100 ~ 120	4.2	4.5	4.7	4.8	4.8	5.0	5.1	5.5	5.6	6.0	4.49E-07	2.06E-10
120 ~ 140	4.2	4.5	4.8	4.8	4.8	5.1	5.1	5.5	5.6	6.1	-2.62E-11	
140 ~ 160	4.3	4.4	4.8	4.9	4.9	5.1	5.1	5.6	5.6	6.1	2.05E-01	

H-LaK51A	697555	n _d = 1.69680	v _d = 55.46	n _F − n _C = 0.012564
		n _e = 1.69980	v _e = 55.25	n _{F'} − n _{C'} = 0.012667

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42		P _{d,C}	0.3048	RC (S)	1	2400	0.742	0.550			
n ₁₉₇₀	1970.09		P _{e,d}	0.2388	RA (S)	3	2200	0.904	0.817			
n ₁₅₃₀	1529.58		P _{g,F}	0.5420	D _W	1	2000	0.980	0.960			
n ₁₁₂₉	1128.64		P' _{d,c'}	0.2542	D _A	3	1800	0.997	0.994			
n ₁₀₆₄	1064.00	1.68155	P' _{e,d}	0.2368	R _{OH} (S)	1	1600	0.999	0.998			
n _t	1013.98	1.68252	P' _{g,F'}	0.4808	RP (S)	2	1400	0.999	0.998			
n _s	852.11	1.68615			CR	1	1200	0.999	0.998			
n _{A'}	768.19	1.68860	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.69080								1000	0.999	0.998
n _C	656.27	1.69297								950	0.999	0.998
n _{C'}	643.85	1.69358								900	0.999	0.998
n _{He-Ne}	632.80	1.69417								850	0.999	0.998
n _D	589.29	1.69670					800	0.999	0.998			
n _d	587.56	1.69680					750	0.999	0.998			
n _e	546.07	1.69980					700	0.999	0.998			
n _F	486.13	1.70553					650	0.999	0.998			
n _{F'}	479.99	1.70625					600	0.999	0.998			
n _g	435.84	1.71234					550	0.999	0.998			
n _h	404.66	1.71799					500	0.999	0.998			
n _i	365.01	1.72764					480	0.998	0.997			
							460	0.997	0.995			
							440	0.996	0.993			

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		Solarization	
ρ (g/cm ³)	3.65	△λ (%)	-3.5

Relative Partial Dispersion		Chemical Properties (grade)	
P _{d,C}	0.3048	RC (S)	1
P _{e,d}	0.2388	RA (S)	3
P _{g,F}	0.5420	D _W	1
P' _{d,c'}	0.2542	D _A	3
P' _{e,d}	0.2368	R _{OH} (S)	1
P' _{g,F'}	0.4808	RP (S)	2
		CR	1
Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)	
P _{F,e}	-0.0035	°C	α
P _{g,F}	-0.0095	-50/-40	48
P _{C,t}	0.0229	-40/-30	50
P _{C,s}	0.0093	-30/-20	50
		-20/-10	52
		-10/0	53
		0/10	55
		10/20	56
		20/30	56
		30/40	56
		40/50	59
		50/60	59
		60/70	60
		70/80	60
		80/90	63
		90/100	64
		100/110	64
		110/120	65
		120/130	65
		130/140	67
		140/150	69
		150/160	71
Thermal Properties		Expansion Coefficient α (×10 ⁻⁷ /K)	
T _g (°C)	648		
T _s (°C)	675		
T ₁₀ ^{14.5} (°C)	589		
T ₁₀ ¹³ (°C)	624		
α _{-50/80°C} (10 ⁻⁷ /K)	55		
α _{100/300°C} (10 ⁻⁷ /K)	72		
λ (W/(m·K))	0.92		
Mechanical Properties		Expansion Coefficient α (×10 ⁻⁷ /K)	
HK (10 ⁷ Pa)	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		

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	360/270
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 54.67	n _F − n _C = 0.013337
		n _e = 1.73234	v _e = 54.44	n _{F'} − n _{C'} = 0.013451

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.68934	P _{d,C}	0.3044	RC (S)	1	2400	0.769	0.591		
n ₁₉₇₀	1970.09	1.69681	P _{e,d}	0.2384	RA (S)	3	2200	0.926	0.857		
n ₁₅₃₀	1529.58	1.70490	P _{g,F}	0.5451	D _W	1	2000	0.978	0.956		
n ₁₁₂₉	1128.64	1.71188	P' _{d,c'}	0.2535	D _A	3	1800	0.994	0.988		
n ₁₀₆₄	1064.00	1.71310	P' _{e,d}	0.2364	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.71409	P' _{g,F'}	0.4840	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.71790			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.72047	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.72279					1000	0.999	0.998		
n _C	656.27	1.72510					950	0.999	0.998		
n _{C'}	643.85	1.72575					900	0.999	0.998		
n _{He-Ne}	632.80	1.72635					850	0.999	0.998		
n _D	589.29	1.72904	P _{F,e}	-0.0026	°C	α	800	0.999	0.998		
n _d	587.56	1.72916	P _{g,F}	-0.0077	-50/-40	54	750	0.999	0.998		
n _e	546.07	1.73234	P _{C,t}	0.0205	-40/-30	56	700	0.999	0.998		
n _F	486.13	1.73844	P _{C,s}	0.0082	-30/-20	57	650	0.999	0.998		
n _{F'}	479.99	1.73920	Thermal Properties		-20/-10	58	600	0.999	0.998		
n _g	435.84	1.74571			Tg (°C)	688	-10/0	58	550	0.999	0.998
n _h	404.66	1.75176			Ts (°C)	705	0/10	59	500	0.999	0.998
n _i	365.01	1.76205			T ₁₀ ^{14.5} (°C)	620	10/20	59	480	0.999	0.998
					T ₁₀ ¹³ (°C)	645	20/30	59	460	0.999	0.998
					30/40	60	440	0.999	0.998		
					40/50	61	420	0.997	0.995		
					50/60	61	400	0.996	0.992		
					60/70	62	390	0.994	0.988		
					70/80	62	380	0.991	0.982		
					80/90	63	370	0.986	0.973		
Constants of Dispersion Formula			Mechanical Properties		90/100	64	360	0.978	0.957		
A ₀	2.93497096E+00				100/110	65	350	0.969	0.938		
A ₁	-1.56596537E-02				110/120	66	340	0.948	0.898		
A ₂	1.92100308E-02				120/130	67	330	0.918	0.842		
A ₃	6.55992008E-04				130/140	68	320	0.873	0.763		
A ₄	-3.57893356E-05		E (GPa)	117.8	140/150	69	310	0.818	0.669		
A ₅	1.86989357E-06		G (GPa)	45.3	150/160	70	300	0.732	0.536		
			μ	0.301			290	0.670	0.449		
Density		Solarization	σ _b (MPa)	91			280	0.583	0.340		
ρ (g/cm ³)	3.98		△λ (%)	-2.6	B (10 ⁻¹² /Pa)	1.35			0.428	0.183	
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

H-LaK53A	755523	n _d = 1.75500	v _d = 52.32	n _F − n _C = 0.014430
		n _e = 1.75844	v _e = 52.09	n _{F'} − n _{C'} = 0.014561

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.71389	P _{d,C}	0.3028	RC (S)	1	2400	0.778	0.605			
n ₁₉₇₀	1970.09	1.72137	P _{e,d}	0.2384	RA (S)	2	2200	0.934	0.872			
n ₁₅₃₀	1529.58	1.72950	P _{g,F}	0.5468	D _W	1	2000	0.990	0.980			
n ₁₁₂₉	1128.64	1.73661	P' _{d,c'}	0.2527	D _A	3	1800	0.999	0.998			
n ₁₀₆₄	1064.00	1.73789	P' _{e,d}	0.2362	R _{OH} (S)	1	1600	0.999	0.998			
n _t	1013.98	1.73893	P' _{g,F'}	0.4855	RP (S)	1	1400	0.999	0.998			
n _s	852.11	1.74293			CR		1200	0.999	0.998			
n _{A'}	768.19	1.74566	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)	1060	0.999	0.998			
n _r	706.52	1.74815										
n _C	656.27	1.75063					P _{F,e}	-0.0026				
n _{C'}	643.85	1.75132					P _{g,F}	-0.0099	°C	α		
n _{He-Ne}	632.80	1.75197					P _{C,t}	0.0172	-50/-40	53		
n _D	589.29	1.75487	P _{C,s}	0.0076	-40/-30	54						
n _d	587.56	1.75500	Thermal Properties			-30/-20	55					
n _e	546.07	1.75844										
n _F	486.13	1.76506				T _g (°C)	695	-20/-10	56			
n _{F'}	479.99	1.76588				T _s (°C)	712	-10/0	57			
n _g	435.84	1.77295				T ₁₀ ^{14.5} (°C)	631	0/10	58			
n _h	404.66	1.77953			T ₁₀ ¹³ (°C)	652	10/20	59				
n _i	365.01	1.79081					20/30	59				
							30/40	59				
							40/50	60				
							50/60	60				
							60/70	60				
							70/80	61				
			Mechanical Properties			80/90	61					
						90/100	62					
						F _A	58	100/110	63			
						E (GPa)	121.8	110/120	63			
						G (GPa)	46.4	120/130	64			
			μ	0.313	130/140	65						
			σ _b (MPa)	102	140/150	66						
			B (10 ⁻¹² /Pa)	1.36	150/160	67						
			Temperature Coefficients of Refractive Index									
			dn/dt relative (×10 ⁻⁶ / °C)									
			Range of Temperature									

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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

H-LaK53B	755523	n _d = 1.75500	v _d = 52.32	n _F − n _C = 0.014430
		n _e = 1.75844	v _e = 52.09	n _{F'} − n _{C'} = 0.014561

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42		P _{d,C}	0.3028	RC (S)	1	2400	0.799	0.638
n ₁₉₇₀	1970.09		P _{e,d}	0.2384	RA (S)	1	2200	0.928	0.862
n ₁₅₃₀	1529.58		P _{g,F}	0.5475	D _W	1	2000	0.975	0.950
n ₁₁₂₉	1128.64	1.73669	P' _{d,e'}	0.2527	D _A	3	1800	0.990	0.981
n ₁₀₆₄	1064.00	1.73793	P' _{e,d}	0.2362	R _{OH} (S)	1	1600	0.996	0.993
n _t	1013.98	1.73896	P' _{g,F'}	0.4862	RP (S)	2	1400	0.996	0.992
n _s	852.11	1.74293			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.74567	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.74815					1000	0.999	0.998
n _C	656.27	1.75063					950	0.999	0.998
n _{C'}	643.85	1.75132					900	0.999	0.998
n _{He-Ne}	632.80	1.75199	P _{F,e}	-0.0026	°C	α	850	0.999	0.998
n _D	589.29	1.75487	P _{g,F}	-0.0092	-50/-40	51	800	0.999	0.998
n _d	587.56	1.75500	P _{C,t}	0.0151	-40/-30	53	750	0.999	0.998
n _e	546.07	1.75844	P _{C,s}	0.0076	-30/-20	54	700	0.999	0.998
n _F	486.13	1.76506	Thermal Properties		-20/-10	55	650	0.999	0.998
n _{F'}	479.99	1.76588			-10/0	55	600	0.999	0.998
n _g	435.84	1.77296	T _g (°C)	683	0/10	57	550	0.999	0.998
n _h	404.66	1.77955	T _s (°C)	712	10/20	57	500	0.998	0.996
n _i	365.01	1.79083	T ₁₀ ^{14.5} (°C)	622	20/30	58	480	0.997	0.994
			T ₁₀ ¹³ (°C)	643	30/40	59	460	0.996	0.992
			α _{-50/80°C} (10 ⁻⁷ /K)	57	40/50	59	440	0.994	0.989
			α _{100/300°C} (10 ⁻⁷ /K)	73	50/60	60	420	0.993	0.986
			λ (W/(m·K))	0.90	60/70	60	400	0.991	0.982
					70/80	60	390	0.988	0.977
Constants of Dispersion Formula			Mechanical Properties		80/90	60	380	0.985	0.970
					90/100	60	370	0.977	0.955
A ₀	3.01608135E+00		HK (10 ⁷ Pa)	635	100/110	62	360	0.967	0.935
A ₁	-1.42847622E-02		F _A	65	110/120	62	350	0.949	0.901
A ₂	2.30284242E-02		E (GPa)	122.2	120/130	64	340	0.920	0.847
A ₃	1.69148291E-04		G (GPa)	46.9	130/140	65	330	0.882	0.778
A ₄	3.56310545E-05		μ	0.303	140/150	65	320	0.831	0.690
A ₅	-1.43259924E-06		σ _b (MPa)	91	150/160	67	310	0.764	0.584
Density			B (10 ⁻¹² /Pa)	1.30			300	0.690	0.476
							290	0.594	0.353
ρ (g/cm ³)	4.18						280	0.447	0.200
Solarization									
△λ (%)	-3.0								

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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		
λ ₈₀ (λ ₇₀)/λ ₅		360/270
Coloration of Internal Transmittance		
λτ ₈₀ /λτ 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	v _d = 51.05	n _F − n _C = 0.014377
		n _e = 1.73742	v _e = 50.82	n _{F'} − n _{C'} = 0.014511

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.69388	P _{d,C}	0.3026	RC (S)	1	2400	0.786	0.618		
n ₁₉₇₀	1970.09	1.70113	P _{e,d}	0.2379	RA (S)	2	2200	0.922	0.850		
n ₁₅₃₀	1529.58	1.70899	P _{g,F}	0.5467	D _W	1	2000	0.987	0.974		
n ₁₁₂₉	1128.64	1.71588	P' _{d,c'}	0.2522	D _A	3	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.71711	P' _{e,d}	0.2357	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.71813	P' _{g,F'}	0.4851	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.72204			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.72471	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.72718					1000	0.999	0.998		
n _C	656.27	1.72965					950	0.999	0.998		
n _{C'}	643.85	1.73034					900	0.999	0.998		
n _{He-Ne}	632.80	1.73099					850	0.999	0.998		
n _D	589.29	1.73387	P _{F,e}	-0.0023	°C	α	800	0.999	0.998		
n _d	587.56	1.73400	P _{g,F}	-0.0121	-50/-40	44	750	0.999	0.998		
n _e	546.07	1.73742	P _{C,t}	0.0138	-40/-30	47	700	0.999	0.998		
n _F	486.13	1.74403	P _{C,s}	0.0064	-30/-20	48	650	0.999	0.998		
n _{F'}	479.99	1.74485	Thermal Properties		-20/-10	49	600	0.999	0.998		
n _g	435.84	1.75189			T _g (°C)	636	-10/0	50	550	0.999	0.998
n _h	404.66	1.75842			T _s (°C)	665	0/10	51	500	0.999	0.998
n _i	365.01	1.76975			T ₁₀ ^{14.5} (°C)	575	10/20	51	480	0.999	0.998
					T ₁₀ ¹³ (°C)	618	20/30	52	460	0.998	0.996
			α _{-50/80°C} (10 ⁻⁷ /K)	51	30/40	52	440	0.997	0.994		
			α _{100/300°C} (10 ⁻⁷ /K)	67	40/50	53	420	0.995	0.989		
			λ (W/(m·K))	0.96	50/60	53	400	0.992	0.984		
Constants of Dispersion Formula					60/70	54	390	0.989	0.977		
			Mechanical Properties		70/80	54	380	0.983	0.966		
HK (10 ⁷ Pa)	698	80/90			55	370	0.973	0.947			
F _A	80	90/100			55	360	0.954	0.912			
E (GPa)	112.3	100/110			56	350	0.926	0.859			
G (GPa)	43.5	110/120			57	340	0.885	0.782			
			μ	0.291	120/130	58	330	0.823	0.677		
			σ _b (MPa)	85	130/140	59	320	0.735	0.540		
			B (10 ⁻¹² /Pa)	1.81	140/150	60	310	0.595	0.352		
Density		4.07	Solarization		150/160	61	300	0.385	0.148		
ρ (g/cm ³)							290				
Range of Temperature	Temperature Coefficients of Refractive Index						280				
	dn/dt relative (×10 ⁻⁶ / °C)										

Coloration Code	
λ ₈₀ (λ ₇₀)/λ ₅	360/290
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 52.70	n _F − n _C = 0.014060
		n _e = 1.74435	v _e = 52.41	n _{F'} − n _{C'} = 0.014203

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.70124	P _{d,C}	0.3037	RC (S)	1	2400	0.783	0.613		
n ₁₉₇₀	1970.09	1.70844	P _{e,d}	0.2383	RA (S)	2	2200	0.930	0.865		
n ₁₅₃₀	1529.58	1.71627	P _{g,F}	0.5484	D _W	1	2000	0.986	0.972		
n ₁₁₂₉	1128.64	1.72315	P' _{d,c'}	0.2528	D _A	3	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.72438	P' _{e,d}	0.2359	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.72540	P' _{g,F'}	0.4851	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.72928			CR	2	1200	0.999	0.998		
n _{A'}	768.19	1.73191	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.73432					1000	0.999	0.998		
n _C	656.27	1.73673					950	0.999	0.998		
n _{C'}	643.85	1.73741					900	0.999	0.998		
n _{He-Ne}	632.80	1.73805					850	0.999	0.998		
n _D	589.29	1.74087	P _{F,e}	-0.0031	°C	α	800	0.999	0.998		
n _d	587.56	1.74100	P _{g,F}	-0.0077	-50/-40	49	750	0.999	0.998		
n _e	546.07	1.74435	P _{C,t}	0.0103	-40/-30	51	700	0.999	0.998		
n _F	486.13	1.75079	P _{C,s}	0.0030	-30/-20	52	650	0.999	0.998		
n _{F'}	479.99	1.75161	Thermal Properties		-20/-10	53	600	0.999	0.998		
n _g	435.84	1.75850			T _g (°C)	668	-10/0	54	550	0.999	0.998
n _h	404.66	1.76491			T _s (°C)	693	0/10	55	500	0.999	0.998
n _i	365.01	1.77586			T ₁₀ ^{14.5} (°C)	601	10/20	56	480	0.999	0.998
					T ₁₀ ¹³ (°C)	635	20/30	57	460	0.999	0.998
					30/40	57	440	0.999	0.998		
					40/50	58	420	0.999	0.998		
					50/60	58	400	0.997	0.993		
					60/70	59	390	0.995	0.988		
					70/80	59	380	0.990	0.979		
Constants of Dispersion Formula					80/90	60	370	0.983	0.964		
A ₀	2.97212067E+00		Mechanical Properties		90/100	61	360	0.969	0.935		
A ₁	-1.51048406E-02				HK (10 ⁷ Pa)	706	100/110	61	350	0.948	0.893
A ₂	2.02885560E-02				F _A	67	110/120	62	340	0.914	0.831
A ₃	7.34194347E-04				E (GPa)	119.9	120/130	63	330	0.866	0.746
A ₄	-3.75051084E-05				G (GPa)	45.2	130/140	64	320	0.804	0.641
A ₅	1.82377017E-06			μ	0.327	140/150	65	310	0.728	0.526	
Density		Solarization		σ _b (MPa)	81	150/160	66	300	0.644	0.411	
ρ (g/cm ³)	4.10			B (10 ⁻¹² /Pa)	1.49			290	0.551	0.300	
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

H-LaK68	678507	n _d = 1.67790	v _d = 50.72	n _F − n _C = 0.013365
		n _e = 1.68108	v _e = 50.44	n _{F'} − n _{C'} = 0.013502

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.64478	P _{d,C}	0.3008	RC (S)	1	2400	0.910	0.828
n ₁₉₇₀	1970.09	1.65017	P _{e,d}	0.2379	RA (S)	3	2200	0.968	0.937
n ₁₅₃₀	1529.58	1.65615	P _{g,F}	0.5559	D _W	1	2000	0.994	0.989
n ₁₁₂₉	1128.64	1.66167	P' _{d,e'}	0.2503	D _A	3	1800	0.999	0.998
n ₁₀₆₄	1064.00	1.66271	P' _{e,d}	0.2355	R _{OH} (S)	2	1600	0.999	0.998
n _t	1013.98	1.66357	P' _{g,F'}	0.4925	RP (S)	2	1400	0.999	0.998
n _s	852.11	1.66699			CR	3	1200	0.999	0.998
n _{A'}	768.19	1.66940	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.67162					1000	0.999	0.998
n _C	656.27	1.67388					950	0.999	0.998
n _{C'}	643.85	1.67452					900	0.999	0.998
n _{He-Ne}	632.80	1.67511	P _{F,e}	-0.0013	°C	α	850	0.999	0.998
n _D	589.29	1.67778	P _{g,F}	-0.0034	-50/-40	67	800	0.999	0.998
n _d	587.56	1.67790	P _{C,t}	-0.0145	-40/-30	69	750	0.999	0.998
n _e	546.07	1.68108	P _{C,s}	-0.0066	-30/-20	71	700	0.999	0.998
n _F	486.13	1.68724	Thermal Properties		-20/-10	72	650	0.999	0.998
n _{F'}	479.99	1.68802			-10/0	72	600	0.998	0.996
n _g	435.84	1.69467			0/10	73	550	0.997	0.993
n _h	404.66	1.70090			10/20	74	500	0.996	0.990
n _i	365.01	1.71174	T _g (°C)	657	20/30	74	480	0.995	0.987
			T _s (°C)	698	30/40	75	460	0.993	0.984
			T ₁₀ ^{14.5} (°C)	594	40/50	75	440	0.991	0.981
			T ₁₀ ¹³ (°C)	628	50/60	75	420	0.989	0.976
			α _{-50/80°C} (10 ⁻⁷ /K)	74	60/70	75	400	0.986	0.966
			α _{100/300°C} (10 ⁻⁷ /K)	89	70/80	76	390	0.977	0.954
			λ (W/(m·K))	0.80	80/90	77	380	0.967	0.931
					90/100	78	370	0.944	0.884
			Mechanical Properties		100/110	78	360	0.886	0.781
					110/120	79	350	0.756	0.566
					120/130	80	340	0.474	0.220
					130/140	82	330	0.115	0.016
					140/150	82	320		
					150/160	83	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		Solarization	
ρ (g/cm ³)	3.86	△λ (%)	-0.8

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	375/335
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 50.32	n _F − n _C = 0.015410
		n _e = 1.77902	v _e = 50.10	n _{F'} − n _{C'} = 0.015550

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42		P _{d,C}	0.3030	RC (S)	1	2400	0.815	0.664		
n ₁₉₇₀	1970.09		P _{e,d}	0.2375	RA (S)	1	2200	0.948	0.899		
n ₁₅₃₀	1529.58	1.74890	P _{g,F}	0.5509	D _W	1	2000	0.984	0.968		
n ₁₁₂₉	1128.64	1.75598	P' _{d,c'}	0.2521	D _A	3	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.75728	P' _{e,d}	0.2354	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.75836	P' _{g,F'}	0.4887	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.76253			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.76541	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.76805					1000	0.999	0.998		
n _C	656.27	1.77069					950	0.999	0.998		
n _{C'}	643.85	1.77144					900	0.999	0.998		
n _{He-Ne}	632.80	1.77213					850	0.999	0.998		
n _D	589.29	1.77522	P _{F,e}	-0.0030	°C	α	800	0.999	0.998		
n _d	587.56	1.77536	P _{g,F}	-0.0091	-50/-40	52	750	0.999	0.998		
n _e	546.07	1.77902	P _{C,t}	0.0162	-40/-30	54	700	0.999	0.998		
n _F	486.13	1.78610	P _{C,s}	0.0084	-30/-20	56	650	0.999	0.998		
n _{F'}	479.99	1.78699	Thermal Properties		-20/-10	57	600	0.999	0.998		
n _g	435.84	1.79459			T _g (°C)	699	-10/0	58	550	0.999	0.998
n _h	404.66	1.80168			T _s (°C)	714	0/10	58	500	0.999	0.998
n _i	365.01	1.81387			T ₁₀ ^{14.5} (°C)	625	10/20	59	480	0.997	0.994
					T ₁₀ ¹³ (°C)	670	20/30	59	460	0.996	0.992
			α _{-50/80°C} (10 ⁻⁷ /K)	62	30/40	60	440	0.996	0.992		
			α _{100/300°C} (10 ⁻⁷ /K)	76	40/50	60	420	0.996	0.992		
			λ (W/(m·K))	1.02	50/60	61	400	0.996	0.992		
Constants of Dispersion Formula					60/70	61	390	0.991	0.982		
					70/80	62	380	0.986	0.972		
A ₀	3.08315587E+00		Mechanical Properties		80/90	63	370	0.979	0.958		
A ₁	-1.49460142E-02				90/100	64	360	0.971	0.943		
A ₂	2.43300964E-02				F _A	115	350	0.950	0.903		
A ₃	3.65640749E-04				E (GPa)	108.0	340	0.913	0.834		
A ₄	1.42131183E-05				G (GPa)	41.6	330	0.870	0.757		
A ₅	-8.23160850E-08		μ	0.297	130/140	68	320	0.813	0.661		
Density			σ _b (MPa)	85	140/150	69	320	0.736	0.542		
			ρ (g/cm ³)	4.35	B (10 ⁻¹² /Pa)	1.20	150/160	70	310	0.633	0.401
Solarization			Temperature Coefficients of Refractive Index								
										△λ (%)	-2.9
Range of Temperature			dn/dt relative (×10 ⁻⁶ / °C)								

H-KF6			517522			n _d = 1.51742			v _d = 52.15			n _F − n _C = 0.009922																		
						n _e = 1.51977			v _e = 51.85			n _{F'} − n _{C'} = 0.010024																		
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance																
			λ (nm)			n _λ							λ (nm)		τ5mm		τ10mm													
n ₂₃₂₅			2325.42			1.49023			P _{d,C}		0.3003		RC (S)		1		2400		0.929		0.861									
n ₁₉₇₀			1970.09			1.49507			P _{e,d}		0.2368		RA (S)		1		2200		0.956		0.910									
n ₁₅₃₀			1529.58			1.50035			P _{g,F}		0.5624		D _W		1		2000		0.994		0.987									
n ₁₁₂₉			1128.64			1.50503			P' _{d,c'}		0.2504		D _A		2		1800		0.997		0.994									
n ₁₀₆₄			1064.00			1.50588			P' _{e,d}		0.2344		R _{OH} (S)		2		1600		0.999		0.998									
n _t			1013.98			1.50657			P' _{g,F'}		0.4998		RP (S)		1		1400		0.999		0.998									
n _s			852.11			1.50925							CR		1		1200		0.999		0.998									
n _{A'}			768.19			1.51108			Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1060		0.999		0.998									
n _r			706.52			1.51276											P _{F,e}		0.0012		°C		α		1000		0.999		0.998	
n _C			656.27			1.51444											P _{g,F}		0.0054		-50/-40		82		950		0.999		0.998	
n _{C'}			643.85			1.51491											P _{C,t}		0.0004		-40/-30		86		900		0.999		0.998	
n _{He-Ne}			632.80			1.51535			P _{C,s}		-0.0025		-30/-20		88		700		0.999		0.998									
n _D			589.29			1.51733			Thermal Properties				-20/-10		89		650		0.999		0.998									
n _d			587.56			1.51742							T _g (°C)		461		-10/0		90		600		0.999		0.998					
n _e			546.07			1.51977							T _s (°C)		536		0/10		91		550		0.999		0.998					
n _F			486.13			1.52436							T ₁₀ ^{14.5} (°C)		407		10/20		92		500		0.999		0.998					
n _{F'}			479.99			1.52493			Mechanical Properties				20/30		92		480		0.999		0.998									
n _g			435.84			1.52994							T ₁₀ ¹³ (°C)		430		30/40		93		460		0.999		0.998					
n _h			404.66			1.53468							α _{-50/80°C} (10 ⁻⁷ /K)		91		40/50		93		440		0.998		0.996					
n _i			365.01			1.54305							α _{100/300°C} (10 ⁻⁷ /K)		102		50/60		94		420		0.997		0.993					
													60/70		94		400		0.995		0.991									
Constants of Dispersion Formula														70/80		95		390		0.993		0.989								
A ₀			2.26634630E+00											80/90		96		380		0.987		0.979								
A ₁			-8.85481035E-03							HK (10 ⁷ Pa)		432		90/100		96		370		0.976		0.957								
A ₂			1.25163602E-02							F _A		107		100/110		97		360		0.936		0.879								
A ₃			3.69483817E-04							E (GPa)		56.3		110/120		98		350		0.783		0.618								
A ₄			-8.19964870E-06							G (GPa)		22.8		120/130		99		340		0.390		0.154								
A ₅			1.43231024E-06							μ		0.233		130/140		100		330												
Density						Solarization							σ _b (MPa)		48		140/150		101		320									
ρ (g/cm ³)		2.52	△λ (%)		-4.1					B (10 ⁻¹² /Pa)		3.12		150/160		102		310												
Range of Temperature (°C)			Temperature Coefficients of Refractive Index										Coloration Code																	
			dn/dt relative (×10 ⁻⁶ / °C)												λ ₈₀ (λ ₇₀)/λ ₅		360/340													
			t	s	C	C'	He-Ne	d	e	F	F'	g			Coloration of Internal Transmittance															
			-60 ~ -40	-1.2	-1.0	-0.9	-0.8	-0.8	-0.8	-0.6	-0.3	-0.2	0.2	λτ ₈₀ /λτ ₅		356/336														
			-40 ~ -20	-1.1	-1.0	-0.9	-0.8	-0.7	-0.6	-0.5	-0.2	-0.1	0.3	Constants of dn/dt																
			-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	D ₀		D ₁		D ₂															
100 ~ 120	-0.4	-0.3	-0.2	-0.1	-0.1	-0.1	0.5	0.7	0.7	1.2	-5.94E-06		1.78E-08		-2.50E-11															
120 ~ 140	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.5	0.8	0.8	1.3	E ₀		E ₁		λ _{TK}															
140 ~ 160	-0.1	0.0	0.1	0.2	0.2	0.2	0.7	0.9	0.9	1.4	4.20E-07		1.79E-10		2.83E-01															

H-QF14	596392	n _d = 1.59551	v _d = 39.22	n _F − n _C = 0.015183
		n _e = 1.59911	v _e = 38.95	n _{F'} − n _{C'} = 0.015383

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.56078	P _{d,C}	0.2951	RC (S)	1	2400	0.958	0.916		
n ₁₉₇₀	1970.09	1.56608	P _{e,d}	0.2371	RA (S)	1	2200	0.964	0.927		
n ₁₅₃₀	1529.58	1.57206	P _{g,F}	0.5849	D _W	1	2000	0.990	0.977		
n ₁₁₂₉	1128.64	1.57777	P' _{d,c'}	0.2457	D _A	1	1800	0.994	0.987		
n ₁₀₆₄	1064.00	1.57886	P' _{e,d}	0.2340	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.57979	P' _{g,F'}	0.5181	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.58348			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.58609	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.58854					1000	0.999	0.998		
n _C	656.27	1.59103					950	0.999	0.998		
n _{C'}	643.85	1.59173					900	0.999	0.998		
n _{He-Ne}	632.80	1.59239					850	0.999	0.998		
n _D	589.29	1.59538	P _{F,e}	-0.0009	°C	α	800	0.999	0.998		
n _d	587.56	1.59551	P _{g,F}	0.0064	-50/-40	73	750	0.999	0.998		
n _e	546.07	1.59911	P _{C,t}	0.0101	-40/-30	75	700	0.999	0.998		
n _F	486.13	1.60621	P _{C,s}	0.0027	-30/-20	76	650	0.999	0.998		
n _{F'}	479.99	1.60712	Thermal Properties		-20/-10	76	600	0.999	0.998		
n _g	435.84	1.61509			T _g (°C)	540	-10/0	77	550	0.999	0.998
n _h	404.66	1.62284			T _s (°C)	594	0/10	78	500	0.999	0.998
n _i	365.01	1.63695			T ₁₀ ^{14.5} (°C)	483	10/20	79	480	0.999	0.998
					20/30	79	460	0.999	0.998		
					30/40	80	440	0.997	0.994		
					40/50	81	420	0.995	0.990		
					50/60	81	400	0.993	0.986		
					60/70	82	390	0.990	0.980		
Constants of Dispersion Formula					70/80	83	380	0.981	0.961		
A ₀	2.48576653E+00		Mechanical Properties		80/90	84	370	0.956	0.914		
A ₁	-9.89034420E-03				90/100	85	360	0.882	0.776		
A ₂	2.02035248E-02				F _A	168	100/110	86	350	0.641	0.413
A ₃	4.92709000E-04				E (GPa)	75.3	110/120	87	340	0.185	0.038
A ₄	1.83898751E-05		G (GPa)	30.9	120/130	88	330				
A ₅	2.51608701E-06		μ	0.221	130/140	89	320				
Density		Solarization		σ _b (MPa)	73	140/150	90	310			
ρ (g/cm ³)	2.71			B (10 ⁻¹² /Pa)	3.08	150/160	91	300			
							290				
Range of Temperature	Temperature Coefficients of Refractive Index						280				
	dn/dt relative (×10 ⁻⁶ / °C)										

Coloration Code			λ ₈₀ (λ ₇₀)/λ ₅			370/350		
Coloration of Internal Transmittance			λτ ₈₀ /λτ ₅			369/350		
Constants of dn/dt			D ₀			D ₁		
			1.19E-06			1.20E-08		
			E ₀			E ₁		
			5.30E-07			5.94E-10		
						λ _{TK}		
						3.05E-01		

H-QF50	581409	n _d = 1.58144	v _d = 40.89	n _F − n _C = 0.014220
		n _e = 1.58481	v _e = 40.61	n _{F'} − n _{C'} = 0.014400

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42	1.54848	P _{d,C}	0.2961	RC (S)	1	2400	0.933	0.810					
n ₁₉₇₀	1970.09	1.55364	P _{e,d}	0.2370	RA (S)	1	2200	0.946	0.859					
n ₁₅₃₀	1529.58	1.55940	P _{g,F}	0.5738	D _W	1	2000	0.980	0.960					
n ₁₁₂₉	1128.64	1.56481	P' _{d,c'}	0.2465	D _A	1	1800	0.990	0.980					
n ₁₀₆₄	1064.00	1.56584	P' _{e,d}	0.2340	R _{OH} (S)	1	1600	0.999	0.998					
n _t	1013.98	1.56671	P' _{g,F'}	0.5083	RP (S)	1	1400	0.999	0.998					
n _s	852.11	1.57015			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.57260	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998				
n _r	706.52	1.57490								1000	0.999	0.998		
n _C	656.27	1.57723						P _{F,e}	-0.0007			950	0.999	0.998
n _{C'}	643.85	1.57789						P _{g,F}	-0.0018	°C	α	900	0.999	0.998
n _{He-Ne}	632.80	1.57852						P _{C,t}	0.0016	-50/-40	73	850	0.999	0.998
n _D	589.29	1.58131	P _{C,s}	-0.0006	-40/-30	76	800	0.999	0.998					
n _d	587.56	1.58144	Thermal Properties			-30/-20	78	750	0.999	0.998				
n _e	546.07	1.58481						-20/-10	79	700	0.999	0.998		
n _F	486.13	1.59145				T _g (°C)	590	-10/0	80	650	0.999	0.998		
n _{F'}	479.99	1.59229				T _s (°C)	649	0/10	80	600	0.999	0.998		
n _g	435.84	1.59961				T ₁₀ ^{14.5} (°C)	515	10/20	81	550	0.999	0.998		
n _h	404.66	1.60669	T ₁₀ ¹³ (°C)	559	20/30	82	500	0.999	0.998					
n _i	365.01	1.61951	α _{-50/80°C} (10 ⁻⁷ /K)	82	30/40	82	480	0.998	0.996					
			α _{100/300°C} (10 ⁻⁷ /K)	98	40/50	83	460	0.997	0.994					
			λ (W/(m·K))	0.98	50/60	84	440	0.996	0.992					
Constants of Dispersion Formula					60/70	84	420	0.994	0.989					
			Mechanical Properties			70/80	85	400	0.992	0.981				
80/90	85	390				0.986	0.966							
90/100	86	380				0.966	0.926							
100/110	87	370				0.903	0.808							
110/120	88	360				0.701	0.488							
A ₀	2.44672171E+00				120/130	90	350	0.268	0.075					
A ₁	-9.64692814E-03				130/140	91	340							
A ₂	1.72763622E-02				140/150	92	330							
A ₃	1.09967502E-03				150/160	93	320							
A ₄	-9.37435013E-05						310							
A ₅	8.00160916E-06			300										
Density		Solarization		Range of Temperature			Temperature Coefficients of Refractive Index							
ρ (g/cm ³)	2.64									dn/dt relative (×10 ⁻⁶ / °C)				
		△λ (%)	-0.6				290							
							280							

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	380/350
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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			v _d = 38.01			n _F − n _C = 0.015875															
						n _e = 1.60718			v _e = 37.74			n _{F'} − n _{C'} = 0.016088															
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance													
		λ (nm)		n _λ										λ (nm)		τ5mm		τ10mm									
n ₂₃₂₅		2325.42		1.56760		P _{d,C}		0.2948		RC (S)		1		2400		0.938		0.867									
n ₁₉₇₀		1970.09		1.57308		P _{e,d}		0.2369		RA (S)		1		2200		0.950		0.892									
n ₁₅₃₀		1529.58		1.57923		P _{g,F}		0.5820		D _W		1		2000		0.987		0.961									
n ₁₁₂₉		1128.64		1.58506		P' _{d,c'}		0.2449		D _A		1		1800		0.996		0.982									
n ₁₀₆₄		1064.00		1.58618		P' _{e,d}		0.2337		R _{OH} (S)		1		1600		0.999		0.998									
n _t		1013.98		1.58713		P' _{g,F'}		0.5153		RP (S)		1		1400		0.999		0.998									
n _s		852.11		1.59091						CR		3		1200		0.999		0.998									
n _{A'}		768.19		1.59361		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1060		0.999		0.998									
n _r		706.52		1.59615										P _{F,e}		-0.0006		°C		α		1000		0.999		0.998	
n _C		656.27		1.59874										P _{g,F}		0.0016		-50/-40		73		950		0.999		0.998	
n _{C'}		643.85		1.59948										P _{C,t}		0.0070		-40/-30		74		900		0.999		0.998	
n _{He-Ne}		632.80		1.60017		P _{C,s}		0.0016		-30/-20		74		850		0.999		0.998									
n _D		589.29		1.60328		Thermal Properties				-20/-10		74		800		0.999		0.998									
n _d		587.56		1.60342						T _g (°C)		591		-10/0		76		750		0.999		0.998					
n _e		546.07		1.60718						T _s (°C)		638		0/10		78		650		0.999		0.998					
n _F		486.13		1.61462						T ₁₀ ^{14.5} (°C)		517		10/20		78		600		0.999		0.998					
n _{F'}		479.99		1.61557		T ₁₀ ¹³ (°C)		565		20/30		80		550		0.999		0.998									
n _g		435.84		1.62386		α _{-50/80°C} (10 ⁻⁷ /K)		79		30/40		81		500		0.999		0.998									
n _h		404.66		1.63190		α _{100/300°C} (10 ⁻⁷ /K)		98		40/50		82		480		0.998		0.996									
n _i		365.01		1.64667		λ (W/(m·K))		1.19		50/60		83		460		0.997		0.993									
Constants of Dispersion Formula						Mechanical Properties				60/70		83		440		0.995		0.990									
														70/80		86		420		0.991		0.981					
A ₀		2.50960367E+00				HK (10 ⁷ Pa)		491		80/90		87		400		0.985		0.965									
A ₁		-1.03328069E-02				F _A		141		90/100		88		390		0.975		0.944									
A ₂		1.94468683E-02				E (GPa)		76.6		100/110		89		380		0.940		0.867									
A ₃		1.23207636E-03				G (GPa)		31.3		110/120		90		370		0.841		0.683									
A ₄		-9.94382918E-05				μ		0.223		120/130		93		360		0.540		0.279									
A ₅		9.44281258E-06				σ _b (MPa)				130/140		93		350		0.112		0.018									
Density			Solarization			B (10 ⁻¹² /Pa)		2.74		140/150		95		340													
ρ (g/cm ³)		2.63								150/160		97		330													
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code															
		dn/dt relative (×10 ⁻⁶ / °C)																									
		t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance															
-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	λτ ₈₀ /λτ ₅															
-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	375/354															
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	Constants of dn/dt															
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	D ₀		D ₁		D ₂											
100 ~ 120		1.9	2.4	2.7	2.7	2.8	3.1	3.3	4.1	4.2	5.2	1.43E-07		1.19E-08		-2.03E-11											
120 ~ 140		2.0	2.5	2.8	2.8	2.8	3.2	3.4	4.2	4.3	5.3	E ₀		E ₁		λ _{TK}											
140 ~ 160		2.0	2.5	2.8	2.9	2.9	3.4	3.6	4.4	4.5	5.5	5.89E-07		5.54E-10		2.98E-01											

H-F4	620364	n _d = 1.62005	v _d = 36.35	n _F − n _C = 0.017060
		n _e = 1.62408	v _e = 36.09	n _{F'} − n _{C'} = 0.017291

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.58141	P _{d,C}	0.2937	RC (S)	1	2400	0.934	0.872		
n ₁₉₇₀	1970.09	1.58736	P _{e,d}	0.2362	RA (S)	1	2200	0.945	0.893		
n ₁₅₃₀	1529.58	1.59402	P _{g,F}	0.5885	D _W	1	2000	0.994	0.989		
n ₁₁₂₉	1128.64	1.60033	P' _{d,c'}	0.2446	D _A	1	1800	0.999	0.998		
n ₁₀₆₄	1064.00	1.60154	P' _{e,d}	0.2331	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.60256	P' _{g,F'}	0.5217	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.60664			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.60954	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.61226					1000	0.999	0.998		
n _C	656.27	1.61504					950	0.999	0.998		
n _{C'}	643.85	1.61582					900	0.999	0.998		
n _{He-Ne}	632.80	1.61656					850	0.999	0.998		
n _D	589.29	1.61990	P _{F,e}	0.0000	°C	α	800	0.999	0.998		
n _d	587.56	1.62005	P _{g,F}	0.0053	-50/-40	71	750	0.999	0.998		
n _e	546.07	1.62408	P _{C,t}	0.0153	-40/-30	73	700	0.999	0.998		
n _F	486.13	1.63210	P _{C,s}	0.0047	-30/-20	75	650	0.999	0.998		
n _{F'}	479.99	1.63312	Thermal Properties		-20/-10	76	600	0.999	0.998		
n _g	435.84	1.64214			Tg (°C)	590	-10/0	77	550	0.999	0.998
n _h	404.66	1.65099			Ts (°C)	635	0/10	77	500	0.999	0.998
n _i	365.01	1.66740			T ₁₀ ^{14.5} (°C)	524	10/20	78	480	0.999	0.998
					T ₁₀ ¹³ (°C)	563	20/30	79	460	0.999	0.998
			α _{-50/80°C} (10 ⁻⁷ /K)	73	30/40	79	440	0.997	0.994		
			α _{100/300°C} (10 ⁻⁷ /K)	90	40/50	79		0.995	0.990		

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		Solarization	
ρ (g/cm ³)	2.66	△λ (%)	-1.2

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	390/360
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 35.70	n _F − n _C = 0.017532
		n _e = 1.63003	v _e = 35.43	n _{F'} − n _{C'} = 0.017780

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.58752	P _{d,C}	0.2932	RC (S)	1	2400	0.945	0.893		
n ₁₉₇₀	1970.09	1.59329	P _{e,d}	0.2367	RA (S)	1	2200	0.948	0.899		
n ₁₅₃₀	1529.58	1.59977	P _{g,F}	0.5886	D _W	1	2000	0.982	0.964		
n ₁₁₂₉	1128.64	1.60594	P' _{d,c'}	0.2435	D _A	1	1800	0.984	0.968		
n ₁₀₆₄	1064.00	1.60713	P' _{e,d}	0.2334	R _{OH} (S)	1	1600	0.998	0.996		
n _t	1013.98	1.60814	P' _{g,F'}	0.5214	RP (S)	1	1400	0.998	0.996		
n _s	852.11	1.61220			CR	1	1200	0.998	0.996		
n _{A'}	768.19	1.61513	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.998	0.996		
n _r	706.52	1.61790					1000	0.998	0.996		
n _C	656.27	1.62074					950	0.998	0.996		
n _{C'}	643.85	1.62155					900	0.998	0.996		
n _{He-Ne}	632.80	1.62231					850	0.998	0.996		
n _D	589.29	1.62573	P _{F,e}	0.0001	°C	α	800	0.998	0.996		
n _d	587.56	1.62588	P _{g,F}	0.0043	-50/-40	72	750	0.998	0.996		
n _e	546.07	1.63003	P _{C,t}	0.0056	-40/-30	74	700	0.998	0.996		
n _F	486.13	1.63828	P _{C,s}	0.0010	-30/-20	75	650	0.998	0.996		
n _{F'}	479.99	1.63933	Thermal Properties		-20/-10	76	600	0.998	0.996		
n _g	435.84	1.64860			Tg (°C)	596	-10/0	76	550	0.998	0.996
n _h	404.66	1.65768			Ts (°C)	639	0/10	77	500	0.996	0.993
n _i	365.01	1.67466			T ₁₀ ^{14.5} (°C)	522	10/20	77	480	0.994	0.989
					T ₁₀ ¹³ (°C)	566	20/30	77	460	0.992	0.984
			α _{-50/80°C} (10 ⁻⁷ /K)	75	30/40	78	440	0.989	0.978		
			α _{100/300°C} (10 ⁻⁷ /K)	93	40/50	78					

H-ZF1B	648338	n _d = 1.64769	v _d = 33.84	n _F − n _C = 0.019140
		n _e = 1.65222	v _e = 33.58	n _{F'} − n _{C'} = 0.019421

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42		P _{d,C}	0.2926	RC (S)	1	2400	0.930	0.865					
n ₁₉₇₀	1970.09		P _{e,d}	0.2367	RA (S)	1	2200	0.944	0.891					
n ₁₅₃₀	1529.58		P _{g,F}	0.5904	D _W	1	2000	0.976	0.953					
n ₁₁₂₉	1128.64	1.62568	P' _{d,c'}	0.2425	D _A	1	1800	0.985	0.971					
n ₁₀₆₄	1064.00	1.62715	P' _{e,d}	0.2333	R _{OH} (S)	1	1600	0.995	0.991					
n _t	1013.98	1.62838	P' _{g,F'}	0.5221	RP (S)	1	1400	0.996	0.993					
n _s	852.11	1.63289			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.63608	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998					
n _r	706.52	1.63905					1000	0.999	0.998					
n _C	656.27	1.64209					950	0.999	0.998					
n _{C'}	643.85	1.64298					900	0.999	0.998					
n _{He-Ne}	632.80	1.64382	P _{F,e}	-0.0003	°C	α	850	0.999	0.998					
n _D	589.29	1.64754	P _{g,F}	0.0030	-50/-40	76	800	0.999	0.998					
n _d	587.56	1.64769	P _{C,t}	0.0122	-40/-30	78	750	0.999	0.998					
n _e	546.07	1.65222	P _{C,s}	-0.0009	-30/-20	79	700	0.999	0.998					
n _F	486.13	1.66124	Thermal Properties		-20/-10	80	650	0.999	0.998					
n _{F'}	479.99	1.66240			T _g (°C)	580	-10/0	81	600	0.999	0.998			
n _g	435.84	1.67254	T _s (°C)		0/10	82	550	0.998	0.997					
n _h	404.66	1.68252			T ₁₀ ^{14.5} (°C)	527	10/20	85	500	0.998	0.996			
n _i	365.01	1.70116	T ₁₀ ¹³ (°C)		20/30	87	480	0.997	0.995					
					α _{-50/80°C} (10 ⁻⁷ /K)	85	30/40	88	460	0.996	0.993			
			α _{100/300°C} (10 ⁻⁷ /K)		40/50	89	440	0.995	0.990					
					λ (W/(m·K))	1.11	50/60	91	420	0.992	0.985			
Constants of Dispersion Formula					60/70	91	400	0.980	0.961					
					70/80	92	390	0.959	0.920					
A ₀	2.65337691E+00		Mechanical Properties		80/90	94	380	0.898	0.807					
A ₁	-1.90021227E-02				HK (10 ⁷ Pa)	538	90/100	94	370	0.726	0.527			
A ₂	1.44298518E-02		F _A		100/110	97	360	0.367	0.135					
A ₃	4.25529366E-03				E (GPa)	82.0	110/120	98	350					
A ₄	-4.77918162E-04		G (GPa)		120/130	100	340							
A ₅	3.06145958E-05				μ	0.252	130/140	102	330					
Density		Solarization		σ _b (MPa)	81	140/150	102	320						
				B (10 ⁻¹² /Pa)	2.79	150/160	104	310						
ρ (g/cm ³)	2.77	△λ (%)	-0.7								300			
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										290			
	dn/dt relative (×10 ⁻⁶ / °C)										280			
	t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration Code			
	-60 ~ -40	0.2	0.4	0.8	1.0	1.1	1.5	1.7	2.0	2.2	2.8	λ ₈₀ (λ ₇₀)/λ ₅		390/360
	-40 ~ -20	0.4	0.6	0.9	1.2	1.3	1.7	1.8	2.2	2.3	3.0	Coloration of Internal Transmittance		
	-20 ~ 0	0.5	0.7	1.1	1.3	1.5	1.9	2.1	2.3	2.4	3.4	λτ ₈₀ /λτ ₅		379/356
	0 ~ 20	0.6	0.9	1.3	1.4	1.6	2.1	2.3	2.5	2.5	3.6	Constants of dn/dt		
	20 ~ 40	0.8	1.1	1.5	1.5	1.7	2.2	2.5	2.5	2.6	3.9	D ₀	D ₁	D ₂
	40 ~ 60	0.9	1.2	1.6	1.6	1.8	2.4	2.7	2.7	2.9	4.1	-2.51E-06	1.55E-08	-3.44E-11
	60 ~ 80	0.9	1.4	1.7	1.8	2.0	2.5	2.8	2.9	3.1	4.3	E ₀	E ₁	λ _{TK}
	80 ~ 100	0.9	1.5	1.8	1.9	2.1	2.6	3.0	3.0	3.2	4.5	9.45E-07	8.73E-10	1.94E-01
	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			

H-ZF2	673322	n _d = 1.67270	v _d = 32.17	n _F − n _C = 0.020910
		n _e = 1.67764	v _e = 31.92	n _{F'} − n _{C'} = 0.021227

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.63037	P _{d,C}	0.2912	RC (S)	1	2400	0.930	0.865
n ₁₉₇₀	1970.09	1.63613	P _{e,d}	0.2363	RA (S)	1	2200	0.952	0.906
n ₁₅₃₀	1529.58	1.64275	P _{g,F}	0.5988	D _W	1	2000	0.986	0.972
n ₁₁₂₉	1128.64	1.64942	P' _{d,e'}	0.2421	D _A	1	1800	0.996	0.992
n ₁₀₆₄	1064.00	1.65076	P' _{e,d}	0.2327	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.65190	P' _{g,F'}	0.5300	RP (S)	1	1400	0.999	0.998
n _s	852.11	1.65659			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.66001	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.66327					1000	0.999	0.998
n _C	656.27	1.66661					950	0.999	0.998
n _{C'}	643.85	1.66756					900	0.999	0.998
n _{He-Ne}	632.80	1.66846	P _{F,e}	0.0001	°C	α	850	0.999	0.998
n _D	589.29	1.67252	P _{g,F}	0.0086	-50/-40	76	800	0.999	0.998
n _d	587.56	1.67270	P _{C,t}	0.0075	-40/-30	79	750	0.999	0.998
n _e	546.07	1.67764	P _{C,s}	0.0016	-30/-20	80	700	0.999	0.998
n _F	486.13	1.68752	Thermal Properties		-20/-10	82	650	0.999	0.998
n _{F'}	479.99	1.68879			-10/0	84	600	0.999	0.998
n _g	435.84	1.70004			0/10	86	550	0.997	0.993
n _h	404.66	1.71115			10/20	87	500	0.995	0.989
n _i	365.01	1.73203	T _g (°C)	592	20/30	88	480	0.993	0.987
			T _s (°C)	627	30/40	89	460	0.991	0.984
			T ₁₀ ^{14.5} (°C)	518	40/50	89	440	0.989	0.979
			T ₁₀ ¹³ (°C)	560	50/60	90	420	0.986	0.970
			α _{-50/80°C} (10 ⁻⁷ /K)	85	60/70	90	400	0.971	0.937
			α _{100/300°C} (10 ⁻⁷ /K)	107	70/80	91	390	0.943	0.883
			λ (W/(m·K))	1.20	80/90	92	380	0.868	0.747
					90/100	93	370	0.655	0.426
			Mechanical Properties		100/110	94	360	0.225	0.052
					110/120	95	350		
					120/130	97	340		
					130/140	98	330		
			F _A	140	140/150	99	320		
			E (GPa)	82.1	150/160	100	310		
			G (GPa)	33.2			300		
			μ	0.237			290		
			σ _b (MPa)	89			280		
			B (10 ⁻¹² /Pa)	2.53					

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

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	395/360
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 29.50	n _F − n _C = 0.024318
		n _e = 1.72310	v _e = 29.27	n _{F'} − n _{C'} = 0.024707

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.67093	P _{d,C}	0.2895	RC (S)	1	2400	0.934	0.872		
n ₁₉₇₀	1970.09	1.67676	P _{e,d}	0.2360	RA (S)	1	2200	0.963	0.927		
n ₁₅₃₀	1529.58	1.68361	P _{g,F}	0.6041	D _W	1	2000	0.993	0.986		
n ₁₁₂₉	1128.64	1.69079	P' _{d,c'}	0.2404	D _A	1	1800	0.998	0.996		
n ₁₀₆₄	1064.00	1.69228	P' _{e,d}	0.2323	R _{OH} (S)	1	1600	0.998	0.996		
n _t	1013.98	1.69355	P' _{g,F'}	0.5343	RP (S)	1	1400	0.998	0.996		
n _s	852.11	1.69884			CR	1	1200	0.998	0.996		
n _{A'}	768.19	1.70274	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.998	0.996		
n _r	706.52	1.70647					1000	0.998	0.996		
n _C	656.27	1.71032					P _{F,e}	0.0006	950	0.998	0.996
n _{C'}	643.85	1.71142					P _{g,F}	0.0095	900	0.998	0.996
n _{He-Ne}	632.80	1.71245					P _{C,t}	0.0066	850	0.998	0.996
n _D	589.29	1.71715	P _{C,s}	0.0009	800	0.998	0.996	0.996			
n _d	587.56	1.71736	Thermal Properties		750	0.998	0.996				
n _e	546.07	1.72310			700	0.998	0.996				
n _F	486.13	1.73464			Tg (°C)	601	650	0.998	0.996		
n _{F'}	479.99	1.73613			Ts (°C)	634	600	0.998	0.996		
n _g	435.84	1.74933			T ₁₀ ^{14.5} (°C)	538	550	0.998	0.996		
n _h	404.66	1.76249	T ₁₀ ¹³ (°C)	572	500	0.996	0.992				
n _i	365.01	1.78745	α _{-50/80°C} (10 ⁻⁷ /K)	84	480	0.994	0.989				
			α _{100/300°C} (10 ⁻⁷ /K)	107	460	0.992	0.985				
					440	0.990	0.978				

H-ZF4AGT	728283	n _d = 1.72825	v _d = 28.32	n _F − n _C = 0.025716
		n _e = 1.73432	v _e = 28.10	n _{F'} − n _{C'} = 0.026133

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42		P _{d,C}	0.2889	RC (S)	1	2400	0.902	0.814		
n ₁₉₇₀	1970.09		P _{e,d}	0.2360	RA (S)	1	2200	0.938	0.880		
n ₁₅₃₀	1529.58		P _{g,F}	0.6070	D _W	1	2000	0.970	0.940		
n ₁₁₂₉	1128.64	1.70032	P' _{d,c'}	0.2399	D _A	1	1800	0.982	0.964		
n ₁₀₆₄	1064.00	1.70187	P' _{e,d}	0.2323	R _{OH} (S)	1	1600	0.994	0.987		
n _t	1013.98	1.70320	P' _{g,F'}	0.5373	RP (S)	1	1400	0.996	0.992		
n _s	852.11	1.70873			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.71283	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.71676					1000	0.999	0.998		
n _C	656.27	1.72082					950	0.999	0.998		
n _{C'}	643.85	1.72198					900	0.999	0.998		
n _{He-Ne}	632.80	1.72306					850	0.999	0.998		
n _D	589.29	1.72802	P _{F,e}	0.0006	°C	α	800	0.999	0.998		
n _d	587.56	1.72825	P _{g,F}	0.0105	-50/-40	79	750	0.999	0.998		
n _e	546.07	1.73432	P _{C,t}	0.0078	-40/-30	82	700	0.998	0.997		
n _F	486.13	1.74654	P _{C,s}	0.0018	-30/-20	84	650	0.998	0.996		
n _{F'}	479.99	1.74811	Thermal Properties		-20/-10	84	600	0.998	0.996		
n _g	435.84	1.76215			Tg (°C)	594	-10/0	85	550	0.997	0.994
n _h	404.66	1.77622			Ts (°C)	621	0/10	86	500	0.995	0.989
n _i	365.01	1.80305			T ₁₀ ^{14.5} (°C)	530	10/20	87	480	0.993	0.986
					T ₁₀ ¹³ (°C)	559	20/30	90	460	0.991	0.981
					α _{-50/80°C} (10 ⁻⁷ /K)	86	30/40	91	440	0.987	0.974
					α _{100/300°C} (10 ⁻⁷ /K)	105	40/50	93	420	0.978	0.957
					λ (W/(m·K))	1.12	50/60	94	400	0.949	0.900
							60/70	94	390	0.898	0.806
							70/80	95	380	0.775	0.601
Constants of Dispersion Formula							80/90	95	370	0.493	0.243
A ₀	2.87790099E+00						90/100	97	360	0.136	0.019
A ₁	-1.14975391E-02						100/110	97	350		
A ₂	3.40752512E-02						110/120	99	340		
A ₃	1.83854310E-03						120/130	100	330		
A ₄	-1.04547399E-04						130/140	100	320		
A ₅	1.87465641E-05						140/150	101	310		
							150/160	103	300		
									290		
									280		

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	410/365
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.74000$	$v_d = 28.30$	$n_F - n_C = 0.026152$
		$n_e = 1.74617$	$v_e = 28.07$	$n_F - n_{C'} = 0.026584$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.69091	$P_{d,C}$	0.2887	RC (S)	1	2400	0.937	0.878
n_{1970}	1970.09	1.69701	$P_{e,d}$	0.2359	RA (S)	1	2200	0.962	0.925
n_{1530}	1529.58	1.70416	$P_{g,F}$	0.6076	D_W	1	2000	0.991	0.982
n_{1129}	1128.64	1.71169	$P'_{d,c'}$	0.2396	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.71325	$P'_{e,d}$	0.2321	R_{OH} (S)	1	1600	0.997	0.994
n_t	1013.98	1.71459	$P'_{g,F'}$	0.5375	RP (S)	1	1400	0.997	0.994
n_s	852.11	1.72020			CR	1	1200	0.997	0.994
$n_{A'}$	768.19	1.72435	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.997	0.994
n_r	706.52	1.72833					1000	0.997	0.994
n_C	656.27	1.73245					950	0.997	0.994
$n_{C'}$	643.85	1.73363					900	0.997	0.994
n_{He-Ne}	632.80	1.73474	$P_{F,e}$	0.0011	$^{\circ}C$	α	850	0.997	0.994
n_D	589.29	1.73977	$P_{g,F}$	0.0110	-50/-40	76	800	0.997	0.994
n_d	587.56	1.74000	$P_{C,t}$	0.0057	-40/-30	78	750	0.997	0.994
n_e	546.07	1.74617	$P_{C,s}$	0.0001	-30/-20	80	700	0.997	0.994
n_F	486.13	1.75861	Thermal Properties		-20/-10	82	650	0.997	0.994
$n_{F'}$	479.99	1.76021			-10/0	83	600	0.997	0.994
n_g	435.84	1.77450			0/10	84	550	0.995	0.992
n_h	404.66	1.78876			10/20	84	500	0.992	0.987
n_i	365.01	1.81588	T_g ($^{\circ}C$)	604	20/30	85	480	0.990	0.985
			T_s ($^{\circ}C$)	647	30/40	86	460	0.984	0.973
			$T_{10}^{14.5}$ ($^{\circ}C$)	543	40/50	86	440	0.980	0.966
			T_{10}^{13} ($^{\circ}C$)	574	50/60	87	420	0.971	0.949
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	86	60/70	87	400	0.935	0.875
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	107	70/80	88	390	0.892	0.800
			λ (W/(m·K))	1.15	80/90	89	380	0.776	0.603
					90/100	90	370	0.491	0.236
			Mechanical Properties		100/110	91	360	0.109	0.013
					110/120	93	350		
					120/130	94	340		
					130/140	95	330		
			μ	0.283	140/150	97	320		
			σ_b (MPa)	62	150/160	98	310		
			B ($10^{-12}/Pa$)	2.58			300		

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		Solarization	
ρ (g/cm ³)	3.09	$\Delta\lambda$ (%)	0.0

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.74000$	$v_d = 28.30$	$n_F - n_C = 0.026152$
		$n_e = 1.74617$	$v_e = 28.07$	$n_F - n_{C'} = 0.026584$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42	1.69091	P _{d,C}	0.2887	RC (S)	1	2400	0.937	0.878				
n ₁₉₇₀	1970.09	1.69701	P _{e,d}	0.2359	RA (S)	1	2200	0.962	0.925				
n ₁₅₃₀	1529.58	1.70416	P _{g,F}	0.6076	D _W	1	2000	0.991	0.982				
n ₁₁₂₉	1128.64	1.71169	P' _{d,c'}	0.2396	D _A	1	1800	0.997	0.994				
n ₁₀₆₄	1064.00	1.71325	P' _{e,d}	0.2321	R _{OH} (S)	1	1600	0.997	0.994				
n _t	1013.98	1.71459	P' _{g,F'}	0.5375	RP (S)	1	1400	0.997	0.994				
n _s	852.11	1.72020			CR	1	1200	0.997	0.994				
n _{A'}	768.19	1.72435	Deviation of Relative Partial Dispersions				1060	0.997	0.994				
n _r	706.52	1.72833							1000	0.997	0.994		
n _C	656.27	1.73245					P _{F,e}	0.0011	Expansion Coefficient α (×10 ⁻⁷ /K)	950	0.997	0.994	
n _{C'}	643.85	1.73363					P _{g,F}	0.0110		900	0.997	0.994	
n _{He-Ne}	632.80	1.73474	P _{C,t}	0.0057	°C	α	850	0.997		0.994			
n _D	589.29	1.73977	P _{C,s}	0.0001	-50/-40	76	800	0.997		0.994			
n _d	587.56	1.74000	Thermal Properties				-40/-30	78	750	0.997	0.994		
n _e	546.07	1.74617							-30/-20	80	700	0.997	0.994
n _F	486.13	1.75861					Tg (°C)	604	-20/-10	82	650	0.997	0.994
n _{F'}	479.99	1.76021					Ts (°C)	647	-10/0	83	600	0.997	0.994
n _g	435.84	1.77450	T ₁₀ ^{14.5} (°C)	543	0/10	84	550	0.995	0.992				
n _h	404.66	1.78876	T ₁₀ ¹³ (°C)	574	10/20	84	500	0.992	0.988				
n _i	365.01	1.81588	α _{-50/80°C} (10 ⁻⁷ /K)	86	20/30	85	480	0.990	0.985				
			α _{100/300°C} (10 ⁻⁷ /K)	107	30/40	86	460	0.988	0.981				
			λ (W/(m·K))	1.15	40/50	86	440	0.985	0.973				
					50/60	87	420	0.978	0.957				
Constants of Dispersion Formula						60/70	87	400	0.952	0.907			
						70/80	88	390	0.912	0.834			
A ₀	2.91687382E+00		Mechanical Properties		80/90	89	380	0.807	0.657				
A ₁	-1.18527790E-02				HK (10 ⁷ Pa)	580	90/100	90	370	0.535	0.292		
A ₂	3.42689145E-02				F _A	162	100/110	91	360	0.113	0.016		
A ₃	2.02963652E-03				E (GPa)	91.2	110/120	93	350				
A ₄	-1.14580838E-04		G (GPa)	35.6	120/130	94	340						
A ₅	1.85928308E-05		μ	0.283	130/140	95	330						
Density		Solarization		σ _b (MPa)	62	140/150	97	320					
				B (10 ⁻¹² /Pa)	2.58	150/160	98	310					
Range of Temperature							Temperature Coefficients of Refractive Index						
							dn/dt relative (×10 ⁻⁶ / °C)						
							300						
							290						
							280						

H-ZF6	755275	$n_d = 1.75520$	$v_d = 27.53$	$n_F - n_C = 0.027432$
		$n_e = 1.76167$	$v_e = 27.31$	$n_F - n_{C'} = 0.027888$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.70459	$P_{d,C}$	0.2883	RC (S)	1	2400	0.935	0.876
n_{1970}	1970.09	1.71072	$P_{e,d}$	0.2359	RA (S)	1	2200	0.968	0.937
n_{1530}	1529.58	1.71794	$P_{g,F}$	0.6084	D_W	1	2000	0.992	0.984
n_{1129}	1128.64	1.72566	$P'_{d,c'}$	0.2395	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.72728	$P'_{e,d}$	0.2320	R_{OH} (S)	1	1600	0.997	0.994
n_t	1013.98	1.72867	$P'_{g,F'}$	0.5379	RP (S)	1	1400	0.997	0.994
n_s	852.11	1.73450			CR	1	1200	0.997	0.994
$n_{A'}$	768.19	1.73882	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.997	0.994
n_r	706.52	1.74299					1000	0.997	0.994
n_C	656.27	1.74729					950	0.997	0.994
$n_{C'}$	643.85	1.74852					900	0.997	0.994
n_{He-Ne}	632.80	1.74968	$P_{F,e}$	0.0007	$^{\circ}C$	α	850	0.997	0.994
n_D	589.29	1.75496	$P_{g,F}$	0.0105	-50/-40	81	800	0.997	0.994
n_d	587.56	1.75520	$P_{C,t}$	0.0053	-40/-30	84	750	0.997	0.994
n_e	546.07	1.76167	$P_{C,s}$	-0.0002	-30/-20	86	700	0.997	0.994
n_F	486.13	1.77472	Thermal Properties		-20/-10	88	650	0.997	0.994
$n_{F'}$	479.99	1.77641			-10/0	90	600	0.995	0.991
n_g	435.84	1.79141			0/10	91	550	0.996	0.992
n_h	404.66	1.80646			10/20	92	500	0.994	0.988
n_i	365.01	1.83529	T_g ($^{\circ}C$)	604	20/30	93	480	0.990	0.984
			T_s ($^{\circ}C$)	635	30/40	94	460	0.988	0.978
			$T_{10}^{14.5}$ ($^{\circ}C$)	536	40/50	95	440	0.983	0.966
			T_{10}^{13} ($^{\circ}C$)	575	50/60	96	420	0.975	0.950
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	88	60/70	97	400	0.941	0.884
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	109	70/80	98	390	0.897	0.802
			λ (W/(m·K))	1.13	80/90	98	380	0.774	0.603
					90/100	99	370	0.463	0.213
			Mechanical Properties		100/110	100	360		
					110/120	100	350		
					120/130	101	340		
					130/140	102	330		
			μ	0.290	140/150	104	320		
			σ_b (MPa)	81	150/160	104	310		
			B ($10^{-12}/Pa$)	2.54			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	3.15	$\triangle\lambda$ (%)	-0.6

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	
$\lambda\tau_{80}/\lambda\tau_5$	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	$n_d = 1.75520$	$v_d = 27.53$	$n_F - n_C = 0.027432$
		$n_e = 1.76167$	$v_e = 27.31$	$n_F - n_{C'} = 0.027888$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.70459	$P_{d,C}$	0.2883	RC (S)	1	2400	0.937	0.880
n_{1970}	1970.09	1.71072	$P_{e,d}$	0.2359	RA (S)	1	2200	0.969	0.939
n_{1530}	1529.58	1.71794	$P_{g,F}$	0.6084	D_W	1	2000	0.992	0.984
n_{1129}	1128.64	1.72566	$P'_{d,c'}$	0.2395	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.72728	$P'_{e,d}$	0.2320	R_{OH} (S)	1	1600	0.997	0.994
n_t	1013.98	1.72867	$P'_{g,F'}$	0.5379	RP (S)	1	1400	0.997	0.994
n_s	852.11	1.73450			CR	1	1200	0.997	0.994
$n_{A'}$	768.19	1.73882	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.997	0.994
n_r	706.52	1.74299					1000	0.997	0.994
n_C	656.27	1.74729					950	0.997	0.994
$n_{C'}$	643.85	1.74852					900	0.997	0.994
n_{He-Ne}	632.80	1.74968	$P_{F,e}$	0.0007	$^{\circ}C$	α	850	0.997	0.994
n_D	589.29	1.75496	$P_{g,F}$	0.0105	-50/-40	81	800	0.997	0.994
n_d	587.56	1.75520	$P_{C,t}$	0.0053	-40/-30	84	750	0.997	0.994
n_e	546.07	1.76167	$P_{C,s}$	-0.0002	-30/-20	86	700	0.997	0.994
n_F	486.13	1.77472	Thermal Properties		-20/-10	88	650	0.997	0.994
$n_{F'}$	479.99	1.77641			-10/0	90	600	0.997	0.994
n_g	435.84	1.79141			0/10	91	550	0.996	0.993
n_h	404.66	1.80646			10/20	92	500	0.994	0.988
n_i	365.01	1.83529	T_g ($^{\circ}C$)	604	20/30	93	480	0.992	0.986
			T_s ($^{\circ}C$)	635	30/40	94	460	0.989	0.980
			$T_{10}^{14.5}$ ($^{\circ}C$)	536	40/50	95	440	0.985	0.975
			T_{10}^{13} ($^{\circ}C$)	575	50/60	96	420	0.977	0.958
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	88	60/70	97	400	0.950	0.909
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	109	70/80	98	390	0.911	0.835
			λ (W/(m·K))	1.13	80/90	98	380	0.799	0.646
					90/100	99	370	0.512	0.263
Constants of Dispersion Formula			Mechanical Properties		100/110	100	360	0.094	0.014
					110/120	100	350		
A_0	2.96351629E+00				120/130	101	340		
A_1	-1.19513676E-02				130/140	102	330		
A_2	3.59998931E-02		HK (10^7Pa)	525	140/150	104	320		
A_3	2.29903731E-03		F_A	170	150/160	104	310		
A_4	-1.58881885E-04		E (GPa)	92.0			300		
A_5	2.32603789E-05		G (GPa)	35.6			290		
			μ	0.290			280		
			σ_b (MPa)	81					
			B ($10^{-12}/Pa$)	2.54					
Density		Solarization							
ρ (g/cm ³)	3.15	$\Delta\lambda$ (%)	-0.6						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.80518$	$v_d = 25.46$	$n_F - n_C = 0.031630$
		$n_e = 1.81263$	$v_e = 25.25$	$n_F - n_{C'} = 0.032180$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.74928	$P_{d,C}$	0.2868	RC (S)	1	2400	0.927	0.863
n_{1970}	1970.09	1.75560	$P_{e,d}$	0.2355	RA (S)	1	2200	0.960	0.920
n_{1530}	1529.58	1.76321	$P_{g,F}$	0.6156	D_W	1	2000	0.979	0.956
n_{1129}	1128.64	1.77158	$P'_{d,c'}$	0.2380	D_A	1	1800	0.987	0.976
n_{1064}	1064.00	1.77339	$P'_{e,d}$	0.2315	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.77494	$P'_{g,F'}$	0.5441	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.78150			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.78642	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.79118					1000	0.998	0.996
n_C	656.27	1.79611					950	0.998	0.996
$n_{C'}$	643.85	1.79752					900	0.998	0.996
n_{He-Ne}	632.80	1.79883	$P_{F,e}$	0.0016	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.80491	$P_{g,F}$	0.0142	-50/-40	80	800	0.998	0.997
n_d	587.56	1.80518	$P_{C,t}$	0.0058	-40/-30	82	750	0.998	0.997
n_e	546.07	1.81263	$P_{C,s}$	0.0004	-30/-20	85	700	0.998	0.997
n_F	486.13	1.82774	Thermal Properties		-20/-10	87	650	0.998	0.996
$n_{F'}$	479.99	1.82970			-10/0	89	600	0.998	0.997
n_g	435.84	1.84721			0/10	90	550	0.997	0.995
n_h	404.66	1.86480			10/20	91	500	0.994	0.988
n_i	365.01	1.89846	T_g ($^{\circ}C$)	606	20/30	92	480	0.992	0.984
			T_s ($^{\circ}C$)	636	30/40	92	460	0.989	0.979
			$T_{10}^{14.5}$ ($^{\circ}C$)	565	40/50	93	440	0.984	0.969
			T_{10}^{13} ($^{\circ}C$)	581	50/60	93	420	0.974	0.948
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	88	60/70	94	400	0.946	0.894
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	109	70/80	95	390	0.906	0.821
			λ (W/(m·K))	0.99	80/90	95	380	0.799	0.638
					90/100	97	370	0.527	0.278
Constants of Dispersion Formula			Mechanical Properties		100/110	98	360	0.148	0.022
					110/120	99	350		
A_0	3.11898504E+00				120/130	100	340		
A_1	-1.24052596E-02				130/140	102	330		
A_2	4.32862244E-02		HK (10^7Pa)	523	140/150	102	320		
A_3	2.26049835E-03		F_A	186	150/160	103	310		
A_4	-7.69462999E-05		E (GPa)	93.6			300		
A_5	2.11453139E-05		G (GPa)	36.1			290		
			μ	0.296			280		
			σ_b (MPa)	77					
			B ($10^{-12}/Pa$)	2.67					
Density		Solarization							
ρ (g/cm ³)	3.38	$\triangle\lambda$ (%)	-0.6						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.80518$	$v_d = 25.46$	$n_F - n_C = 0.031630$
		$n_e = 1.81263$	$v_e = 25.25$	$n_F - n_{C'} = 0.032180$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.74928	P _{d,C}	0.2868	RC (S)	1	2400	0.951	0.905			
n ₁₉₇₀	1970.09	1.75560	P _{e,d}	0.2355	RA (S)	1	2200	0.974	0.949			
n ₁₅₃₀	1529.58	1.76321	P _{g,F}	0.6156	D _W	1	2000	0.990	0.980			
n ₁₁₂₉	1128.64	1.77158	P' _{d,c'}	0.2380	D _A	1	1800	0.998	0.996			
n ₁₀₆₄	1064.00	1.77339	P' _{e,d}	0.2315	R _{OH} (S)	1	1600	0.998	0.996			
n _t	1013.98	1.77494	P' _{g,F'}	0.5441	RP (S)	1	1400	0.998	0.996			
n _s	852.11	1.78150			CR	1	1200	0.998	0.996			
n _{A'}	768.19	1.78642	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.998	0.996		
n _r	706.52	1.79118						1000	0.998	0.996		
n _C	656.27	1.79611	950					0.998	0.996			
n _{C'}	643.85	1.79752	P _{F,e}	0.0016	900				0.998	0.996		
n _{He-Ne}	632.80	1.79883	P _{g,F}	0.0142	°C			α	850	0.998	0.996	
n _D	589.29	1.80491	P _{C,t}	0.0058	-50/-40	80	800	0.998	0.996			
n _d	587.56	1.80518	P _{C,s}	0.0004	-40/-30	82	750	0.998	0.996			
n _e	546.07	1.81263	Thermal Properties			-30/-20	85	700	0.998	0.996		
n _F	486.13	1.82774				-20/-10	87	650	0.998	0.996		
n _{F'}	479.99	1.82970	T _g (°C)	606	-10/0	89	600	0.998	0.996			
n _g	435.84	1.84721	T _s (°C)	636	0/10	90	550	0.996	0.993			
n _h	404.66	1.86480	T ₁₀ ^{14.5} (°C)	565	10/20	91	500	0.994	0.988			
n _i	365.01	1.89846	T ₁₀ ¹³ (°C)	581	20/30	92	480	0.992	0.983			
			α _{-50/80°C} (10 ⁻⁷ /K)	88	30/40	92	460	0.990	0.980			
			α _{100/300°C} (10 ⁻⁷ /K)	109	40/50	93	440	0.987	0.971			
			λ (W/(m·K))	0.99	50/60	93	420	0.977	0.953			
Constants of Dispersion Formula					60/70	94	400	0.952	0.904			
			Mechanical Properties			70/80	95	390	0.913	0.830		
A ₀	3.11898504E+00	HK (10 ⁷ Pa)				523	80/90	95	380	0.815	0.669	
A ₁	-1.24052596E-02	F _A	186	90/100	97	370	0.548	0.301				
A ₂	4.32862244E-02	E (GPa)	93.6	100/110	98	360	0.157	0.025				
A ₃	2.26049835E-03	G (GPa)	36.1	110/120	99	350						
A ₄	-7.69462999E-05	μ	0.296	120/130	100	340						
A ₅	2.11453139E-05	σ _b (MPa)	77	130/140	102	330						
Density			Solarization		140/150	102	320					
					150/160	103	310					
ρ (g/cm ³)	3.38	△λ (%)	-0.6	B (10 ⁻¹² /Pa)			300					
Range of Temperature	Temperature Coefficients of Refractive Index						290					
	dn/dt relative (×10 ⁻⁶ / °C)						280					

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		Solarization	
ρ (g/cm ³)	3.38	$\triangle\lambda$ (%)	-0.6

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZF8	622307	$n_d = 1.62201$	$v_d = 30.66$	$n_F - n_C = 0.020287$
		$n_e = 1.62678$	$v_e = 30.36$	$n_{F'} - n_{C'} = 0.020646$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2858	RC (S)	1	2400	0.923	0.853
n_{1970}	1970.09		$P_{e,d}$	0.2352	RA (S)	2	2200	0.944	0.891
n_{1530}	1529.58		$P_{g,F}$	0.6220	D_W	2	2000	0.966	0.933
n_{1129}	1128.64	1.60013	$P'_{d,c'}$	0.2373	D_A	4	1800	0.985	0.970
n_{1064}	1064.00	1.60137	$P'_{e,d}$	0.2310	R_{OH} (S)	1	1600	0.998	0.995
n_t	1013.98	1.60243	$P'_{g,F'}$	0.5495	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.60678			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.60997	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.61303					1000	0.999	0.998
n_C	656.27	1.61620	$P_{F,e}$	0.0058	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.61710	$P_{g,F}$	0.0294	-50/-40	131	900	0.999	0.998
n_{He-Ne}	632.80	1.61795	$P_{C,t}$	-0.0093	-40/-30	132	850	0.999	0.998
n_D	589.29	1.62183	$P_{C,s}$	-0.0095	-30/-20	132	800	0.999	0.998
n_d	587.56	1.62201	Thermal Properties		-20/-10	134	750	0.999	0.998
n_e	546.07	1.62678	T_g ($^{\circ}C$)	428	-10/0	138	700	0.999	0.998
n_F	486.13	1.63648	T_s ($^{\circ}C$)	470	0/10	138	650	0.999	0.998
$n_{F'}$	479.99	1.63775	$T_{10}^{14.5}$ ($^{\circ}C$)	393	10/20	139	600	0.998	0.997
n_g	435.84	1.64911	T_{10}^{13} ($^{\circ}C$)	426	20/30	143	550	0.997	0.994
n_h	404.66	1.66072	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	141	30/40	144	500	0.994	0.988
n_i	365.01		$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	184	40/50	146	480	0.992	0.984
			λ (W/(m·K))	0.84	50/60	150	460	0.988	0.977
					60/70	151	440	0.984	0.969
Constants of Dispersion Formula			Mechanical Properties		70/80	155	420	0.973	0.948
A_0	2.55421627E+00				80/90	156	400	0.932	0.869
A_1	-1.01378222E-02		HK (10^7Pa)	333	90/100	159	390	0.861	0.741
A_2	2.29003271E-02		F_A	166	100/110	162	380	0.651	0.424
A_3	1.95813392E-03		E (GPa)	61.8	110/120	163	370	0.235	0.055
A_4	-1.71553545E-04		G (GPa)	24.4	120/130	166	360		
A_5	2.27385738E-05		μ	0.266	130/140	169	350		
			σ_b (MPa)	49	140/150	172	340		
Density		Solarization		B ($10^{-12}/Pa$)	1.95	150/160	176	330	
ρ (g/cm ³)	2.81	$\triangle\lambda$ (%)	-0.4					320	
								310	
								300	
								290	
								280	

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	-7.7	-7.6	-7.1	-7.1	-7.0	-6.8	-6.5	-5.8	-5.7	-4.6
-40 ~ -20	-7.7	-7.5	-7.1	-7.0	-7.0	-6.7	-6.4	-5.6	-5.5	-4.3
-20 ~ 0	-7.6	-7.5	-6.9	-6.9	-6.8	-6.5	-6.2	-5.3	-5.2	-4.0
0 ~ 20	-7.5	-7.4	-6.8	-6.7	-6.7	-6.4	-6.0	-5.1	-4.9	-3.6
20 ~ 40	-7.5	-7.3	-6.6	-6.6	-6.5	-6.2	-5.8	-4.8	-4.7	-3.2
40 ~ 60	-7.4	-7.1	-6.5	-6.4	-6.3	-6.0	-5.6	-4.5	-4.4	-2.8
60 ~ 80	-7.3	-7.0	-6.3	-6.3	-6.2	-5.8	-5.4	-4.3	-4.1	-2.5
80 ~ 100	-7.2	-7.0	-6.2	-6.1	-6.1	-5.7	-5.2	-4.0	-3.9	-2.1
100 ~ 120	-7.2	-6.9	-6.1	-6.1	-6.0	-5.6	-5.0	-3.8	-3.6	-1.8
120 ~ 140	-7.2	-6.9	-6.1	-6.0	-5.9	-5.5	-4.9	-3.6	-3.4	-1.5
140 ~ 160	-7.2	-6.9	-6.0	-5.9	-5.8	-5.4	-4.8	-3.4	-3.2	-1.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	405/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	393/369

Constants of dn/dt		
D ₀	D ₁	D ₂
-1.94E-05	1.35E-08	-3.34E-11
E ₀	E ₁	λ_{TK}
1.01E-06	1.52E-09	2.96E-01

H-ZF10	689312	$n_d = 1.68893$	$v_d = 31.16$	$n_F - n_C = 0.022109$
		$n_e = 1.69416$	$v_e = 30.92$	$n_{F'} - n_{C'} = 0.022450$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm	
n ₂₃₂₅	2325.42	1.64510	P _{d,C}	0.2904	RC (S)	1	2400	0.944	0.890	
n ₁₉₇₀	1970.09	1.65089	P _{e,d}	0.2366	RA (S)	1	2200	0.966	0.933	
n ₁₅₃₀	1529.58	1.65759	P _{g,F}	0.5989	D _W	1	2000	0.993	0.986	
n ₁₁₂₉	1128.64	1.66444	P' _{d,c'}	0.2414	D _A	1	1800	0.998	0.996	
n ₁₀₆₄	1064.00	1.66585	P' _{e,d}	0.2330	R _{OH} (S)	1	1600	0.998	0.996	
n _t	1013.98	1.66704	P' _{g,F'}	0.5301	RP (S)	1	1400	0.998	0.996	
n _s	852.11	1.67195			CR	1	1200	0.998	0.996	
n _{A'}	768.19	1.67555	Deviation of Relative Partial Dispersions				1060	0.998	0.996	
n _r	706.52	1.67898					1000	0.998	0.996	
n _C	656.27	1.68251	P _{F,e}	0.0001	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.998	0.996	
n _{C'}	643.85	1.68351	P _{g,F}	0.0070			900	0.998	0.996	
n _{He-Ne}	632.80	1.68445	P _{C,t}	0.0086	°C	α	850	0.998	0.996	
n _D	589.29	1.68874	P _{C,s}	0.0024	-50/-40	79	800	0.998	0.996	
n _d	587.56	1.68893	Thermal Properties			-40/-30	82	750	0.998	0.996
n _e	546.07	1.69416				-30/-20	84	700	0.998	0.996
n _F	486.13	1.70462	T _g (°C)	597	-20/-10	87	650	0.998	0.996	
n _{F'}	479.99	1.70596	T _s (°C)	631	-10/0	89	600	0.998	0.996	
n _g	435.84	1.71786	T ₁₀ ^{14.5} (°C)	523	0/10	90	550	0.998	0.996	
n _h	404.66	1.72964	T ₁₀ ¹³ (°C)	561	10/20	91	500	0.996	0.992	
n _i	365.01	1.75182	α _{-50/80°C} (10 ⁻⁷ /K)	89	20/30	92	480	0.994	0.988	
			α _{100/300°C} (10 ⁻⁷ /K)	109	30/40	93	460	0.992	0.984	
			λ (W/(m·K))	1.11	40/50	94	440	0.990	0.980	
					50/60	94	420	0.985	0.970	
Constants of Dispersion Formula					60/70	95	400	0.971	0.931	
			Mechanical Properties		70/80	95	390	0.941	0.879	
HK (10 ⁷ Pa)	545	80/90			96	380	0.861	0.741		
A ₀	2.76089226E+00		F _A	139	90/100	97	370	0.652	0.427	
A ₁	-1.10845008E-02		E (GPa)	85.4	100/110	98	360	0.256	0.075	
A ₂	2.89559966E-02		G (GPa)	34.7	110/120	99	350			
A ₃	1.51547191E-03		μ	0.232	120/130	100	340			
A ₄	-8.76539698E-05		σ _b (MPa)	82	130/140	102	330			
A ₅	1.38043475E-05		B (10 ⁻¹² /Pa)	2.71	140/150	103	320			
Density		Solarization								
ρ (g/cm ³)	2.93									
		Δλ (%)	-0.4							
Range of Temperature			Temperature Coefficients of Refractive Index							
			dn/dt relative (×10 ⁻⁶ / °C)							

H-ZF11	699301	$n_d = 1.69894$	$v_d = 30.05$	$n_F - n_C = 0.023259$
		$n_e = 1.70444$	$v_e = 29.81$	$n_{F'} - n_{C'} = 0.023628$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.65368	$P_{d,C}$	0.2894	RC (S)	1	2400	0.930	0.857
n_{1970}	1970.09	1.65957	$P_{e,d}$	0.2365	RA (S)	1	2200	0.956	0.905
n_{1530}	1529.58	1.66640	$P_{g,F}$	0.6023	D_W	1	2000	0.980	0.961
n_{1129}	1128.64	1.67343	$P'_{d,c'}$	0.2404	D_A	1	1800	0.993	0.985
n_{1064}	1064.00	1.67487	$P'_{e,d}$	0.2328	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.67610	$P'_{g,F'}$	0.5328	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.68119			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.68494	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.68852					1000	0.999	0.998
n_C	656.27	1.69221					950	0.999	0.998
$n_{C'}$	643.85	1.69326					900	0.999	0.998
n_{He-Ne}	632.80	1.69425	$P_{F,e}$	0.0006	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.69875	$P_{g,F}$	0.0087	-50/-40	79	800	0.999	0.998
n_d	587.56	1.69894	$P_{C,t}$	0.0069	-40/-30	82	750	0.999	0.998
n_e	546.07	1.70444	$P_{C,s}$	0.0013	-30/-20	84	700	0.999	0.998
n_F	486.13	1.71547	Thermal Properties		-20/-10	86	650	0.999	0.998
$n_{F'}$	479.99	1.71689			-10/0	89	600	0.999	0.998
n_g	435.84	1.72948			0/10	89	550	0.999	0.998
n_h	404.66	1.74204			10/20	91	500	0.997	0.995
n_i	365.01	1.76590			20/30	92	480	0.996	0.993
					30/40	93	460	0.995	0.990
			T_g ($^{\circ}C$)	592	40/50	93	440	0.993	0.986
			T_s ($^{\circ}C$)	625	50/60	94	420	0.986	0.973
			$T_{10}^{14.5}$ ($^{\circ}C$)	528	60/70	95	400	0.962	0.926
			T_{10}^{13} ($^{\circ}C$)	558	70/80	96	390	0.922	0.850
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	86	80/90	96	380	0.812	0.659
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	108	90/100	97	370	0.540	0.292
			λ (W/(m·K))	1.17	100/110	98	360	0.159	0.025
					110/120	99	350		
					120/130	100	340		
					130/140	102	330		
					140/150	103	320		
					150/160	104	310		
							300		
							290		
							280		

Constants of Dispersion Formula		Mechanical Properties	
A_0	2.79026920E+00		
A_1	-1.13154551E-02	HK (10^7Pa)	524
A_2	2.98537059E-02	F_A	139
A_3	1.85548133E-03	E (GPa)	88.1
A_4	-1.33930426E-04	G (GPa)	33.6
A_5	1.81714166E-05	μ	0.312
		σ_b (MPa)	74
		B ($10^{-12}/Pa$)	2.56

Density		Solarization	
ρ (g/cm ³)	2.96	$\triangle\lambda$ (%)	-0.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.76182$	$v_d = 26.61$	$n_F - n_C = 0.028631$
		$n_e = 1.76857$	$v_e = 26.39$	$n_F - n_{C'} = 0.029118$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.70927	$P_{d,C}$	0.2875	RC (S)	1	2400	0.935	0.874
n_{1970}	1970.09	1.71556	$P_{e,d}$	0.2358	RA (S)	1	2200	0.956	0.914
n_{1530}	1529.58	1.72304	$P_{g,F}$	0.6123	D_W	1	2000	0.979	0.958
n_{1129}	1128.64	1.73106	$P'_{d,c'}$	0.2387	D_A	1	1800	0.986	0.972
n_{1064}	1064.00	1.73276	$P'_{e,d}$	0.2318	R_{OH} (S)	1	1600	0.995	0.990
n_t	1013.98	1.73422	$P'_{g,F'}$	0.5412	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.74028			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.74478	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.74912					1000	0.998	0.996
n_C	656.27	1.75359					950	0.998	0.996
$n_{C'}$	643.85	1.75487					900	0.998	0.996
n_{He-Ne}	632.80	1.75608	$P_{F,e}$	0.0012	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.76157	$P_{g,F}$	0.0129	-50/-40	77	800	0.998	0.996
n_d	587.56	1.76182	$P_{C,t}$	0.0075	-40/-30	78	750	0.998	0.996
n_e	546.07	1.76857	$P_{C,s}$	0.0006	-30/-20	78	700	0.998	0.996
n_F	486.13	1.78222	Thermal Properties		-20/-10	79	650	0.998	0.996
$n_{F'}$	479.99	1.78399			-10/0	80	600	0.998	0.996
n_g	435.84	1.79975			0/10	82	550	0.998	0.996
n_h	404.66	1.81558			10/20	83	500	0.995	0.990
n_i	365.01	1.84562			20/30	83	480	0.991	0.982
					30/40	85	460	0.987	0.974
			T_g ($^{\circ}C$)	614	40/50	86	440	0.983	0.966
			T_s ($^{\circ}C$)	655	50/60	87	420	0.969	0.939
			$T_{10}^{14.5}$ ($^{\circ}C$)	544	60/70	88	400	0.923	0.849
			T_{10}^{13} ($^{\circ}C$)	590	70/80	89	390	0.849	0.718
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	83	80/90	90	380	0.711	0.508
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	103	90/100	92	370	0.355	0.129
			λ (W/(m·K))	1.10	100/110	93	360		
					110/120	93	350		
			Mechanical Properties		120/130	95	340		
					130/140	98	330		
					140/150	99	320		
					150/160	102	310		
			μ	0.283			300		
			σ_b (MPa)	77			290		
			B ($10^{-12}/Pa$)	2.85			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		Solarization	
ρ (g/cm ³)	3.16	$\triangle\lambda$ (%)	-0.3

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.76182$	$v_d = 26.61$	$n_F - n_C = 0.028631$
		$n_e = 1.76857$	$v_e = 26.39$	$n_{F'} - n_{C'} = 0.029118$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.70927	$P_{d,C}$	0.2875	RC (S)	1	2400	0.962	0.926
n_{1970}	1970.09	1.71556	$P_{e,d}$	0.2358	RA (S)	1	2200	0.980	0.960
n_{1530}	1529.58	1.72304	$P_{g,F}$	0.6123	D_W	1	2000	0.992	0.984
n_{1129}	1128.64	1.73106	$P'_{d,c'}$	0.2387	D_A	1	1800	0.999	0.998
n_{1064}	1064.00	1.73276	$P'_{e,d}$	0.2318	$R_{OH}(S)$	1	1600	0.999	0.998
n_t	1013.98	1.73422	$P'_{g,F'}$	0.5412	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.74028			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.74478	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.74912					1000	0.999	0.998
n_C	656.27	1.75359					950	0.999	0.998
$n_{C'}$	643.85	1.75487					900	0.999	0.998
n_{He-Ne}	632.80	1.75608	$P_{F,e}$	0.0012	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.76157	$P_{g,F}$	0.0129	-50/-40	77	800	0.999	0.998
n_d	587.56	1.76182	$P_{C,t}$	0.0075	-40/-30	78	750	0.999	0.998
n_e	546.07	1.76857	$P_{C,s}$	0.0006	-30/-20	78	700	0.999	0.998
n_F	486.13	1.78222	Thermal Properties		-20/-10	79	650	0.998	0.996
$n_{F'}$	479.99	1.78399			-10/0	80	600	0.998	0.996
n_g	435.84	1.79975			0/10	82	550	0.997	0.994
n_h	404.66	1.81558			10/20	83	500	0.993	0.987
n_i	365.01	1.84562			20/30	83	480	0.991	0.983
					30/40	85	460	0.988	0.977
			T_g ($^{\circ}C$)	614	40/50	86	440	0.984	0.969
			T_s ($^{\circ}C$)	665	50/60	87	420	0.975	0.951
			$T_{10}^{14.5}$ ($^{\circ}C$)	544	60/70	88	400	0.946	0.895
			T_{10}^{13} ($^{\circ}C$)	590	70/80	89	390	0.901	0.812
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	83	80/90	90	380	0.767	0.588
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	103	90/100	92	370	0.458	0.210
			λ (W/(m·K))	1.10	100/110	93	360	0.105	0.011
					110/120	93	350		
					120/130	95	340		
					130/140	98	330		
					140/150	99	320		
					150/160	102	310		
							300		
							290		
							280		

Constants of Dispersion Formula		Mechanical Properties	
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		Solarization	
ρ (g/cm ³)	3.16	$\triangle\lambda$ (%)	-0.3

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.78472$	$v_d = 25.72$	$n_F - n_C = 0.030510$
		$n_e = 1.79191$	$v_e = 25.51$	$n_{F'} - n_{C'} = 0.031042$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.73037	$P_{d,C}$	0.2868	RC (S)	1	2400	0.950	0.900
n_{1970}	1970.09	1.73662	$P_{e,d}$	0.2357	RA (S)	1	2200	0.976	0.950
n_{1530}	1529.58	1.74411	$P_{g,F}$	0.6142	D_W	1	2000	0.987	0.972
n_{1129}	1128.64	1.75231	$P'_{d,c'}$	0.2381	D_A	1	1800	0.993	0.984
n_{1064}	1064.00	1.75406	$P'_{e,d}$	0.2316	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.75557	$P'_{g,F'}$	0.5428	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.76192			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.76666	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.77124					1000	0.998	0.996
n_C	656.27	1.77597					950	0.998	0.996
$n_{C'}$	643.85	1.77733					900	0.998	0.996
n_{He-Ne}	632.80	1.77861	$P_{F,e}$	0.0015	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.78446	$P_{g,F}$	0.0133	-50/-40	80	800	0.998	0.996
n_d	587.56	1.78472	$P_{C,t}$	0.0039	-40/-30	81	750	0.998	0.996
n_e	546.07	1.79191	$P_{C,s}$	-0.0016	-30/-20	82	700	0.998	0.996
n_F	486.13	1.80648	Thermal Properties		-20/-10	82	650	0.998	0.996
$n_{F'}$	479.99	1.80837			-10/0	84	600	0.998	0.996
n_g	435.84	1.82522			0/10	87	550	0.996	0.992
n_h	404.66	1.84210			10/20	88	500	0.994	0.988
n_i	365.01	1.87399			20/30	88	480	0.990	0.980
					30/40	89	460	0.984	0.968
			T_g ($^{\circ}C$)	601	40/50	91	440	0.976	0.953
			T_s ($^{\circ}C$)	638	50/60	93	420	0.962	0.925
			$T_{10}^{14.5}$ ($^{\circ}C$)	535	60/70	93	400	0.907	0.819
			T_{10}^{13} ($^{\circ}C$)	573	70/80	95	390	0.812	0.658
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	87	80/90	96	380	0.640	0.407
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	111	90/100	98	370	0.308	0.095
			λ (W/(m·K))	0.98	100/110	98	360		
					110/120	99	350		
					120/130	102	340		
					130/140	103	330		
					140/150	104	320		
					150/160	107	310		
							300		
							290		
							280		

Constants of Dispersion Formula		Mechanical Properties	
A_0	3.05227481E+00		
A_1	-1.21808741E-02	HK (10^7Pa)	528
A_2	4.16791281E-02	F_A	181
A_3	1.79932930E-03	E (GPa)	91.5
A_4	1.91659600E-05	G (GPa)	35.7
A_5	1.22563456E-05	μ	0.281
		σ_b (MPa)	70
		B ($10^{-12}/Pa$)	2.73

Density		Solarization	
ρ (g/cm ³)	3.22	$\triangle\lambda$ (%)	-0.9

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.78472$	$v_d = 25.72$	$n_F - n_C = 0.030510$
		$n_e = 1.79191$	$v_e = 25.51$	$n_F - n_{C'} = 0.031042$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.73037	$P_{d,C}$	0.2868	RC (S)	1	2400	0.950	0.900
n_{1970}	1970.09	1.73662	$P_{e,d}$	0.2357	RA (S)	1	2200	0.976	0.950
n_{1530}	1529.58	1.74411	$P_{g,F}$	0.6142	D_W	1	2000	0.987	0.972
n_{1129}	1128.64	1.75231	$P'_{d,c'}$	0.2381	D_A	1	1800	0.993	0.984
n_{1064}	1064.00	1.75406	$P'_{e,d}$	0.2316	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.75557	$P'_{g,F'}$	0.5428	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.76192			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.76666	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.77124					1000	0.998	0.996
n_C	656.27	1.77597					950	0.998	0.996
$n_{C'}$	643.85	1.77733					900	0.998	0.996
n_{He-Ne}	632.80	1.77861	$P_{F,e}$	0.0015	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.78446	$P_{g,F}$	0.0133	-50/-40	80	800	0.998	0.996
n_d	587.56	1.78472	$P_{C,t}$	0.0039	-40/-30	81	750	0.998	0.996
n_e	546.07	1.79191	$P_{C,s}$	-0.0016	-30/-20	82	700	0.998	0.996
n_F	486.13	1.80648	Thermal Properties		-20/-10	82	650	0.998	0.996
$n_{F'}$	479.99	1.80837			-10/0	84	600	0.998	0.996
n_g	435.84	1.82522			0/10	87	550	0.998	0.996
n_h	404.66	1.84210			10/20	88	500	0.998	0.996
n_i	365.01	1.87399	T_g ($^{\circ}C$)	601	20/30	88	480	0.996	0.992
			T_s ($^{\circ}C$)	638	30/40	89	460	0.993	0.985
			$T_{10}^{14.5}$ ($^{\circ}C$)	535	40/50	91	440	0.986	0.975
			T_{10}^{13} ($^{\circ}C$)	573	50/60	93	420	0.970	0.950
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	87	60/70	93	400	0.938	0.889
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	111	70/80	95	390	0.891	0.801
			λ (W/(m·K))	0.98	80/90	96	380	0.760	0.590
					90/100	98	370	0.458	0.210
Constants of Dispersion Formula			Mechanical Properties		100/110	98	360	0.068	0.005
					110/120	99	350		
A_0	3.05227481E+00				120/130	102	340		
A_1	-1.21808741E-02				130/140	103	330		
A_2	4.16791281E-02		HK (10^7Pa)	528	140/150	104	320		
A_3	1.79932930E-03		F_A	181	150/160	107	310		
A_4	1.91659600E-05		E (GPa)	91.5			300		
A_5	1.22563456E-05		G (GPa)	35.7			290		
			μ	0.281			280		
			σ_b (MPa)	70					
			B ($10^{-12}/Pa$)	2.73					
Density		Solarization							
ρ (g/cm ³)	3.22	$\triangle\lambda$ (%)	-0.9						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZF16			664274	n _d = 1.66382		v _d = 27.35		n _F – n _C = 0.024274			
				n _e = 1.66953		v _e = 27.09		n _{F'} – n _{C'} = 0.024713			
Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42						2400	0.928	0.861		
n ₁₉₇₀	1970.09						2200	0.944	0.892		
n ₁₅₃₀	1529.58						2000	0.967	0.935		
n ₁₁₂₉	1128.64	1.63798					1800	0.985	0.970		
n ₁₀₆₄	1064.00	1.63943					1600	0.995	0.991		
n _t	1013.98	1.64066	1400	0.997	0.994						
n _s	852.11	1.64575		1200	0.998	0.997					
n _{A'}	768.19	1.64951		1060	0.999	0.998					
n _r	706.52	1.65313	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1000	0.999	0.998		
n _C	656.27	1.65688					950	0.999	0.998		
n _{C'}	643.85	1.65796					900	0.999	0.998		
n _{He-Ne}	632.80	1.65897					850	0.999	0.998		
n _D	589.29	1.66361	ΔP _{F,e}	0.0040	°C	α	800	0.999	0.998		
n _d	587.56	1.66382	ΔP _{g,F}	0.0258	-50/-40	120	750	0.999	0.998		
n _e	546.07	1.66953	ΔP _{C,t}	-0.0044	-40/-30	122	700	0.998	0.997		
n _F	486.13	1.68116	ΔP _{C,s}	-0.0074	-30/-20	122	650	0.998	0.997		
n _{F'}	479.99	1.68267	Thermal Properties		-20/-10	124	600	0.997	0.994		
n _g	435.84	1.69630			T _g (°C)	501	-10/0	125	550	0.993	0.987
n _h	404.66	1.71027			T _s (°C)	540	0/10	129	500	0.986	0.972
n _i	365.01	1.73801			T ₁₀ ^{14.5} (°C)	464	10/20	129	480	0.982	0.965
			T ₁₀ ¹³ (°C)	495	20/30	130	460	0.978	0.956		
			α _{-50/80°C} (10 ⁻⁷ /K)	129	30/40	133	440	0.971	0.942		
			α _{100/300°C} (10 ⁻⁷ /K)	158	40/50	134	420	0.951	0.905		
			λ (W/(m·K))	0.80	50/60	134	400	0.894	0.800		
					60/70	137	390	0.787	0.620		
Constants of Dispersion Formula			Mechanical Properties		70/80	138	380	0.475	0.226		
					80/90	140	370	0.167	0.028		
A ₀	2.67714843E+00	HK (10 ⁷ Pa)			336	90/100	142	360			
A ₁	-1.25476109E-02	F _A			136	100/110	143	350			
A ₂	2.53428256E-02	E (GPa)	63.8	110/120	146	340					
A ₃	3.34008152E-03	G (GPa)	25.0	120/130	149	330					
A ₄	-3.50698887E-04	μ	0.278	130/140	150	320					
A ₅	3.62744120E-05	σ _b (MPa)	43	140/150	148	310					
Density		Solarization		B (10 ⁻¹² /Pa)	2.30	150/160	152	300			
ρ (g/cm ³)	2.88					290					
		Δλ (%)						280			
Range of Temperature (°C)	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										
	t	s	C	C'	He-Ne	d	e	F	F'	g	
	-60 ~ -40	-6.4	-6.1	-5.4	-5.3	-5.3	-5.0	-4.6	-3.9	-3.8	-3.0
	-40 ~ -20	-6.3	-6.0	-5.3	-5.2	-5.2	-4.8	-4.5	-3.7	-3.7	-2.9
	-20 ~ 0	-6.1	-5.8	-5.1	-5.0	-4.9	-4.6	-4.3	-3.5	-3.4	-2.7
	0 ~ 20	-5.9	-5.6	-4.9	-4.8	-4.7	-4.4	-4.0	-3.3	-3.2	-2.4
	20 ~ 40	-5.7	-5.4	-4.6	-4.5	-4.5	-4.2	-3.8	-3.0	-2.9	-2.1
	40 ~ 60	-5.4	-5.1	-4.4	-4.3	-4.2	-3.9	-3.5	-2.8	-2.7	-1.8
	60 ~ 80	-5.2	-4.9	-4.1	-4.0	-4.0	-3.6	-3.2	-2.5	-2.4	-1.5
	80 ~ 100	-5.0	-4.7	-3.9	-3.8	-3.7	-3.4	-3.0	-2.2	-2.1	-1.3
	100 ~ 120	-4.8	-4.4	-3.6	-3.6	-3.5	-3.1	-2.7	-2.0	-1.9	-1.0
120 ~ 140	-4.6	-4.2	-3.4	-3.4	-3.3	-2.9	-2.5	-1.7	-1.6	-0.8	
140 ~ 160	-4.4	-4.1	-3.2	-3.2	-3.1	-2.7	-2.3	-1.5	-1.4	-0.6	
Coloration Code											
λ ₈₀ (λ ₇₀)/λ ₅					425/375						
Coloration of Internal Transmittance											
λτ ₈₀ /λτ ₅					400/372						
Constants of dn/dt											
D ₀			D ₁			D ₂					
-1.58E-05			2.11E-08			-2.52E-11					
E ₀			E ₁			λ _{TK}					
1.68E-06			2.78E-10			1.13E-10					

H-ZF50	741278	$n_d = 1.74077$	$v_d = 27.76$	$n_F - n_C = 0.026685$
		$n_e = 1.74707$	$v_e = 27.54$	$n_F - n_{C'} = 0.027125$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.69064	$P_{d,C}$	0.2886	RC (S)	1	2400	0.954	0.908
n_{1970}	1970.09	1.69692	$P_{e,d}$	0.2361	RA (S)	1	2200	0.968	0.941
n_{1530}	1529.58	1.70426	$P_{g,F}$	0.6078	D_W	1	2000	0.990	0.980
n_{1129}	1128.64	1.71195	$P'_{d,c'}$	0.2396	D_A	1	1800	0.993	0.986
n_{1064}	1064.00	1.71354	$P'_{e,d}$	0.2323	$R_{OH}(S)$	1	1600	0.998	0.996
n_t	1013.98	1.71491	$P'_{g,F'}$	0.5379	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.72060			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.72483	Deviation of Relative Partial Dispersions		Expansion Coefficient $\alpha (\times 10^{-7}/K)$		1060	0.998	0.996
n_r	706.52	1.72888					1000	0.998	0.996
n_C	656.27	1.73307					950	0.998	0.996
$n_{C'}$	643.85	1.73427					900	0.998	0.996
n_{He-Ne}	632.80	1.73540	$P_{F,e}$	0.0007	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.74054	$P_{g,F}$	0.0103	-50/-40	72	800	0.998	0.996
n_d	587.56	1.74077	$P_{C,t}$	0.0059	-40/-30	75	750	0.998	0.996
n_e	546.07	1.74707	$P_{C,s}$	0.0003	-30/-20	77	700	0.998	0.996
n_F	486.13	1.75976	Thermal Properties		-20/-10	78	650	0.998	0.996
$n_{F'}$	479.99	1.76139			-10/0	80	600	0.998	0.996
n_g	435.84	1.77598			0/10	81	550	0.998	0.996
n_h	404.66	1.79059			10/20	82	500	0.996	0.990
n_i	365.01	1.81850	$T_g (^{\circ}C)$	616	20/30	83	480	0.993	0.984
			$T_s (^{\circ}C)$	650	30/40	84	460	0.990	0.979
			$T_{10}^{14.5} (^{\circ}C)$	540	40/50	85	440	0.986	0.972
			$T_{10}^{13} (^{\circ}C)$	591	50/60	85	420	0.980	0.955
			$\alpha_{-50/80^{\circ}C} (10^{-7}/K)$	81	60/70	86	400	0.940	0.884
			$\alpha_{100/300^{\circ}C} (10^{-7}/K)$	101	70/80	87	390	0.885	0.785
			$\lambda (W/(m \cdot K))$	1.16	80/90	87	380	0.745	0.554
					90/100	88	370	0.431	0.185
			Mechanical Properties		100/110	89	360		
					110/120	90	350		
					120/130	91	340		
					130/140	93	330		
			μ	0.248	140/150	94	320		
			σ_b (MPa)	58	150/160	95	310		
			B ($10^{-12}/Pa$)	2.62			300		
							290		
							280		

Constants of Dispersion Formula		Solarization	
A_0	2.91816811E+00		
A_1	-1.22621813E-02	$\Delta\lambda$ (%)	0.4
A_2	3.41878382E-02		
A_3	2.36117574E-03		
A_4	-1.68240994E-04		
A_5	2.26673138E-05		

Density		Solarization	
ρ (g/cm ³)	3.05		

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.74077$	$v_d = 27.76$	$n_F - n_C = 0.026685$
		$n_e = 1.74707$	$v_e = 27.54$	$n_F - n_{C'} = 0.027125$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.69064	$P_{d,C}$	0.2886	RC (S)	1	2400	0.956	0.910
n_{1970}	1970.09	1.69692	$P_{e,d}$	0.2361	RA (S)	1	2200	0.969	0.944
n_{1530}	1529.58	1.70426	$P_{g,F}$	0.6078	D_W	1	2000	0.990	0.980
n_{1129}	1128.64	1.71195	$P'_{d,c'}$	0.2396	D_A	1	1800	0.993	0.986
n_{1064}	1064.00	1.71354	$P'_{e,d}$	0.2323	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.71491	$P'_{g,F'}$	0.5379	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.72060			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.72483	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.72888					1000	0.998	0.996
n_C	656.27	1.73307					950	0.998	0.996
$n_{C'}$	643.85	1.73427					900	0.998	0.996
n_{He-Ne}	632.80	1.73540	$P_{F,e}$	0.0007	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.74054	$P_{g,F}$	0.0103	-50/-40	72	800	0.998	0.996
n_d	587.56	1.74077	$P_{C,t}$	0.0059	-40/-30	75	750	0.998	0.996
n_e	546.07	1.74707	$P_{C,s}$	0.0003	-30/-20	77	700	0.998	0.996
n_F	486.13	1.75976	Thermal Properties		-20/-10	78	650	0.998	0.996
$n_{F'}$	479.99	1.76139			-10/0	80	600	0.998	0.996
n_g	435.84	1.77598			0/10	81	550	0.998	0.996
n_h	404.66	1.79059			10/20	82	500	0.996	0.994
n_i	365.01	1.81850	T_g ($^{\circ}C$)	616	20/30	83	480	0.993	0.991
			T_s ($^{\circ}C$)	650	30/40	84	460	0.990	0.988
			$T_{10}^{14.5}$ ($^{\circ}C$)	540	40/50	85	440	0.987	0.981
			T_{10}^{13} ($^{\circ}C$)	591	50/60	85	420	0.982	0.965
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	81	60/70	86	400	0.955	0.914
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	101	70/80	87	390	0.914	0.834
			λ (W/(m·K))	1.16	80/90	87	380	0.790	0.623
					90/100	88	370	0.467	0.219
			Mechanical Properties		100/110	89	360		
					110/120	90	350		
					120/130	91	340		
					130/140	93	330		
			μ	0.248	140/150	94	320		
			σ_b (MPa)	58	150/160	95	310		
			B ($10^{-12}/Pa$)	2.62			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	3.05	$\triangle\lambda$ (%)	0.4

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.84666$	$v_d = 23.78$	$n_F - n_C = 0.035608$
		$n_e = 1.85504$	$v_e = 23.59$	$n_{F'} - n_{C'} = 0.036247$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.78524	$P_{d,C}$	0.2856	RC (S)	1	2400	0.962	0.925
n_{1970}	1970.09	1.79201	$P_{e,d}$	0.2353	RA (S)	1	2200	0.980	0.961
n_{1530}	1529.58	1.80020	$P_{g,F}$	0.6195	D_W	1	2000	0.992	0.985
n_{1129}	1128.64	1.80936	$P'_{d,c'}$	0.2370	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.81133	$P'_{e,d}$	0.2312	R_{OH} (S)	1	1600	0.999	0.999
n_t	1013.98	1.81304	$P'_{g,F'}$	0.5476	RP (S)	1	1400	0.999	0.999
n_s	852.11	1.82028			CR	1	1200	0.999	0.999
$n_{A'}$	768.19	1.82573	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.999
n_r	706.52	1.83101					1000	0.999	0.999
n_C	656.27	1.83649					950	0.999	0.999
$n_{C'}$	643.85	1.83807					900	0.999	0.999
n_{He-Ne}	632.80	1.83956	$P_{F,e}$	0.0020	$^{\circ}C$	α	850	0.999	0.999
n_D	589.29	1.84635	$P_{g,F}$	0.0154	-50/-40	75	800	0.999	0.999
n_d	587.56	1.84666	$P_{C,t}$	0.0032	-40/-30	78	750	0.999	0.999
n_e	546.07	1.85504	$P_{C,s}$	-0.0022	-30/-20	79	700	0.999	0.999
n_F	486.13	1.87210	Thermal Properties		-20/-10	81	650	0.999	0.999
$n_{F'}$	479.99	1.87431			-10/0	82	600	0.999	0.999
n_g	435.84	1.89416			0/10	83	550	0.997	0.995
n_h	404.66	1.91418			10/20	84	500	0.993	0.986
n_i	365.01	1.95237			20/30	85	480	0.990	0.980
					30/40	85	460	0.985	0.971
			T_g ($^{\circ}C$)	632	40/50	86	440	0.977	0.954
			T_s ($^{\circ}C$)	662	50/60	86	420	0.958	0.918
			$T_{10}^{14.5}$ ($^{\circ}C$)	582	60/70	87	400	0.911	0.830
			T_{10}^{13} ($^{\circ}C$)	608	70/80	87	390	0.843	0.710
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	83	80/90	88	380	0.671	0.450
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	101	90/100	89	370	0.332	0.110
			λ (W/(m·K))	1.04	100/110	90	360		
					110/120	92	350		
					120/130	93	340		
					130/140	94	330		
					140/150	96	320		
					150/160	97	310		
							300		
							290		
							280		

Constants of Dispersion Formula		Mechanical Properties	
A_0	3.25093122E+00		
A_1	-1.35032313E-02		
A_2	4.90304607E-02		
A_3	2.49344608E-03	HK (10^7Pa)	531
A_4	-1.81762799E-05	F_A	176
A_5	1.94686410E-05	E (GPa)	96.1
		G (GPa)	38.1
		μ	0.262
		σ_b (MPa)	56
		B ($10^{-12}/Pa$)	2.54

Density		Solarization	
ρ (g/cm ³)	3.54	$\triangle\lambda$ (%)	-1.2

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.84666$	$v_d = 23.78$	$n_F - n_C = 0.035608$
		$n_e = 1.85504$	$v_e = 23.59$	$n_{F'} - n_{C'} = 0.036247$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.78524	$P_{d,C}$	0.2856	RC (S)	1	2400	0.893	0.928
n_{1970}	1970.09	1.79201	$P_{e,d}$	0.2353	RA (S)	1	2200	0.954	0.953
n_{1530}	1529.58	1.80020	$P_{g,F}$	0.6195	D_W	1	2000	0.994	0.977
n_{1129}	1128.64	1.80936	$P'_{d,c'}$	0.2370	D_A	1	1800	0.999	0.985
n_{1064}	1064.00	1.81133	$P'_{e,d}$	0.2312	R_{OH} (S)	1	1600	0.999	0.994
n_t	1013.98	1.81304	$P'_{g,F'}$	0.5476	RP (S)	1	1400	0.999	0.995
n_s	852.11	1.82028			CR	1	1200	0.999	0.996
$n_{A'}$	768.19	1.82573	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.83101					1000	0.999	0.998
n_C	656.27	1.83649					950	0.999	0.998
$n_{C'}$	643.85	1.83807					900	0.999	0.998
n_{He-Ne}	632.80	1.83956	$P_{F,e}$	0.0020	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.84635	$P_{g,F}$	0.0154	-50/-40	75	800	0.999	0.998
n_d	587.56	1.84666	$P_{C,t}$	0.0032	-40/-30	78	750	0.999	0.998
n_e	546.07	1.85504	$P_{C,s}$	-0.0022	-30/-20	79	700	0.998	0.997
n_F	486.13	1.87210	Thermal Properties		-20/-10	81	650	0.998	0.996
$n_{F'}$	479.99	1.87431			-10/0	82	600	0.997	0.994
n_g	435.84	1.89416			0/10	83	550	0.996	0.992
n_h	404.66	1.91418			10/20	84	500	0.991	0.983
n_i	365.01	1.95237			20/30	85	480	0.988	0.977
					30/40	85	460	0.985	0.970
			T_g ($^{\circ}C$)	632	40/50	86	440	0.978	0.957
			T_s ($^{\circ}C$)	662	50/60	86	420	0.964	0.930
			$T_{10}^{14.5}$ ($^{\circ}C$)	582	60/70	87	400	0.925	0.855
			T_{10}^{13} ($^{\circ}C$)	608	70/80	87	390	0.863	0.745
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	83	80/90	88	380	0.695	0.483
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	101	90/100	89	370	0.346	0.120
			λ (W/(m·K))	1.04	100/110	90	360		
					110/120	92	350		
					120/130	93	340		
					130/140	94	330		
					140/150	96	320		
					150/160	97	310		
							300		
							290		
							280		

Constants of Dispersion Formula		Mechanical Properties	
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		Solarization	
ρ (g/cm ³)	3.54	$\triangle\lambda$ (%)	-1.1

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZF52B	847238	$n_d = 1.84666$	$v_d = 23.78$	$n_F - n_C = 0.035608$
		$n_e = 1.85504$	$v_e = 23.59$	$n_{F'} - n_{C'} = 0.036247$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2845	RC (S)	1	2400	0.957	0.915
n_{1970}	1970.09		$P_{e,d}$	0.2353	RA (S)	1	2200	0.978	0.957
n_{1530}	1529.58		$P_{g,F}$	0.6277	D_W	1	2000	0.993	0.987
n_{1129}	1128.64	1.80930	$P'_{d,c'}$	0.2359	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.81131	$P'_{e,d}$	0.2312	$R_{OH}(S)$	1	1600	0.998	0.997
n_t	1013.98	1.81304	$P'_{g,F'}$	0.5554	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.82033			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.82578	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.83105					1000	0.999	0.998
n_C	656.27	1.83653					950	0.999	0.998
$n_{C'}$	643.85	1.83811					900	0.999	0.998
n_{He-Ne}	632.80	1.83959	$P_{F,e}$	0.0029	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.84636	$P_{g,F}$	0.0236	-50/-40	67	800	0.998	0.997
n_d	587.56	1.84666	$P_{C,t}$	0.0043	-40/-30	75	750	0.998	0.997
n_e	546.07	1.85504	$P_{C,s}$	-0.0025	-30/-20	84	700	0.998	0.996
n_F	486.13	1.87213	Thermal Properties		-20/-10	85	650	0.997	0.994
$n_{F'}$	479.99	1.87435			-10/0	85	600	0.996	0.993
n_g	435.84	1.89448			0/10	86	550	0.993	0.987
n_h	404.66	1.91508			10/20	86	500	0.985	0.971
n_i	365.01		T_g ($^{\circ}C$)	551	20/30	86	480	0.979	0.958
			T_s ($^{\circ}C$)	591	30/40	87	460	0.968	0.937
			$T_{10}^{14.5}$ ($^{\circ}C$)	507	40/50	87	440	0.952	0.906
			T_{10}^{13} ($^{\circ}C$)	540	50/60	88	420	0.919	0.845
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	83	60/70	89	400	0.839	0.704
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	99	70/80	89	390	0.729	0.532
			λ (W/(m·K))	0.82	80/90	90	380	0.455	0.207
					90/100	91	370	0.135	0.018
			Mechanical Properties		100/110	93	360		
					110/120	95	350		
					120/130	98	340		
					130/140	99	330		
			μ	0.276	140/150	101	320		
			σ_b (MPa)		150/160	103	310		
			B ($10^{-12}/Pa$)	2.53			300		
							290		
							280		

Constants of Dispersion Formula	
A_0	3.25501075E+00
A_1	-1.55546766E-02
A_2	4.62097153E-02
A_3	3.54440350E-03
A_4	-2.41943734E-04
A_5	4.01197414E-05

Density		Solarization	
ρ (g/cm ³)	3.71	$\triangle\lambda$ (%)	-0.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	-2.8	-2.6	-2.4	-2.3	-2.2	-2.1	-1.9	-1.7	-1.5	-1.0
-40 ~ -20	-2.7	-2.6	-2.3	-2.3	-2.2	-2.0	-1.8	-1.6	-1.4	-0.8
-20 ~ 0	-2.7	-2.4	-2.1	-2.0	-2.0	-1.9	-1.6	-1.4	-1.3	-0.5
0 ~ 20	-2.6	-2.3	-1.9	-1.9	-1.9	-1.7	-1.5	-1.2	-1.2	-0.4
20 ~ 40	-2.5	-2.2	-1.8	-1.8	-1.7	-1.5	-1.4	-1.1	-0.8	-0.1
40 ~ 60	-2.3	-2.0	-1.6	-1.6	-1.5	-1.3	-1.2	-0.9	-0.6	0.2
60 ~ 80	-2.3	-1.9	-1.6	-1.6	-1.5	-1.2	-1.1	-0.7	-0.3	0.6
80 ~ 100	-2.3	-1.7	-1.3	-1.3	-1.2	-1.0	-0.9	-0.5	-0.1	0.9
100 ~ 120	-2.1	-1.5	-1.1	-1.1	-1.0	-0.8	-0.7	-0.4	0.1	1.1
120 ~ 140	-2.0	-1.1	-0.9	-0.8	-0.8	-0.6	-0.3	-0.1	0.3	1.4
140 ~ 160	-1.9	-0.9	-0.7	-0.6	-0.6	-0.4	-0.1	0.1	0.4	1.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(420)/375
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	412/372

Constants of dn/dt		
D_0	D_1	D_2
-7.08E-06	1.39E-08	-1.78E-11
E_0	E_1	λ_{TK}
5.17E-07	6.08E-10	2.48E-01

H-ZF56	855248	$n_d = 1.85478$	$v_d = 24.80$	$n_F - n_C = 0.034469$
		$n_e = 1.86290$	$v_e = 24.61$	$n_{F'} - n_{C'} = 0.035057$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.79256	$P_{d,C}$	0.2872	RC (S)	1	2400	0.971	0.943
n_{1970}	1970.09	1.79984	$P_{e,d}$	0.2356	RA (S)	1	2200	0.982	0.964
n_{1530}	1529.58	1.80851	$P_{g,F}$	0.6119	D_W	1	2000	0.992	0.985
n_{1129}	1128.64	1.81792	$P'_{d,c'}$	0.2385	D_A	1	1800	0.994	0.988
n_{1064}	1064.00	1.81992	$P'_{e,d}$	0.2316	R_{OH} (S)	1	1600	0.997	0.995
n_t	1013.98	1.82165	$P'_{g,F'}$	0.5411	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.82888			CR	2	1200	0.999	0.998
$n_{A'}$	768.19	1.83428	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.83948					1000	0.999	0.998
n_C	656.27	1.84488					950	0.999	0.998
$n_{C'}$	643.85	1.84642					900	0.999	0.998
n_{He-Ne}	632.80	1.84787	$P_{F,e}$	0.0007	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.85448	$P_{g,F}$	0.0094	-50/-40	64	800	0.999	0.998
n_d	587.56	1.85478	$P_{C,t}$	0.0137	-40/-30	67	750	0.999	0.998
n_e	546.07	1.86290	$P_{C,s}$	0.0043	-30/-20	73	700	0.999	0.997
n_F	486.13	1.87935	Thermal Properties		-20/-10	73	650	0.998	0.996
$n_{F'}$	479.99	1.88147			-10/0	74	600	0.998	0.995
n_g	435.84	1.90044	T_g ($^{\circ}C$)	585	0/10	74	550	0.996	0.992
n_h	404.66	1.91945	T_s ($^{\circ}C$)	623	10/20	77	500	0.991	0.982
n_i	365.01	1.95583	$T_{10}^{14.5}$ ($^{\circ}C$)	530	20/30	80	480	0.988	0.975
			T_{10}^{13} ($^{\circ}C$)	563	30/40	80	460	0.983	0.967
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	76	40/50	80	440	0.976	0.953
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	97	50/60	83	420	0.961	0.924
			λ (W/(m·K))	1.23	60/70	85	400	0.929	0.862
					70/80	85	390	0.897	0.804
Constants of Dispersion Formula			Mechanical Properties		80/90	86	380	0.835	0.697
					90/100	88	370	0.683	0.466
A_0	3.28426529E+00		HK (10^7Pa)	572	100/110	88	360	0.361	0.131
A_1	-1.47934043E-02		F_A	201	110/120	89	350		
A_2	4.81498133E-02		E (GPa)	106.5	120/130	89	340		
A_3	2.74086829E-03		G (GPa)	42.3	130/140	93	330		
A_4	-1.33744832E-04		μ	0.257	140/150	93	320		
A_5	2.63779943E-05		σ_b (MPa)	106	150/160	95	310		
Density		Solarization		B ($10^{-12}/Pa$)	3.06		300		
ρ (g/cm ³)	3.49	$\Delta\lambda$ (%)	-1.7				290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(395)/360
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	390/355

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	$n_d = 1.92286$	$v_d = 20.88$	$n_F - n_C = 0.044198$
		$n_e = 1.93323$	$v_e = 20.71$	$n_F - n_{C'} = 0.045071$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.84761	$P_{d,C}$	0.2824	RC (S)	1	2400	0.957	0.916
n_{1970}	1970.09	1.85605	$P_{e,d}$	0.2346	RA (S)	1	2200	0.978	0.956
n_{1530}	1529.58	1.86617	$P_{g,F}$	0.6374	D_W	1	2000	0.999	0.998
n_{1129}	1128.64	1.87734	$P'_{d,c'}$	0.2341	D_A	1	1800	0.999	0.998
n_{1064}	1064.00	1.87974	$P'_{e,d}$	0.2301	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.88181	$P'_{g,F'}$	0.5627	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.89061			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.89723	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.90366					1000	0.999	0.998
n_C	656.27	1.91038					950	0.999	0.998
$n_{C'}$	643.85	1.91231					900	0.999	0.998
n_{He-Ne}	632.80	1.91413	$P_{F,e}$	0.0042	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.92248	$P_{g,F}$	0.0284	-50/-40	54	800	0.999	0.998
n_d	587.56	1.92286	$P_{C,t}$	0.0051	-40/-30	56	750	0.999	0.998
n_e	546.07	1.93323	$P_{C,s}$	-0.0032	-30/-20	58	700	0.999	0.998
n_F	486.13	1.95457	Thermal Properties		-20/-10	60	650	0.998	0.997
$n_{F'}$	479.99	1.95738			-10/0	61	600	0.997	0.995
n_g	435.84	1.98274			0/10	62	550	0.993	0.986
n_h	404.66	2.00892			10/20	62	500	0.983	0.965
n_i	365.01		T_g ($^{\circ}C$)	690	20/30	63	480	0.976	0.952
			T_s ($^{\circ}C$)	725	30/40	63	460	0.966	0.934
			$T_{10}^{14.5}$ ($^{\circ}C$)	625	40/50	64	440	0.950	0.902
			T_{10}^{13} ($^{\circ}C$)	664	50/60	64	420	0.917	0.840
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	61	60/70	65	400	0.791	0.625
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	74	70/80	65	390	0.586	0.343
			λ (W/(m·K))	0.99	80/90	65	380	0.210	0.044
					90/100	67	370		
			Mechanical Properties		100/110	67	360		
					110/120	68	350		
					120/130	70	340		
					130/140	70	330		
			μ	0.257	140/150	72	320		
			σ_b (MPa)	71	150/160	72	310		
			B ($10^{-12}/Pa$)	2.85			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	3.93	$\triangle\lambda$ (%)	-0.4

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.92286$	$v_d = 20.88$	$n_F - n_C = 0.044198$
		$n_e = 1.93323$	$v_e = 20.71$	$n_F - n_{C'} = 0.045071$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.84761	$P_{d,C}$	0.2824	RC (S)	1	2400	0.961	0.924
n_{1970}	1970.09	1.85605	$P_{e,d}$	0.2346	RA (S)	1	2200	0.984	0.969
n_{1530}	1529.58	1.86617	$P_{g,F}$	0.6374	D_W	1	2000	0.999	0.998
n_{1129}	1128.64	1.87734	$P'_{d,c'}$	0.2341	D_A	1	1800	0.999	0.998
n_{1064}	1064.00	1.87974	$P'_{e,d}$	0.2301	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.88181	$P'_{g,F'}$	0.5627	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.89061			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.89723	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.90366					1000	0.999	0.998
n_C	656.27	1.91038	$P_{F,e}$	0.0042	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.91231	$P_{g,F}$	0.0284	-50/-40	54	900	0.999	0.998
n_{He-Ne}	632.80	1.91413	$P_{C,t}$	0.0051	-40/-30	56	850	0.999	0.998
n_D	589.29	1.92248	$P_{C,s}$	-0.0032	-30/-20	58	800	0.999	0.998
n_d	587.56	1.92286	Thermal Properties		-20/-10	60	750	0.999	0.998
n_e	546.07	1.93323			-10/0	61	700	0.999	0.998
n_F	486.13	1.95457	T_g ($^{\circ}C$)	690	0/10	62	650	0.998	0.997
$n_{F'}$	479.99	1.95738	T_s ($^{\circ}C$)	725	10/20	62	600	0.997	0.995
n_g	435.84	1.98274	$T_{10}^{14.5}$ ($^{\circ}C$)	625	20/30	63	550	0.997	0.994
n_h	404.66	2.00892	T_{10}^{13} ($^{\circ}C$)	664	30/40	63	500	0.991	0.983
n_i	365.01		$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	61	40/50	64	480	0.988	0.975
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	74	50/60	64	460	0.983	0.965
			λ (W/(m·K))	0.99	60/70	65	440	0.974	0.949
					70/80	65	420	0.945	0.894
Constants of Dispersion Formula			Mechanical Properties		80/90	65	400	0.836	0.700
					90/100	67	390	0.615	0.378
A_0	3.49733468E+00		HK (10^7Pa)	485	100/110	67	380	0.245	0.060
A_1	-1.75493772E-02		F_A	228	110/120	68	370		
A_2	5.99594355E-02		E (GPa)	98.0	120/130	70	360		
A_3	3.90005481E-03		G (GPa)	39.0	130/140	70	350		
A_4	-1.39531497E-04		μ	0.257	140/150	72	340		
A_5	4.41807948E-05		σ_b (MPa)	71	150/160	72	330		
Density		Solarization		B ($10^{-12}/Pa$)	2.85		320		
ρ (g/cm ³)	3.93						310		
		$\triangle\lambda$ (%)	-0.4				300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.92286$	$v_d = 18.90$	$n_F - n_C = 0.048837$
		$n_e = 1.93429$	$v_e = 18.74$	$n_{F'} - n_{C'} = 0.049853$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.84193	$P_{d,C}$	0.2805	RC (S)	1	2400	0.983	0.966
n_{1970}	1970.09	1.85076	$P_{e,d}$	0.2340	RA (S)	1	2200	0.995	0.990
n_{1530}	1529.58	1.86140	$P_{g,F}$	0.6499	D_W	1	2000	0.997	0.994
n_{1129}	1128.64	1.87330	$P'_{d,c'}$	0.2325	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.87587	$P'_{e,d}$	0.2293	R_{OH} (S)	1	1600	0.997	0.994
n_t	1013.98	1.87811	$P'_{g,F'}$	0.5741	RP (S)	1	1400	0.997	0.994
n_s	852.11	1.88761			CR	1	1200	0.997	0.994
$n_{A'}$	768.19	1.89481	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.997	0.994
n_r	706.52	1.90181					1000	0.997	0.994
n_C	656.27	1.90916					950	0.997	0.994
$n_{C'}$	643.85	1.91127					900	0.997	0.994
n_{He-Ne}	632.80	1.91327	$P_{F,e}$	0.0057	$^{\circ}C$	α	850	0.997	0.994
n_D	589.29	1.92245	$P_{g,F}$	0.0377	-50/-40	57	800	0.997	0.994
n_d	587.56	1.92286	$P_{C,t}$	0.0041	-40/-30	60	750	0.997	0.994
n_e	546.07	1.93429	$P_{C,s}$	-0.0045	-30/-20	62	700	0.997	0.994
n_F	486.13	1.95800	Thermal Properties		-20/-10	64	650	0.997	0.994
$n_{F'}$	479.99	1.96112			-10/0	66	600	0.997	0.994
n_g	435.84	1.98974			0/10	67	550	0.990	0.981
n_h	404.66	2.01970			10/20	68	500	0.973	0.954
n_i	365.01		T_g ($^{\circ}C$)	656	20/30	69	480	0.966	0.938
			T_s ($^{\circ}C$)	684	30/40	70	460	0.954	0.915
			$T_{10}^{14.5}$ ($^{\circ}C$)	585	40/50	71	440	0.933	0.875
			T_{10}^{13} ($^{\circ}C$)	634	50/60	71	420	0.890	0.788
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	66	60/70	72	400	0.642	0.410
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	82	70/80	72	390	0.253	0.066
			λ (W/(m·K))	1.13	80/90	73	380		
					90/100	73	370		
Constants of Dispersion Formula			Mechanical Properties		100/110	74	360		
					110/120	74	350		
					120/130	75	340		
					130/140	76	330		
Density		3.57	Solarization		140/150	77	320		
					150/160	78	310		
ρ (g/cm ³)	3.57		$\Delta\lambda$ (%)	-0.4			300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.92286$	$v_d = 18.90$	$n_F - n_C = 0.048837$
		$n_e = 1.93429$	$v_e = 18.74$	$n_{F'} - n_{C'} = 0.049853$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm	
n ₂₃₂₅	2325.42	1.84193	P _{d,C}	0.2805	RC (S)	1	2400	0.983	0.966	
n ₁₉₇₀	1970.09	1.85076	P _{e,d}	0.2340	RA (S)	1	2200	0.995	0.990	
n ₁₅₃₀	1529.58	1.86140	P _{g,F}	0.6499	D _W	1	2000	0.997	0.994	
n ₁₁₂₉	1128.64	1.87330	P' _{d,c'}	0.2325	D _A	1	1800	0.999	0.998	
n ₁₀₆₄	1064.00	1.87587	P' _{e,d}	0.2293	R _{OH} (S)	1	1600	0.999	0.998	
n _t	1013.98	1.87811	P' _{g,F'}	0.5741	RP (S)	1	1400	0.999	0.998	
n _s	852.11	1.88761			CR	1	1200	0.999	0.998	
n _{A'}	768.19	1.89481	Deviation of Relative Partial Dispersions				1060	0.999	0.998	
n _r	706.52	1.90181					1000	0.999	0.998	
n _C	656.27	1.90916	P _{F,e}	0.0057	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.999	0.998	
n _{C'}	643.85	1.91127	P _{g,F}	0.0377			850	0.999	0.998	
n _{He-Ne}	632.80	1.91327	P _{C,t}	0.0041	°C	α	800	0.999	0.998	
n _D	589.29	1.92245	P _{C,s}	-0.0045	-50/-40	57	750	0.999	0.998	
n _d	587.56	1.92286	Thermal Properties			-40/-30	60	700	0.999	0.998
n _e	546.07	1.93429				-30/-20	62	650	0.999	0.998
n _F	486.13	1.95800	T _g (°C)	656	-20/-10	65	600	0.999	0.997	
n _{F'}	479.99	1.96112	T _s (°C)	684	-10/0	66	550	0.998	0.997	
n _g	435.84	1.98974	T ₁₀ ^{14.5} (°C)	585	0/10	67	500	0.996	0.991	
n _h	404.66	2.01970	T ₁₀ ¹³ (°C)	634	10/20	69	480	0.988	0.977	
n _i	365.01		α _{-50/80°C} (10 ⁻⁷ /K)	65	20/30	69	460	0.983	0.965	
			α _{100/300°C} (10 ⁻⁷ /K)	81	30/40	70	440	0.974	0.949	
			λ (W/(m·K))	1.13	40/50	70	420	0.959	0.919	
Constants of Dispersion Formula					50/60	70	400	0.921	0.848	
					60/70	71	390	0.671	0.450	
A ₀	3.47907547E+00	Mechanical Properties			70/80	71	380	0.305	0.093	
A ₁	-1.82056514E-02				80/90	72	370			
A ₂	6.44069814E-02	HK (10 ⁷ Pa)	488	90/100	72	360				
A ₃	4.67488595E-03	F _A	206	100/110	73	350				
A ₄	-2.34014347E-04	E (GPa)	100.3	110/120	74	340				
A ₅	6.37833754E-05	G (GPa)	40.3	120/130	74	330				
Density			μ	0.243	130/140	75	320			
			σ _b (MPa)	56	140/150	76	310			
			B (10 ⁻¹² /Pa)	3.24	150/160	77	300			
									290	
Range of Temperature		Temperature Coefficients of Refractive Index								
		dn/dt relative (×10 ⁻⁶ / °C)								
							280			

H-ZF75A	946180	$n_d = 1.94595$	$v_d = 17.98$	$n_F - n_C = 0.052600$
		$n_e = 1.95825$	$v_e = 17.84$	$n_F - n_{C'} = 0.053718$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.85978	$P_{d,C}$	0.2798	RC (S)	1	2400	0.972	0.945
n_{1970}	1970.09	1.86908	$P_{e,d}$	0.2338	RA (S)	1	2200	0.982	0.964
n_{1530}	1529.58	1.88034	$P_{g,F}$	0.6549	D_W	1	2000	0.997	0.994
n_{1129}	1128.64	1.89291	$P'_{d,c'}$	0.2318	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.89565	$P'_{e,d}$	0.2290	R_{OH} (S)	1	1600	0.997	0.994
n_t	1013.98	1.89802	$P'_{g,F'}$	0.5782	RP (S)	1	1400	0.997	0.994
n_s	852.11	1.90816			CR	1	1200	0.997	0.994
$n_{A'}$	768.19	1.91585	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.997	0.994
n_r	706.52	1.92337					1000	0.997	0.994
n_C	656.27	1.93123	$P_{F,e}$	0.0060	$^{\circ}C$	α	950	0.997	0.994
$n_{C'}$	643.85	1.93350	$P_{g,F}$	0.0412	-50/-40	47	900	0.997	0.994
n_{He-Ne}	632.80	1.93564	$P_{C,t}$	0.0041	-40/-30	50	850	0.997	0.994
n_D	589.29	1.94550	$P_{C,s}$	-0.0050	-30/-20	51	800	0.997	0.994
n_d	587.56	1.94595	Thermal Properties		-20/-10	53	750	0.997	0.994
n_e	546.07	1.95825			-10/0	54	700	0.997	0.994
n_F	486.13	1.98383	T_g ($^{\circ}C$)	682	0/10	55	650	0.997	0.994
$n_{F'}$	479.99	1.98722	T_s ($^{\circ}C$)	709	10/20	56	600	0.995	0.990
n_g	435.84	2.01828	$T_{10}^{14.5}$ ($^{\circ}C$)	609	20/30	57	550	0.993	0.986
n_h	404.66	2.05110	T_{10}^{13} ($^{\circ}C$)	660	30/40	57	500	0.970	0.941
n_i	365.01		$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	55	40/50	58	480	0.960	0.921
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	70	50/60	60	460	0.946	0.894
			λ (W/(m·K))	1.11	60/70	60	440	0.923	0.853
					70/80	61	420	0.870	0.756
Constants of Dispersion Formula			Mechanical Properties		80/90	61	400	0.546	0.298
					90/100	62	390	0.181	0.033
A_0	3.55084508E+00		HK (10^7Pa)	510	100/110	63	380		
A_1	-1.93992631E-02		F_A	199	110/120	64	370		
A_2	6.82201738E-02		E (GPa)	104.6	120/130	65	360		
A_3	5.85319322E-03		G (GPa)	41.1	130/140	66	350		
A_4	-4.21740063E-04		μ	0.272	140/150	66	340		
A_5	8.66214086E-05		σ_b (MPa)	66	150/160	67	330		
Density		Solarization		B ($10^{-12}/Pa$)	3.38		320		
ρ (g/cm ³)	3.53	$\triangle\lambda$ (%)	-0.5				310		
							300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.94595$	$v_d = 17.98$	$n_F - n_C = 0.052600$
		$n_e = 1.95825$	$v_e = 17.84$	$n_{F'} - n_{C'} = 0.053718$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.85978	$P_{d,C}$	0.2798	RC (S)	1	2400	0.975	0.951
n_{1970}	1970.09	1.86908	$P_{e,d}$	0.2338	RA (S)	1	2200	0.986	0.973
n_{1530}	1529.58	1.88034	$P_{g,F}$	0.6549	D_W	1	2000	0.997	0.995
n_{1129}	1128.64	1.89291	$P'_{d,c'}$	0.2318	D_A	1	1800	0.997	0.995
n_{1064}	1064.00	1.89565	$P'_{e,d}$	0.2290	R_{OH} (S)	1	1600	0.997	0.995
n_t	1013.98	1.89802	$P'_{g,F'}$	0.5782	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.90816			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.91585	Deviation of Relative Partial Dispersions				1060	0.998	0.996
n_r	706.52	1.92337					1000	0.998	0.996
n_C	656.27	1.93123	$P_{F,e}$	0.0060	Expansion Coefficient α ($\times 10^{-7}/K$)		950	0.998	0.996
$n_{C'}$	643.85	1.93350	$P_{g,F}$	0.0412			900	0.998	0.996
n_{He-Ne}	632.80	1.93564	$P_{C,t}$	0.0041	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.94550	$P_{C,s}$	-0.0050	-50/-40	48	800	0.998	0.996
n_d	587.56	1.94595	Thermal Properties		-40/-30	51	750	0.998	0.996
n_e	546.07	1.95825			-30/-20	53	700	0.998	0.996
n_F	486.13	1.98383	T_g ($^{\circ}C$)	682	-20/-10	55	650	0.998	0.996
$n_{F'}$	479.99	1.98722	T_s ($^{\circ}C$)	709	-10/0	56	600	0.998	0.996
n_g	435.84	2.01828	$T_{10}^{14.5}$ ($^{\circ}C$)	609	0/10	57	550	0.995	0.991
n_h	404.66	2.05110	T_{10}^{13} ($^{\circ}C$)	660	10/20	57	500	0.988	0.975
n_i	365.01		$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	54	20/30	58	480	0.982	0.963
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	68	30/40	59	460	0.973	0.946
			λ (W/(m·K))	1.11	40/50	59	440	0.957	0.916
					50/60	60	420	0.915	0.838
					60/70	61	400	0.604	0.365
					70/80	61	390	0.243	0.059
					80/90	62	380		
					90/100	62	370		
					100/110	63	360		
					110/120	64	350		
					120/130	64	340		
					130/140	66	330		
					140/150	67	320		
					150/160	68	310		
							300		
							290		
							280		

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	$\Delta\lambda$ (%)	-0.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.95906$	$v_d = 17.47$	$n_F - n_C = 0.054890$
		$n_e = 1.97189$	$v_e = 17.33$	$n_F - n_{C'} = 0.056091$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2789	RC (S)	1	2400	0.976	0.953
n_{1970}	1970.09		$P_{e,d}$	0.2337	RA (S)	1	2200	0.990	0.980
n_{1530}	1529.58		$P_{g,F}$	0.6566	D_W	1	2000	0.992	0.984
n_{1129}	1128.64	1.90422	$P'_{d,c'}$	0.2309	D_A	1	1800	0.996	0.991
n_{1064}	1064.00	1.90710	$P'_{e,d}$	0.2287	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.90958	$P'_{g,F'}$	0.5792	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.92000			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.92789	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.93562					1000	0.999	0.998
n_C	656.27	1.94375	$P_{F,e}$	0.0070	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.94611	$P_{g,F}$	0.0420	-50/-40	53	900	0.999	0.998
n_{He-Ne}	632.80	1.94834	$P_{C,t}$	-0.0022	-40/-30	55	850	0.999	0.998
n_D	589.29	1.95860	$P_{C,s}$	-0.0096	-30/-20	56	800	0.999	0.998
n_d	587.56	1.95906	Thermal Properties		-20/-10	57	750	0.999	0.998
n_e	546.07	1.97189			-10/0	58	700	0.998	0.996
n_F	486.13	1.99865	T_g ($^{\circ}C$)	683	0/10	58	650	0.997	0.994
$n_{F'}$	479.99	2.00220	T_s ($^{\circ}C$)	712	10/20	59	600	0.996	0.992
n_g	435.84	2.03469	$T_{10}^{14.5}$ ($^{\circ}C$)	605	20/30	60	550	0.988	0.977
n_h	404.66	2.06909	T_{10}^{13} ($^{\circ}C$)	655	30/40	62	500	0.972	0.944
n_i	365.01		$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	59	40/50	62	480	0.957	0.917
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	73	50/60	62	460	0.936	0.876
			λ (W/(m·K))		60/70	62	440	0.897	0.804
					70/80	65	420	0.805	0.648
Constants of Dispersion Formula			Mechanical Properties		80/90	65	400	0.370	0.137
					90/100	65	390		
A_0	3.61187240E+00		HK (10^7Pa)	494	100/110	67	380		
A_1	-2.77611102E-02		F_A	178	110/120	67	370		
A_2	5.45160847E-02		E (GPa)	102.9	120/130	68	360		
A_3	1.18687253E-02		G (GPa)	41.2	130/140	70	350		
A_4	-1.30897352E-03		μ	0.249	140/150	70	340		
A_5	1.41185183E-04		σ_b (MPa)	79	150/160	70	330		
Density		Solarization		B ($10^{-12}/Pa$)	3.58		320		
ρ (g/cm ³)	3.56	$\triangle\lambda$ (%)	-0.3				310		
							300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.61340$	$v_d = 44.11$	$n_F - n_C = 0.013907$
		$n_e = 1.61669$	$v_e = 43.91$	$n_{F'} - n_{C'} = 0.014044$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance								
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm						
n ₂₃₂₅	2325.42	1.57673	P _{d,C}	0.2991	RC (S)	1	2400	0.885	0.782						
n ₁₉₇₀	1970.09	1.58314	P _{e,d}	0.2366	RA (S)	1	2200	0.953	0.907						
n ₁₅₃₀	1529.58	1.59013	P _{g,F}	0.5623	D _W	1	2000	0.994	0.988						
n ₁₁₂₉	1128.64	1.59636	P' _{d,c'}	0.2492	D _A	1	1800	0.999	0.998						
n ₁₀₆₄	1064.00	1.59749	P' _{e,d}	0.2343	R _{OH} (S)	1	1600	0.999	0.998						
n _t	1013.98	1.59843	P' _{g,F'}	0.5006	RP (S)	1	1400	0.999	0.998						
n _s	852.11	1.60207			CR	1	1200	0.999	0.998						
n _{A'}	768.19	1.60458	Deviation of Relative Partial Dispersions				1060	0.999	0.998						
n _r	706.52	1.60690					1000	0.999	0.998						
n _C	656.27	1.60924	P _{F,e}	-0.0013	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.999	0.998						
n _{C'}	643.85	1.60990	P _{g,F}	-0.0080			°C	α	900	0.999	0.998				
n _{He-Ne}	632.80	1.61051	P _{C,t}	0.0234	-50/-40	55	850	0.999	0.998						
n _D	589.29	1.61327	P _{C,s}	0.0093	-40/-30	56	800	0.999	0.998						
n _d	587.56	1.61340	Thermal Properties				750	0.999	0.998						
n _e	546.07	1.61669					-30/-20	57	700	0.999	0.998				
n _F	486.13	1.62315	T _g (°C)	579	-20/-10	60	650	0.999	0.998						
n _{F'}	479.99	1.62394	T _s (°C)	623	-10/0	63	600	0.999	0.998						
n _g	435.84	1.63097	T ₁₀ ^{14.5} (°C)	504	0/10	62	550	0.999	0.998						
n _h	404.66	1.63765	T ₁₀ ¹³ (°C)	547	10/20	61	500	0.998	0.996						
n _i	365.01	1.64956	α _{-50/80°C} (10 ⁻⁷ /K)	62	20/30	64	480	0.997	0.994						
			α _{100/300°C} (10 ⁻⁷ /K)	78	30/40	63	460	0.996	0.992						
			λ (W/(m·K))	0.97	40/50	66	440	0.995	0.990						
Constants of Dispersion Formula					50/60	65	420	0.993	0.987						
					60/70	66	400	0.990	0.980						
A ₀	2.54989010E+00		Mechanical Properties				390	0.989	0.978						
A ₁	-1.24016345E-02						70/80	68	380	0.982	0.964				
A ₂	1.74291594E-02		HK (10 ⁷ Pa)	575	80/90	66	370	0.970	0.941						
A ₃	1.02656330E-03		F _A	111	90/100	73	360	0.948	0.899						
A ₄	-8.81502201E-05		E (GPa)	86.9	100/110	69	350	0.903	0.815						
A ₅	6.75446845E-06		G (GPa)	35.1	110/120	68	340	0.828	0.685						
			μ	0.238	120/130	72	330	0.647	0.418						
			σ _b (MPa)	63	130/140	71	320	0.239	0.057						
Density		Solarization		B (10 ⁻¹² /Pa)	3.28	140/150	76	310							
ρ (g/cm ³)	2.84					150/160	73	300							
Range of Temperature			Temperature Coefficients of Refractive Index				290								
							dn/dt relative (×10 ⁻⁶ / °C)				280				
			t			s	C	C'	He-Ne	d	e	F	F'	g	280
-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		

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-ZBaF5	671473	n _d = 1.67103	v _d = 47.29	n _F − n _C = 0.014190
		n _e = 1.67440	v _e = 46.99	n _F − n _C ′ = 0.014353

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.63768	P _{d,C}	0.2981	RC (S)	1	2400	0.943	0.889
n ₁₉₇₀	1970.09	1.64279	P _{e,d}	0.2375	RA (S)	3	2200	0.971	0.942
n ₁₅₃₀	1529.58	1.64857	P _{g,F}	0.5659	D _W	1	2000	0.986	0.972
n ₁₁₂₉	1128.64	1.65410	P _{d,c} ′	0.2487	D _A	2	1800	0.992	0.984
n ₁₀₆₄	1064.00	1.65517	P _{e,d} ′	0.2348	R _{OH} (S)	2	1600	0.998	0.997
n _t	1013.98	1.65606	P _{g,F} ′	0.5016	RP (S)	2	1400	0.999	0.998
n _s	852.11	1.65961			CR	1	1200	0.999	0.998
n _A ′	768.19	1.66211	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ^{−7} /K)		1060	0.999	0.998
n _r	706.52	1.66444					1000	0.999	0.998
n _C	656.27	1.66680					950	0.999	0.998
n _C ′	643.85	1.66746	P _{F,e}	0.0003	°C	α	900	0.998	0.997
n _{He-Ne}	632.80	1.66809	P _{g,F}	0.0008	-50/-40	69	850	0.998	0.996
n _D	589.29	1.67091	P _{C,t}	-0.0124	-40/-30	71	800	0.995	0.991
n _d	587.56	1.67103	P _{C,s}	-0.0072	-30/-20	74	750	0.995	0.991
n _e	546.07	1.67440	Thermal Properties		-20/-10	75	700	0.995	0.990
n _F	486.13	1.68099			-10/0	77	650	0.995	0.990
n _F ′	479.99	1.68182			0/10	78	600	0.994	0.989
n _g	435.84	1.68902	T _g (°C)	583	10/20	79	550	0.994	0.989
n _h	404.66	1.69578	T _s (°C)	652	20/30	80	500	0.992	0.985
n _i	365.01	1.70732	T ₁₀ ^{14.5} (°C)	540	30/40	81	480	0.991	0.983
			T ₁₀ ¹³ (°C)	580	40/50	82	460	0.990	0.980
			α _{-50/80°C} (10 ^{−7} /K)	78	50/60	82	440	0.988	0.976
			α _{100/300°C} (10 ^{−7} /K)	94	60/70	83	420	0.985	0.971
			λ (W/(m·K))	0.70	70/80	85	400	0.976	0.953
					80/90	86	390	0.964	0.930
			Mechanical Properties		90/100	87	380	0.941	0.886
					100/110	88	370	0.890	0.800
					110/120	89	360	0.790	0.630
			HK (10 ⁷ Pa)	626	120/130	90	350	0.580	0.340
			F _A	140	130/140	91	340	0.230	0.060
			E (GPa)	97.0	140/150	92	330		
			G (GPa)	38.1	150/160	93	320		
			μ	0.273			310		
			σ _b (MPa)				300		
			B (10 ^{−12} /Pa)	1.74			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		Solarization	
ρ (g/cm ³)	3.58	△λ (%)	-0.4

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ^{−6} / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	380/340
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.61773$	$v_d = 49.83$	$n_F - n_C = 0.012397$
		$n_e = 1.62068$	$v_e = 49.54$	$n_{F'} - n_{C'} = 0.012529$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.58640	$P_{d,C}$	0.3001	RC (S)	1	2400	0.918	0.844
n_{1970}	1970.09	1.59159	$P_{e,d}$	0.2380	RA (S)	1	2200	0.952	0.908
n_{1530}	1529.58	1.59734	$P_{g,F}$	0.5598	D_W	1	2000	0.982	0.965
n_{1129}	1128.64	1.60261	$P'_{d,c'}$	0.2498	D_A	2	1800	0.992	0.984
n_{1064}	1064.00	1.60359	$P'_{e,d}$	0.2355	$R_{OH}(S)$	2	1600	0.999	0.998
n_t	1013.98	1.60441	$P'_{g,F'}$	0.4964	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.60761			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.60985	Expansion Coefficient α ($\times 10^{-7}/K$)				1060	0.999	0.998
n_r	706.52	1.61192					1000	0.999	0.998
n_C	656.27	1.61401	Deviation of Relative Partial Dispersions		$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.61460					900	0.999	0.998
n_{He-Ne}	632.80	1.61515	$P_{F,e}$	-0.0005	-50/-40	65	850	0.999	0.998
n_D	589.29	1.61762	$P_{g,F}$	-0.0010	-40/-30	68	800	0.999	0.998
n_d	587.56	1.61773	$P_{C,t}$	-0.0072	-30/-20	70	750	0.999	0.998
n_e	546.07	1.62068	$P_{C,s}$	-0.0037	-20/-10	71	700	0.999	0.998
n_F	486.13	1.62641	Thermal Properties		-10/0	72	650	0.999	0.998
$n_{F'}$	479.99	1.62713			0/10	73	600	0.999	0.998
n_g	435.84	1.63335	T_g ($^{\circ}C$)	627	10/20	74	550	0.999	0.998
n_h	404.66	1.63923	T_s ($^{\circ}C$)	672	20/30	75	500	0.999	0.998
n_i	365.01	1.64953	$T_{10}^{14.5}$ ($^{\circ}C$)	548	30/40	76	480	0.997	0.994
			T_{10}^{13} ($^{\circ}C$)	590	40/50	77	460	0.995	0.992
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	72	50/60	78	440	0.993	0.988
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	86	60/70	78	420	0.990	0.982
			λ (W/(m·K))	0.90	70/80	78	400	0.984	0.970
					80/90	79	390	0.972	0.947
Constants of Dispersion Formula			Mechanical Properties		90/100	80	380	0.944	0.893
					100/110	80	370	0.892	0.800
A_0	2.56767884E+00		HK (10^7Pa)	539	110/120	81	360	0.770	0.597
A_1	-1.00060261E-02		F_A	142	120/130	82	350	0.518	0.273
A_2	1.66107744E-02		E (GPa)	86.1	130/140	83	340	0.167	0.038
A_3	6.51052393E-04		G (GPa)	34.1	140/150	84	330		
A_4	-4.11297812E-05		μ	0.263	150/160	85	320		
A_5	3.35427062E-06		σ_b (MPa)	83			310		
Density			B ($10^{-12}/Pa$)	2.12			300		
							290		
ρ (g/cm ³)	3.16						280		
Solarization									
$\Delta\lambda$ (%)	-1.2								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZBaF16A	667484	$n_d = 1.66672$	$v_d = 48.42$	$n_F - n_C = 0.013769$
		$n_e = 1.67000$	$v_e = 48.13$	$n_{F'} - n_{C'} = 0.013920$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42		P _{d,C}	0.2992	RC (S)	1	2400	0.946	0.895		
n ₁₉₇₀	1970.09		P _{e,d}	0.2382	RA (S)	2	2200	0.976	0.953		
n ₁₅₃₀	1529.58		P _{g,F}	0.5600	D _W	1	2000	0.987	0.975		
n ₁₁₂₉	1128.64	1.65042	P' _{d,c'}	0.2493	D _A	3	1800	0.993	0.986		
n ₁₀₆₄	1064.00	1.65140	P' _{e,d}	0.2356	R _{OH} (S)	1	1600	0.997	0.995		
n _t	1013.98	1.65223	P' _{g,F'}	0.4964	RP (S)	1	1400	0.998	0.996		
n _s	852.11	1.65560			CR	1	1200	0.999	0.997		
n _{A'}	768.19	1.65802					1060	0.998	0.997		
n _r	706.52	1.66030					1000				0.998
n _C	656.27	1.66260	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.998	0.996		
n _{C'}	643.85	1.66325					900				0.998
n _{He-Ne}	632.80	1.66385	P _{F,e}	-0.0008	°C	α	850	0.997	0.995		
n _D	589.29	1.66660	P _{g,F}	-0.0032	-50/-40	73	800	0.998	0.997		
n _d	587.56	1.66672	P _{C,t}	-0.0216	-40/-30	75	750	0.999	0.997		
n _e	546.07	1.67000	P _{C,s}	-0.0082	-30/-20	77	700	0.998	0.997		
n _F	486.13	1.67637	Thermal Properties		-20/-10	79	650	0.998	0.996		
n _{F'}	479.99	1.67717			-10/0				80	600	0.998
n _g	435.84	1.68408	T _g (°C)		626	0/10	81	550	0.998	0.996	
n _h	404.66	1.69056	T _s (°C)		687	10/20	82	500	0.997	0.995	
n _i	365.01	1.70179	T ₁₀ ^{14.5} (°C)		561	20/30	82	480	0.997	0.993	
			T ₁₀ ¹³ (°C)		590	30/40	84	460	0.996	0.991	
			α _{-50/80°C} (10 ⁻⁷ /K)		81	40/50	85	440	0.995	0.990	
			α _{100/300°C} (10 ⁻⁷ /K)		98	50/60	85	420	0.994	0.989	
			λ (W/(m·K))		0.81	60/70	86	400	0.987	0.975	
						70/80	87	390	0.984	0.968	
Constants of Dispersion Formula							80/90	89	380	0.976	0.952
							89/100		89	370	0.924
A ₀	2.71734266E+00		HK (10 ⁷ Pa)		544	100/110	89	360	0.892	0.796	
A ₁	-7.93439759E-03		F _A		247	110/120	90	350	0.824	0.679	
A ₂	2.10245027E-02		E (GPa)		92.2	120/130	91	340	0.682	0.465	
A ₃	2.14586811E-04		G (GPa)		35.7	130/140	94	330	0.394	0.155	
A ₄	2.86536993E-05		μ		0.293	140/150	94	320			
A ₅	-6.94769473E-07		σ _b (MPa)		72	150/160	96	310			
			B (10 ⁻¹² /Pa)		1.84						
Density		Solarization									
ρ (g/cm ³)	3.63	Δλ (%)	-0.2								
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

H-ZBaF20			702412			n _d = 1.70154			v _d = 41.15			n _F − n _C = 0.017049																	
						n _e = 1.70559			v _e = 40.86			n _F − n _C ′ = 0.017270																	
Refractive Indices						Relative Partial Dispersion			Chemical Properties (grade)			Internal Transmittance																	
	λ (nm)	n _λ			λ (nm)										τ5mm	τ10mm													
n ₂₃₂₅			2325.42			P _{d,C}			0.2950			2400			0.949			0.901											
n ₁₉₇₀			1970.09			P _{e,d}			0.2376			RA (S)			1			2200			0.976			0.952					
n ₁₅₃₀			1529.58			P _{g,F}			0.5766			D _W			1			2000			0.991			0.982					
n ₁₁₂₉			1128.64			1.68168			P _{d,c} ′			0.2455			D _A			1			1800			0.995			0.990		
n ₁₀₆₄			1064.00			1.68293			P _{e,d} ′			0.2345			R _{OH} (S)			1			1600			0.998			0.996		
n _t			1013.98			1.68396			P _{g,F} ′			0.5107			RP (S)			1			1400			0.998			0.996		
n _s			852.11			1.68811									CR			1			1200			0.999			0.998		
n _A ′			768.19			1.69103															1060			0.999			0.998		
n _r			706.52			1.69375			Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)			1000			0.999			0.998								
n _C			656.27			1.69651									P _{F,e}			0.0000			950			0.999			0.998		
n _C ′			643.85			1.69730			P _{g,F}						0.0013			900			0.999			0.998					
n _{He-Ne}			632.80			1.69806			P _{C,t}						-0.0034			850			0.999			0.998					
n _D			589.29			1.70139			P _{C,s}						-0.0065			800			0.999			0.998					
n _d			587.56			1.70154									-50/-40			58			750			0.999			0.998		
n _e			546.07			1.70559									-40/-30			61			700			0.999			0.998		
n _F			486.13			1.71356			Thermal Properties			-30/-20			62			650			0.999			0.997					
n _F ′			479.99			1.71457						-20/-10			62			600			0.998			0.997					
n _g			435.84			1.72339			T _g (°C)			599			-10/0			66			550			0.998			0.997		
n _h			404.66			1.73179			T _s (°C)			657			0/10			67			500			0.997			0.994		
n _i			365.01			1.74679			T ₁₀ ^{14.5} (°C)			555			10/20			67			480			0.996			0.992		
									T ₁₀ ¹³ (°C)			595			20/30			68			460			0.994			0.989		
									α _{-50/80°C} (10 ⁻⁷ /K)			68			30/40			68			440			0.993			0.986		
									α _{100/300°C} (10 ⁻⁷ /K)			84			40/50			70			420			0.989			0.978		
									λ (W/(m·K))			0.99			50/60			70			400			0.979			0.958		
															60/70			73			390			0.964			0.930		
Constants of Dispersion Formula									Mechanical Properties			70/80			73			380			0.935			0.874					
A ₀			2.82868941E+00			HK (10 ⁷ Pa)						618			80/90			73			370			0.861			0.741		
A ₁			-1.38728820E-02			F _A			125			90/100			74			360			0.681			0.464					
A ₂			2.03272973E-02			E (GPa)			98.5			100/110			76			350			0.343			0.118					
A ₃			1.79527923E-03			G (GPa)			38.4			110/120			77			340											
A ₄			-1.30823668E-04			μ			0.284			120/130			78			330											
A ₅			8.20715361E-06			σ _b (MPa)			78			130/140			79			320											
						B (10 ⁻¹² /Pa)			2.05			140/150			79			310											
												150/160			82			300											
																		290											
																		280											
Range of Temperature (°C)			Temperature Coefficients of Refractive Index										Coloration Code																
			dn/dt relative (×10 ⁻⁶ / °C)																										
			t	s	C	C'	He-Ne	d	e	F	F'	g	λ ₈₀ (λ ₇₀)/λ ₅			390/350													
-60 ~ -40			2.5	3.1	3.6	3.6	3.7	4.1	4.7	5.4	5.5	5.9	Coloration of Internal Transmittance			λτ ₈₀ /λτ ₅			373/347										
-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																	
															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-ZBaF50	658509	$n_d = 1.65844$	$v_d = 50.85$	$n_F - n_C = 0.012948$
		$n_e = 1.66152$	$v_e = 50.57$	$n_{F'} - n_{C'} = 0.013082$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.62814	$P_{d,C}$	0.3004	RC (S)	1	2400	0.937	0.880
n_{1970}	1970.09	1.63271	$P_{e,d}$	0.2379	RA (S)	3	2200	0.971	0.946
n_{1530}	1529.58	1.63788	$P_{g,F}$	0.5576	D_W	1	2000	0.993	0.982
n_{1129}	1128.64	1.64287	$P'_{d,c'}$	0.2500	D_A	3	1800	0.995	0.992
n_{1064}	1064.00	1.64384	$P'_{e,d}$	0.2354	R_{OH} (S)	2	1600	0.999	0.998
n_t	1013.98	1.64466	$P'_{g,F'}$	0.4946	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.64791			CR	2	1200	0.999	0.998
$n_{A'}$	768.19	1.65021	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.65237					1000	0.999	0.998
n_C	656.27	1.65455	$P_{F,e}$	-0.0003	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.65517	$P_{g,F}$	-0.0015	-50/-40	66	900	0.999	0.998
n_{He-Ne}	632.80	1.65575	$P_{C,t}$	-0.0227	-40/-30	68	850	0.999	0.998
n_D	589.29	1.65833	$P_{C,s}$	-0.0096	-30/-20	70	800	0.999	0.998
n_d	587.56	1.65844	Thermal Properties		-20/-10	71	750	0.999	0.998
n_e	546.07	1.66152			-10/0	72	700	0.999	0.998
n_F	486.13	1.66750	T_g ($^{\circ}C$)	650	0/10	73	650	0.999	0.998
$n_{F'}$	479.99	1.66825	T_s ($^{\circ}C$)	695	10/20	74	600	0.999	0.998
n_g	435.84	1.67472	$T_{10}^{14.5}$ ($^{\circ}C$)	572	20/30	75	550	0.999	0.998
n_h	404.66	1.68081	T_{10}^{13} ($^{\circ}C$)	630	30/40	76	500	0.999	0.998
n_i	365.01	1.69138	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	74	40/50	77	480	0.999	0.998
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	86	50/60	77	460	0.998	0.996
			λ (W/(m·K))	0.69	60/70	78	440	0.997	0.994
					70/80	78	420	0.996	0.992
Constants of Dispersion Formula			Mechanical Properties		80/90	79	400	0.991	0.983
					90/100	80	390	0.983	0.970
A_0	2.69513820E+00		HK (10^7Pa)	520	100/110	81	380	0.969	0.946
A_1	-8.84212838E-03		F_A	132	110/120	82	370	0.937	0.893
A_2	1.89677206E-02		E (GPa)	93.4	120/130	83	360	0.876	0.787
A_3	4.17388089E-04		G (GPa)	37.3	130/140	83	350	0.752	0.585
A_4	-9.33466805E-06		μ	0.253	140/150	84	340	0.521	0.275
A_5	1.53699645E-06		σ_b (MPa)	60	150/160	85	330	0.203	0.037
Density			B ($10^{-12}/Pa$)	1.84			320		
							310		
ρ (g/cm ³)	3.90						300		
Solarization							290		
							280		
$\Delta\lambda$ (%)	-0.7								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.67003$	$v_d = 47.20$	$n_F - n_C = 0.014197$
		$n_e = 1.67340$	$v_e = 46.90$	$n_{F'} - n_{C'} = 0.014358$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm	
n ₂₃₂₅	2325.42	1.63652	P _{d,C}	0.2987	RC (S)	1	2400	0.938	0.877	
n ₁₉₇₀	1970.09	1.64169	P _{e,d}	0.2374	RA (S)	3	2200	0.970	0.944	
n ₁₅₃₀	1529.58	1.64750	P _{g,F}	0.5628	D _W	1	2000	0.989	0.978	
n ₁₁₂₉	1128.64	1.65305	P' _{d,c'}	0.2486	D _A	1	1800	0.993	0.987	
n ₁₀₆₄	1064.00	1.65411	P' _{e,d}	0.2347	R _{OH} (S)	1	1600	0.999	0.998	
n _t	1013.98	1.65500	P' _{g,F'}	0.4987	RP (S)	1	1400	0.999	0.998	
n _s	852.11	1.65856			CR	1	1200	0.999	0.998	
n _{A'}	768.19	1.66107	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.66342								1000
n _C	656.27	1.66579	P _{F,e}	0.0000			950	0.999	0.998	
n _{C'}	643.85	1.66646	P _{g,F}	-0.0024			900	0.999	0.998	
n _{He-Ne}	632.80	1.66709	P _{C,t}	-0.0088	°C	α	850	0.999	0.998	
n _D	589.29	1.66990	P _{C,s}	-0.0044	-50/-40	55	800	0.999	0.998	
n _d	587.56	1.67003	Thermal Properties		-40/-30	59	750	0.999	0.998	
n _e	546.07	1.67340					-30/-20	62	700	0.999
n _F	486.13	1.67999			-20/-10	64	650	0.999	0.998	
n _{F'}	479.99	1.68082	T _g (°C)	602	-10/0	66	600	0.999	0.998	
n _g	435.84	1.68798	T _s (°C)	661	0/10	68	550	0.999	0.998	
n _h	404.66	1.69475	T ₁₀ ^{14.5} (°C)	539	10/20	70	500	0.998	0.996	
n _i	365.01	1.70662	T ₁₀ ¹³ (°C)	582	20/30	71	480	0.996	0.993	
			α _{-50/80°C} (10 ⁻⁷ /K)	67	30/40	72	460	0.995	0.991	
			α _{100/300°C} (10 ⁻⁷ /K)	85	40/50	73	440	0.994	0.988	
			λ (W/(m·K))	1.08	50/60	73	420	0.992	0.983	
Constants of Dispersion Formula					60/70	74	400	0.983	0.967	
					70/80	74	390	0.973	0.947	
A ₀	2.72917137E+00	Mechanical Properties		80/90	75	380	0.952	0.907		
A ₁	-1.01247435E-02			HK (10 ⁷ Pa)	626	90/100	76	370	0.909	0.826
A ₂	2.03135768E-02	F _A	151	100/110	77	360	0.807	0.652		
A ₃	5.48969301E-04	E (GPa)	96.3	110/120	77	350	0.596	0.355		
A ₄	-1.03383424E-05	G (GPa)	37.6	120/130	78	340	0.269	0.072		
A ₅	1.79727765E-06	μ	0.279	130/140	79	330				
Density		Solarization		σ _b (MPa)	70	140/150	81	320		
ρ (g/cm ³)	3.49			B (10 ⁻¹² /Pa)	1.90	150/160	82	310		
							300			
Range of Temperature	Temperature Coefficients of Refractive Index						290			
	dn/dt relative (×10 ⁻⁶ / °C)						280			

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	v _d = 39.68	n _F − n _C = 0.016484
		n _e = 1.65803	v _e = 39.46	n _F − n _C ′ = 0.016678

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.61564	P _{d,C}	0.2973	RC (S)	1	2400	0.917	0.840
n ₁₉₇₀	1970.09	1.62166	P _{e,d}	0.2372	RA (S)	1	2200	0.950	0.900
n ₁₅₃₀	1529.58	1.62838	P _{g,F}	0.5727	D _W	1	2000	0.987	0.974
n ₁₁₂₉	1128.64	1.63471	P _{d,c} ′	0.2470	D _A	1	1800	0.993	0.986
n ₁₀₆₄	1064.00	1.63592	P _{e,d} ′	0.2344	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.63693	P _{g,F} ′	0.5079	RP (S)	1	1400	0.999	0.998
n _s	852.11	1.64097			CR	1	1200	0.999	0.998
n _A ′	768.19	1.64383	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ^{−7} /K)		1060	0.999	0.998
n _r	706.52	1.64651					1000	0.999	0.998
n _C	656.27	1.64922	P _{F,e}	−0.0024	°C	α	950	0.999	0.998
n _C ′	643.85	1.65000	P _{g,F}	−0.0050			900	0.999	0.998
n _{He-Ne}	632.80	1.65072	P _{C,t}	0.0132	−50/−40	66	850	0.999	0.998
n _D	589.29	1.65397	P _{C,s}	0.0049	−40/−30	69	800	0.999	0.998
n _d	587.56	1.65412	Thermal Properties		−30/−20	71	750	0.999	0.998
n _e	546.07	1.65803			−20/−10	72	700	0.999	0.998
n _F	486.13	1.66571	T _g (°C)	609	−10/0	73	650	0.999	0.998
n _F ′	479.99	1.66668	T _s (°C)	665	0/10	74	600	0.999	0.998
n _g	435.84	1.67515	T ₁₀ ^{14.5} (°C)	549	10/20	75	550	0.999	0.998
n _h	404.66	1.68327	T ₁₀ ¹³ (°C)	590	20/30	75	500	0.999	0.998
n _i	365.01	1.69784	α _{−50/80°C} (10 ^{−7} /K)	74	30/40	76	480	0.998	0.996
			α _{100/300°C} (10 ^{−7} /K)	89	40/50	77	460	0.997	0.994
			λ (W/(m·K))	1.13	50/60	78	440	0.996	0.992
					60/70	78	420	0.994	0.990
					70/80	79	400	0.991	0.983
					80/90	79	390	0.988	0.974
					90/100	80	380	0.977	0.958
					100/110	81	370	0.957	0.919
					110/120	82	360	0.899	0.813
					120/130	83	350	0.751	0.568
					130/140	84	340	0.401	0.164
					140/150	85	330		
					150/160	85	320		
							310		
							300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	3.01	Δλ (%)	−1.6

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ^{−6} / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	370/335
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.69362$	$v_d = 49.20$	$n_F - n_C = 0.014099$
		$n_e = 1.69696$	$v_e = 48.85$	$n_{F'} - n_{C'} = 0.014266$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm	
n ₂₃₂₅	2325.42	1.65990	P _{d,C}	0.2986	RC (S)	1	2400	0.922	0.850	
n ₁₉₇₀	1970.09	1.66516	P _{e,d}	0.2369	RA (S)	3	2200	0.976	0.953	
n ₁₅₃₀	1529.58	1.67106	P _{g,F}	0.5603	D _W	1	2000	0.990	0.980	
n ₁₁₂₉	1128.64	1.67666	P' _{d,c'}	0.2488	D _A	3	1800	0.999	0.998	
n ₁₀₆₄	1064.00	1.67773	P' _{e,d}	0.2341	R _{OH} (S)	1	1600	0.999	0.998	
n _t	1013.98	1.67863	P' _{g,F'}	0.4963	RP (S)	2	1400	0.999	0.998	
n _s	852.11	1.68220			CR	2	1200	0.999	0.998	
n _{A'}	768.19	1.68471	Deviation of Relative Partial Dispersions				1060	0.999	0.998	
n _r	706.52	1.68705					1000	0.999	0.998	
n _C	656.27	1.68941	P _{F,e}	0.0015	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.999	0.998	
n _{C'}	643.85	1.69007	P _{g,F}	-0.0016			°C	α	900	0.999
n _{He-Ne}	632.80	1.69070	P _{C,t}	-0.0139	-50/-40	65	850	0.999	0.998	
n _D	589.29	1.69350	P _{C,s}	-0.0071	-40/-30	68	800	0.999	0.998	
n _d	587.56	1.69362	Thermal Properties			-30/-20	70	750	0.999	0.998
n _e	546.07	1.69696				-20/-10	71	700	0.999	0.998
n _F	486.13	1.70351	T _g (°C)	663	-10/0	72	650	0.999	0.998	
n _{F'}	479.99	1.70433	T _s (°C)	699	0/10	73	600	0.999	0.998	
n _g	435.84	1.71141	T ₁₀ ^{14.5} (°C)	603	10/20	73	550	0.999	0.998	
n _h	404.66	1.71805	T ₁₀ ¹³ (°C)	640	20/30	75	500	0.999	0.998	
n _i	365.01	1.72957	α _{-50/80°C} (10 ⁻⁷ /K)	74	30/40	76	480	0.997	0.994	
			α _{100/300°C} (10 ⁻⁷ /K)	87	40/50	76	460	0.995	0.990	
			λ (W/(m·K))	0.87	50/60	77	440	0.992	0.986	
					60/70	78	420	0.987	0.982	
Constants of Dispersion Formula			Mechanical Properties		70/80	78	400	0.981	0.971	
					80/90	79	390	0.974	0.957	
A ₀	2.80794251E+00		HK (10 ⁷ Pa)	545	90/100	80	380	0.961	0.931	
A ₁	-1.04533648E-02		F _A	159	100/110	80	370	0.932	0.876	
A ₂	2.07773005E-02		E (GPa)	91.9	110/120	81	360	0.866	0.759	
A ₃	4.06086547E-04		G (GPa)	36.0	120/130	82	350	0.716	0.521	
A ₄	1.98268226E-05		μ	0.277	130/140	83	340	0.409	0.174	
A ₅	-7.40077504E-07		σ _b (MPa)	74	140/150	83	330	0.078	0.010	
Density		Solarization		B (10 ⁻¹² /Pa)	1.70	150/160	84	320		
ρ (g/cm ³)	3.97	Δλ (%)	-0.5				310			
Range of Temperature							300			
							290			
							280			
Temperature Coefficients of Refractive Index										
dn/dt relative (×10 ⁻⁶ / °C)										

H-LaF2A	717479	$n_d = 1.71700$	$v_d = 47.89$	$n_F - n_C = 0.014972$
		$n_e = 1.72056$	$v_e = 47.65$	$n_{F'} - n_{C'} = 0.015122$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance										
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm								
n ₂₃₂₅	2325.42		P _{d,C}	0.2999	RC (S)	1	2400	0.907	0.822								
n ₁₉₇₀	1970.09		P _{e,d}	0.2378	RA (S)	2	2200	0.967	0.935								
n ₁₅₃₀	1529.58		P _{g,F}	0.5604	D _W	1	2000	0.986	0.971								
n ₁₁₂₉	1128.64	1.69904	P' _{d,c'}	0.2493	D _A	4	1800	0.994	0.988								
n ₁₀₆₄	1064.00	1.70015	P' _{e,d}	0.2354	R _{OH} (S)	1	1600	0.998	0.995								
n _t	1013.98	1.70108	P' _{g,F'}	0.4973	RP (S)	2	1400	0.999	0.998								
n _s	852.11	1.70484			CR	1	1200	0.999	0.998								
n _{A'}	768.19	1.70750	Deviation of Relative Partial Dispersions				1060	0.999	0.998								
n _r	706.52	1.70999					Expansion Coefficient α (×10 ⁻⁷ /K)				1000	0.999	0.998				
n _C	656.27	1.71251									°Cα				950	0.999	0.998
n _{C'}	643.85	1.71323													-50/-4067		
n _{He-Ne}	632.80	1.71388	-40/-3072														
n _D	589.29	1.71687					-30/-2073										
n _d	587.56	1.71700									-20/-1075						
n _e	546.07	1.72056													-10/075		
n _F	486.13	1.72748	0/1076														
n _{F'}	479.99	1.72835					10/2078										
n _g	435.84	1.73587									20/3078						
n _h	404.66	1.74295													30/4078		
n _i	365.01	1.75527	40/5080														
							50/6080										
											60/7083						
															70/8083		
Constants of Dispersion Formula			Mechanical Properties														
							HK (10 ⁷ Pa)530										
											F _A 122						
															E (GPa)91.7		
G (GPa)35.5				360	0.900	0.810											
				μ0.293				350	0.770	0.593							
								σ _b (MPa)85				340	0.488	0.238			
												B (10 ⁻¹² /Pa)1.29				330	0.143
																320	
																310	
																300	
																290	
																280	

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	$n_d = 1.74400$	$v_d = 44.90$	$n_F - n_C = 0.016570$
		$n_e = 1.74794$	$v_e = 44.63$	$n_{F'} - n_{C'} = 0.016760$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.70713	$P_{d,C}$	0.2981	RC (S)	1	2400	0.914	0.835
n_{1970}	1970.09	1.71244	$P_{e,d}$	0.2378	RA (S)	3	2200	0.960	0.922
n_{1530}	1529.58	1.71852	$P_{g,F}$	0.5631	D_W	1	2000	0.983	0.966
n_{1129}	1128.64	1.72451	$P'_{d,c'}$	0.2482	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.72568	$P'_{e,d}$	0.2351	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.72667	$P'_{g,F'}$	0.4988	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.73070			CR		1200	0.999	0.998
$n_{A'}$	768.19	1.73359	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.73630					1000	0.999	0.998
n_C	656.27	1.73906					950	0.999	0.998
$n_{C'}$	643.85	1.73984					900	0.999	0.998
n_{He-Ne}	632.80	1.74057	$P_{F,e}$	-0.0013	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.74386	$P_{g,F}$	-0.0060	-50/-40	67	800	0.999	0.998
n_d	587.56	1.74400	$P_{C,t}$	-0.0099	-40/-30	69	750	0.999	0.998
n_e	546.07	1.74794	$P_{C,s}$	-0.0036	-30/-20	71	700	0.999	0.998
n_F	486.13	1.75563	Thermal Properties		-20/-10	72	650	0.999	0.998
$n_{F'}$	479.99	1.75660			-10/0	73	600	0.999	0.998
n_g	435.84	1.76496	Tg ($^{\circ}C$)	630	0/10	74	550	0.999	0.998
n_h	404.66	1.77285	Ts ($^{\circ}C$)	683	10/20	75	500	0.999	0.998
n_i	365.01	1.78666	$T_{10}^{14.5}$ ($^{\circ}C$)	557	20/30	76	480	0.999	0.998
			T_{10}^{13} ($^{\circ}C$)	602	30/40	77	460	0.999	0.998
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	74	40/50	77	440	0.999	0.998
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	89	50/60	78	420	0.997	0.995
			λ (W/(m·K))	0.98	60/70	78	400	0.994	0.990
					70/80	78	390	0.990	0.984
			Mechanical Properties		80/90	79	380	0.987	0.974
					90/100	80	370	0.977	0.954
			HK (10^7Pa)	551	100/110	81	360	0.954	0.911
			F_A	149	110/120	82	350	0.922	0.849
			E (GPa)	97.3	120/130	83	340	0.864	0.745
			G (GPa)	37.6	130/140	84	330	0.759	0.575
			μ	0.295	140/150	85	320	0.556	0.310
			σ_b (MPa)	77	150/160	86	310	0.212	0.048
			B ($10^{-12}/Pa$)	1.57			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	4.32	$\triangle\lambda$ (%)	-0.3

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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			v _d = 44.90			n _F – n _C = 0.016570											
						n _e = 1.74794			v _e = 44.63			n _F – n _C = 0.016760											
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance									
		λ (nm)		n _λ						λ (nm)		τ5mm		τ10mm									
n ₂₃₂₅		2325.42				P _{d,C}		0.2981		RC (S)		1		2400		0.910		0.828					
n ₁₉₇₀		1970.09				P _{e,d}		0.2378		RA (S)		2		2200		0.962		0.926					
n ₁₅₃₀		1529.58				P _{g,F}		0.5631		D _W		1		2000		0.982		0.965					
n ₁₁₂₉		1128.64		1.72461		P' _{d,c'}		0.2482		D _A		3		1800		0.992		0.983					
n ₁₀₆₄		1064.00		1.72577		P' _{e,d}		0.2351		R _{OH} (S)		1		1600		0.998		0.995					
n _t		1013.98		1.72675		P' _{g,F'}		0.4988		RP (S)		2		1400		0.999		0.997					
n _s		852.11		1.73074						CR		1		1200		0.999		0.998					
n _{A'}		768.19		1.73361		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1060		0.999		0.998					
n _r		706.52		1.73633										ΔP _{F,e}		-0.0013		°C		α		1000	
n _C		656.27		1.73906		ΔP _{g,F}		-0.0060		-50/-40		78		950		0.999		0.998					
n _{C'}		643.85		1.73984		ΔP _{C,t}		-0.0148		-40/-30		81		900		0.999		0.998					
n _{He-Ne}		632.80		1.74058		ΔP _{C,s}		-0.0060		-30/-20		84		850		0.999		0.998					
n _D		589.29		1.74386		Thermal Properties				-20/-10		86		800		0.999		0.998					
n _d		587.56		1.74400						T _g (°C)		626		-10/0		88		750		0.999		0.998	
n _e		546.07		1.74794		T _s (°C)		676		0/10		89		650		0.999		0.998					
n _F		486.13		1.75563		T ₁₀ ^{14.5} (°C)		553		10/20		90		600		0.999		0.998					
n _{F'}		479.99		1.75660		T ₁₀ ¹³ (°C)		598		20/30		90		550		0.999		0.998					
n _g		435.84		1.76496		α _{-50/80°C} (10 ⁻⁷ /K)		73		30/40		91		480		0.999		0.997					
n _h		404.66		1.77287		α _{100/300°C} (10 ⁻⁷ /K)		91		40/50		92		460		0.998		0.996					
n _i		365.01		1.78671		λ (W/(m·K))		0.70		50/60		92		440		0.998		0.995					
Constants of Dispersion Formula										60/70		93		420		0.997		0.993					
										70/80		93		400		0.995		0.991					
A ₀		2.96730744E+00				Mechanical Properties				80/90		94		390		0.993		0.984					
A ₁		-1.01565086E-02								HK (10 ⁷ Pa)		502		90/100		95		380		0.986		0.971	
A ₂		2.47645800E-02				F _A		195		100/110		97		370		0.972		0.943					
A ₃		7.87107350E-04				E (GPa)				110/120		98		360		0.934		0.870					
A ₄		-3.51755571E-05				G (GPa)				120/130		99		350		0.828		0.685					
A ₅		3.47733569E-06				μ				130/140		100		340		0.565		0.325					
Density				Solarization		σ _b (MPa)		76		140/150		101		330		0.187		0.038					
ρ (g/cm ³)		4.34				B (10 ⁻¹² /Pa)				150/160		102		320									
														310									
														300									
														290									
														280									
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code											
		dn/dt relative (×10 ⁻⁶ / °C)																					
		t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance											
-60 ~ -40		0.5	0.8	0.9	1.1	1.2	1.4	1.6	1.8	2.0	2.5					λτ ₈₀ /λτ ₅				355/331			
-40 ~ -20		0.5	0.8	1.1	1.2	1.2	1.4	1.7	1.9	2.1	2.6	Constants of dn/dt											
-20 ~ 0		0.5	0.8	1.1	1.2	1.3	1.4	1.8	2.0	2.1	2.8					D ₀				D ₁			
0 ~ 20		0.6	1.0	1.1	1.2	1.3	1.6	1.8	2.0	2.2	2.9	-2.11E-06											
20 ~ 40		0.6	1.1	1.2	1.3	1.4	1.6	1.9	2.1	2.2	3.1					E ₀				E ₁			
40 ~ 60		0.6	1.2	1.2	1.3	1.4	1.7	1.9	2.1	2.3	3.2	5.31E-07											
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												

H-LaF4A	750350	$n_d = 1.74950$	$v_d = 35.04$	$n_F - n_C = 0.021390$
		$n_e = 1.75456$	$v_e = 34.77$	$n_{F'} - n_{C'} = 0.021700$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2927	RC (S)	1	2400	0.933	0.871
n_{1970}	1970.09		$P_{e,d}$	0.2366	RA (S)	1	2200	0.980	0.960
n_{1530}	1529.58		$P_{g,F}$	0.5881	D_W	1	2000	0.992	0.983
n_{1129}	1128.64	1.72537	$P'_{d,c'}$	0.2433	D_A	3	1800	0.996	0.992
n_{1064}	1064.00	1.72677	$P'_{e,d}$	0.2332	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.72796	$P'_{g,F'}$	0.5203	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.73284			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.73640	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.73977					1000	0.999	0.998
n_C	656.27	1.74324					950	0.999	0.998
$n_{C'}$	643.85	1.74422					900	0.999	0.998
n_{He-Ne}	632.80	1.74513	$P_{F,e}$	-0.0001	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.74931	$P_{g,F}$	0.0027	-50/-40	72	800	0.999	0.998
n_d	587.56	1.74950	$P_{C,t}$	0.0044	-40/-30	74	750	0.999	0.998
n_e	546.07	1.75456	$P_{C,s}$	0.0017	-30/-20	75	700	0.998	0.997
n_F	486.13	1.76463	Thermal Properties		-20/-10	75	650	0.998	0.997
$n_{F'}$	479.99	1.76592			-10/0	77	600	0.998	0.996
n_g	435.84	1.77721	T_g ($^{\circ}C$)	576	0/10	78	550	0.997	0.995
n_h	404.66	1.78821	T_s ($^{\circ}C$)	620	10/20	80	500	0.994	0.989
n_i	365.01	1.80840	$T_{10}^{14.5}$ ($^{\circ}C$)	507	20/30	81	480	0.991	0.983
			T_{10}^{13} ($^{\circ}C$)	548	30/40	83	460	0.988	0.976
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	80	40/50	85	440	0.982	0.965
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	98	50/60	85	420	0.971	0.943
			λ (W/(m·K))	0.81	60/70	86	400	0.941	0.886
					70/80	87	390	0.910	0.829
			Mechanical Properties		80/90	87	380	0.853	0.727
					90/100	87	370	0.733	0.537
			HK (10^7Pa)	526	100/110	88	360	0.489	0.239
			F_A	177	110/120	89	350	0.161	0.026
			E (GPa)	93.7	120/130	89	340		
			G (GPa)	36.3	130/140	96	330		
			μ	0.290	140/150	96	320		
			σ_b (MPa)	72	150/160	97	310		
			B ($10^{-12}/Pa$)	2.36			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	3.84	$\triangle\lambda$ (%)	-0.3

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.75700$	$v_d = 47.71$	$n_F - n_C = 0.015866$
		$n_e = 1.76078$	$v_e = 47.47$	$n_{F'} - n_{C'} = 0.016028$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.71608	$P_{d,C}$	0.3006	RC (S)	1	2400	0.839	0.704
n_{1970}	1970.09	1.72302	$P_{e,d}$	0.2382	RA (S)	3	2200	0.971	0.943
n_{1530}	1529.58	1.73065	$P_{g,F}$	0.5546	D_W	1	2000	0.996	0.992
n_{1129}	1128.64	1.73755	$P'_{d,c'}$	0.2508	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.73882	$P'_{e,d}$	0.2358	$R_{OH}(S)$	1	1600	0.999	0.998
n_t	1013.98	1.73988	$P'_{g,F'}$	0.4916	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.74401			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.74688	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.74954					1000	0.999	0.998
n_C	656.27	1.75223					950	0.999	0.998
$n_{C'}$	643.85	1.75298					900	0.999	0.998
n_{He-Ne}	632.80	1.75368	$P_{F,e}$	-0.0031	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.75686	$P_{g,F}$	-0.0097	-50/-40	48	800	0.999	0.998
n_d	587.56	1.75700	$P_{C,t}$	0.0071	-40/-30	51	750	0.999	0.998
n_e	546.07	1.76078	$P_{C,s}$	0.0032	-30/-20	52	700	0.999	0.998
n_F	486.13	1.76809	Thermal Properties		-20/-10	53	650	0.999	0.998
$n_{F'}$	479.99	1.76901			-10/0	54	600	0.999	0.998
n_g	435.84	1.77689			0/10	55	550	0.999	0.998
n_h	404.66	1.78427			10/20	55	500	0.999	0.998
n_i	365.01	1.79708			20/30	56	480	0.999	0.997
					30/40	57	460	0.998	0.996
			T_g ($^{\circ}C$)	606	40/50	57	440	0.997	0.994
			T_s ($^{\circ}C$)	631	50/60	58	420	0.994	0.989
			$T_{10}^{14.5}$ ($^{\circ}C$)	538	60/70	58	400	0.991	0.981
			T_{10}^{13} ($^{\circ}C$)	580	70/80	58	390	0.988	0.974
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	54	80/90	59	380	0.982	0.961
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	70	90/100	60	370	0.972	0.939
			λ (W/(m·K))	0.90	100/110	61	360	0.956	0.895
					110/120	62	350	0.928	0.841
			Mechanical Properties		120/130	63	340	0.881	0.758
					130/140	64	330	0.802	0.627
					140/150	65	320	0.652	0.412
					150/160	65	310	0.361	0.125
			μ	0.312			300		
			σ_b (MPa)	73			290		
			B ($10^{-12}/Pa$)	2.20			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		Solarization	
ρ (g/cm ³)	4.25	$\triangle\lambda$ (%)	-0.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-LaF10A	788475	$n_d = 1.78800$	$v_d = 47.49$	$n_F - n_C = 0.016592$
		$n_e = 1.79195$	$v_e = 47.26$	$n_{F'} - n_{C'} = 0.016758$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.74466	P _{d,C}	0.3014	RC (S)	1	2400	0.787	0.620		
n ₁₉₇₀	1970.09	1.75204	P _{e,d}	0.2381	RA (S)	3	2200	0.927	0.859		
n ₁₅₃₀	1529.58	1.76016	P _{g,F}	0.5539	D _W	1	2000	0.976	0.953		
n ₁₁₂₉	1128.64	1.76750	P' _{d,c'}	0.2512	D _A	3	1800	0.991	0.982		
n ₁₀₆₄	1064.00	1.76885	P' _{e,d}	0.2357	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.76996	P' _{g,F'}	0.4911	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.77435			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.77738	Deviation of Relative Partial Dispersions P_{F,e} -0.0035 P_{g,F} -0.0108 P_{C,t} 0.0157 P_{C,s} 0.0070				Expansion Coefficient α (×10⁻⁷/K) °C 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		1060	0.999	0.998
n _r	706.52	1.78018							1000	0.999	0.998
n _C	656.27	1.78300							950	0.999	0.998
n _{C'}	643.85	1.78379							900	0.999	0.998
n _{He-Ne}	632.80	1.78453	Thermal Properties T_g (°C) 688 T_s (°C) 709 T₁₀^{14.5} (°C) 617 T₁₀¹³ (°C) 645 α_{-50/80°C} (10⁻⁷/K) 59 α_{100/300°C} (10⁻⁷/K) 73 λ (W/(m·K)) 1.00				850	0.999	0.998		
n _D	589.29	1.78785					800	0.999	0.998		
n _d	587.56	1.78800					750	0.999	0.998		
n _e	546.07	1.79195					700	0.999	0.998		
n _F	486.13	1.79959					650	0.999	0.998		
n _{F'}	479.99	1.80055					600	0.999	0.998		
n _g	435.84	1.80878					550	0.999	0.998		
n _h	404.66	1.81649					500	0.999	0.998		
n _i	365.01	1.82981					480	0.999	0.998		
							460	0.999	0.998		
			α _{100/300°C} (10 ⁻⁷ /K)	73	440	0.997	0.994				
			λ (W/(m·K))	1.00	420	0.995	0.990				
Constants of Dispersion Formula					400	0.990	0.982				
			Mechanical Properties HK (10⁷Pa) 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		390	0.982	0.972				
A ₀	3.12424071E+00	380			0.973	0.955					
A ₁	-1.57101635E-02	370			0.958	0.927					
A ₂	2.44837290E-02	360			0.936	0.882					
A ₃	1.02164022E-03	350			0.892	0.803					
A ₄	-7.05302601E-05	340			0.818	0.677					
A ₅	4.58907154E-06	330	0.678	0.468							
Density		Solarization		140/150	71	320	0.413	0.178			
ρ (g/cm ³)	4.28			150/160	72	310	0.091	0.012			
Range of Temperature Temperature Coefficients of Refractive Index dn/dt relative (×10⁻⁶ / °C)							300				
							290				
							280				

H-LaF50B	773496	$n_d = 1.77250$	$v_d = 49.60$	$n_F - n_C = 0.015575$
		$n_e = 1.77621$	$v_e = 49.36$	$n_{F'} - n_{C'} = 0.015725$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.3018	RC (S)	1	2400	0.759	0.576
n_{1970}	1970.09		$P_{e,d}$	0.2382	RA (S)	1	2200	0.905	0.818
n_{1530}	1529.58		$P_{g,F}$	0.5515	D_W	1	2000	0.969	0.939
n_{1129}	1128.64		$P'_{d,c'}$	0.2518	D_A	3	1800	0.986	0.972
n_{1064}	1064.00	1.75428	$P'_{e,d}$	0.2359	R_{OH} (S)	1	1600	0.994	0.987
n_t	1013.98	1.75538	$P'_{g,F'}$	0.4890	RP (S)	1	1400	0.994	0.987
n_s	852.11	1.75960			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.76249	Expansion Coefficient α ($\times 10^{-7}/K$)				1060	0.999	0.998
n_r	706.52	1.76514					1000	0.999	0.998
n_C	656.27	1.76780	Deviation of Relative Partial Dispersions		$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.76854					900	0.999	0.998
n_{He-Ne}	632.80	1.76924	$P_{F,e}$	-0.0031	-50/-40	52	850	0.999	0.998
n_D	589.29	1.77236	$P_{g,F}$	-0.0097	-40/-30	53	800	0.999	0.998
n_d	587.56	1.77250	$P_{C,t}$	0.0170	-30/-20	54	750	0.999	0.998
n_e	546.07	1.77621	$P_{C,s}$	0.0070	-20/-10	54	700	0.999	0.998
n_F	486.13	1.78337	Thermal Properties		-10/0	54	650	0.999	0.998
$n_{F'}$	479.99	1.78427			0/10	55	600	0.999	0.998
n_g	435.84	1.79196	T_g ($^{\circ}C$)	682	10/20	57	550	0.999	0.998
n_h	404.66	1.79913	T_s ($^{\circ}C$)	712	20/30	57	480	0.999	0.998
n_i	365.01	1.81144	$T_{10}^{14.5}$ ($^{\circ}C$)	619	30/40	57	460	0.998	0.996
			T_{10}^{13} ($^{\circ}C$)	665	40/50	58	440	0.997	0.994
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	56	50/60	59	420	0.995	0.990
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	72	60/70	61	400	0.990	0.980
			λ (W/(m·K))	0.95	70/80	61	390	0.984	0.968
					80/90	63	380	0.974	0.948
Constants of Dispersion Formula			Mechanical Properties		90/100	63	370	0.957	0.915
					100/110	64	360	0.928	0.861
A_0	3.07486227E+00		HK (10^7Pa)	713	110/120	65	350	0.883	0.780
A_1	-1.60709812E-02		F_A	62	120/130	66	340	0.812	0.660
A_2	2.28883031E-02		E (GPa)	117.3	130/140	66	330	0.699	0.488
A_3	8.28871954E-04		G (GPa)	46.9	140/150	67	320	0.528	0.279
A_4	-4.04256219E-05		μ	0.250	150/160	70	310	0.288	0.083
A_5	2.26879435E-06		σ_b (MPa)	108			300		
Density		4.23	B ($10^{-12}/Pa$)	1.37			290		
							280		
Solarization		-1.2							

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.70000$	$v_d = 48.08$	$n_F - n_C = 0.014559$
		$n_e = 1.70346$	$v_e = 47.80$	$n_{F'} - n_{C'} = 0.014717$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.66549	P _{d,C}	0.2995	RC (S)	1	2400	0.920	0.845		
n ₁₉₇₀	1970.09	1.67085	P _{e,d}	0.2377	RA (S)	1	2200	0.972	0.944		
n ₁₅₃₀	1529.58	1.67686	P _{g,F}	0.5619	D _W	1	2000	0.990	0.977		
n ₁₁₂₉	1128.64	1.68256	P' _{d,c'}	0.2494	D _A	3	1800	0.999	0.990		
n ₁₀₆₄	1064.00	1.68365	P' _{e,d}	0.2351	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.68456	P' _{g,F'}	0.4987	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.68821			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.69079	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.69320					1000	0.999	0.998		
n _C	656.27	1.69564					P _{F,e}	-0.0007	950	0.999	0.998
n _{C'}	643.85	1.69633					P _{g,F}	-0.0019	900	0.999	0.998
n _{He-Ne}	632.80	1.69697	P _{C,t}	-0.0121	°C	α	850	0.999	0.998		
n _D	589.29	1.69987	P _{C,s}	-0.0055	-50/-40	68	800	0.999	0.998		
n _d	587.56	1.70000	Thermal Properties		-40/-30	71	750	0.999	0.998		
n _e	546.07	1.70346			-30/-20	72	700	0.999	0.998		
n _F	486.13	1.71020			-20/-10	74	650	0.999	0.998		
n _{F'}	479.99	1.71104			T _g (°C)	661	600	0.999	0.998		
n _g	435.84	1.71838	T _s (°C)	703	0/10	75	550	0.999	0.998		
n _h	404.66	1.72530	T ₁₀ ^{14.5} (°C)	591	10/20	76	500	0.999	0.998		
n _i	365.01	1.73740	T ₁₀ ¹³ (°C)	635	20/30	77	480	0.999	0.998		
			α _{-50/80°C} (10 ⁻⁷ /K)	77	30/40	77	460	0.999	0.998		
			α _{100/300°C} (10 ⁻⁷ /K)	91	40/50	78	440	0.997	0.996		
			λ (W/(m·K))	0.90	50/60	79	420	0.995	0.993		
Constants of Dispersion Formula					60/70	79	400	0.992	0.985		
			Mechanical Properties		70/80	80	390	0.987	0.977		
80/90	81	380			0.978	0.958					
HK (10 ⁷ Pa)	532	90/100			82	370	0.959	0.921			
F _A	171	100/110			83	360	0.914	0.836			
A ₀	2.82781336E+00	E (GPa)		89.9	110/120	84	350	0.798	0.638		
A ₁	-1.06938171E-02	G (GPa)		34.9	120/130	85	340	0.538	0.290		
A ₂	2.08610635E-02	μ		0.299	130/140	86	330	0.180	0.032		
A ₃	7.26796327E-04	σ _b (MPa)		79	140/150	87	320				
A ₄	-3.73066587E-05	B (10 ⁻¹² /Pa)		1.49	150/160	87	310				
A ₅	3.28626126E-06										
Density		Solarization									
ρ (g/cm ³)	4.01	△λ (%)	-0.2								
Range of Temperature	Temperature Coefficients of Refractive Index										
	dn/dt relative (×10 ⁻⁶ / °C)										

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	v _d = 44.19	n _F − n _C = 0.017786
		n _e = 1.79013	v _e = 43.93	n _F − n _{C'} = 0.017988

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.74308	P _{d,C}	0.2985	RC (S)	1	2400	0.830	0.689
n ₁₉₇₀	1970.09	1.74989	P _{e,d}	0.2378	RA (S)	3	2200	0.958	0.918
n ₁₅₃₀	1529.58	1.75749	P _{g,F}	0.5634	D _W	1	2000	0.990	0.980
n ₁₁₂₉	1128.64	1.76459	P' _{d,c'}	0.2491	D _A	3	1800	0.999	0.998
n ₁₀₆₄	1064.00	1.76594	P' _{e,d}	0.2352	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.76706	P' _{g,F'}	0.4992	RP (S)	1	1400	0.999	0.998
n _s	852.11	1.77153			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.77468	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.77761					1000	0.999	0.998
n _C	656.27	1.78059					950	0.999	0.998
n _{C'}	643.85	1.78142					900	0.999	0.998
n _{He-Ne}	632.80	1.78221	P _{F,e}	-0.0025	°C	α	850	0.999	0.998
n _D	589.29	1.78574	P _{g,F}	-0.0068	-50/-40	50	800	0.999	0.998
n _d	587.56	1.78590	P _{C,t}	0.0065	-40/-30	53	750	0.999	0.998
n _e	546.07	1.79013	P _{C,s}	0.0029	-30/-20	54	700	0.999	0.998
n _F	486.13	1.79837	Thermal Properties		-20/-10	55	650	0.999	0.998
n _{F'}	479.99	1.79941			-10/0	56	600	0.999	0.998
n _g	435.84	1.80839	T _g (°C)	606	0/10	57	550	0.999	0.998
n _h	404.66	1.81685	T _s (°C)	638	10/20	58	500	0.999	0.998
n _i	365.01	1.83170	T ₁₀ ^{14.5} (°C)	548	20/30	59	480	0.998	0.996
			T ₁₀ ¹³ (°C)	574	30/40	59	460	0.996	0.993
			α _{-50/80°C} (10 ⁻⁷ /K)	56	40/50	60	440	0.994	0.990
			α _{100/300°C} (10 ⁻⁷ /K)	72	50/60	60	420	0.988	0.985
			λ (W/(m·K))	0.85	60/70	61	400	0.982	0.975
					70/80	61	390	0.975	0.963
			Mechanical Properties		80/90	62	380	0.966	0.945
					90/100	63	370	0.949	0.913
			HK (10 ⁷ Pa)	649	100/110	64	360	0.920	0.858
			F _A	76	110/120	65	350	0.873	0.774
			E (GPa)	112.5	120/130	66	340	0.793	0.639
			G (GPa)	41.8	130/140	67	330	0.639	0.418
			μ	0.346	140/150	68	320	0.349	0.127
			σ _b (MPa)	90	150/160	68	310		
			B (10 ⁻¹² /Pa)	2.06			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	4.38	△λ (%)	-0.4

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	380/320
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.74330$	$v_d = 49.22$	$n_F - n_C = 0.015101$
		$n_e = 1.74690$	$v_e = 48.99$	$n_{F'} - n_{C'} = 0.015246$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.70297	$P_{d,C}$	0.3013	RC (S)	1	2400	0.761	0.580
n_{1970}	1970.09	1.70999	$P_{e,d}$	0.2384	RA (S)	3	2200	0.914	0.835
n_{1530}	1529.58	1.71767	$P_{g,F}$	0.5536	D_W	1	2000	0.975	0.951
n_{1129}	1128.64	1.72455	$P'_{d,c'}$	0.2512	D_A	3	1800	0.993	0.986
n_{1064}	1064.00	1.72580	$P'_{e,d}$	0.2361	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.72685	$P'_{g,F'}$	0.4913	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.73087			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.73364	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.73619					1000	0.999	0.998
n_C	656.27	1.73875					950	0.999	0.998
$n_{C'}$	643.85	1.73947					900	0.999	0.998
n_{He-Ne}	632.80	1.74015	$P_{F,e}$	-0.0028	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.74317	$P_{g,F}$	-0.0082	-50/-40	44	800	0.999	0.998
n_d	587.56	1.74330	$P_{C,t}$	0.0094	-40/-30	47	750	0.999	0.998
n_e	546.07	1.74690	$P_{C,s}$	0.0033	-30/-20	49	700	0.999	0.998
n_F	486.13	1.75385	Thermal Properties		-20/-10	50	650	0.999	0.998
$n_{F'}$	479.99	1.75472			-10/0	51	600	0.999	0.998
n_g	435.84	1.76221			0/10	52	550	0.999	0.998
n_h	404.66	1.76921			10/20	53	500	0.999	0.998
n_i	365.01	1.78127	T_g ($^{\circ}C$)	608	20/30	53	480	0.999	0.998
			T_s ($^{\circ}C$)	634	30/40	53	460	0.998	0.996
			$T_{10}^{14.5}$ ($^{\circ}C$)	550	40/50	54	440	0.997	0.994
			T_{10}^{13} ($^{\circ}C$)	578	50/60	54	420	0.996	0.992
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	50	60/70	54	400	0.992	0.987
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	66	70/80	55	390	0.987	0.980
			λ (W/(m·K))	0.83	80/90	56	380	0.981	0.970
					90/100	57	370	0.970	0.950
Constants of Dispersion Formula			Mechanical Properties		100/110	58	360	0.951	0.914
					110/120	59	350	0.924	0.862
A_0	2.97513891E+00				120/130	60	340	0.880	0.786
A_1	-1.46215956E-02				130/140	61	330	0.815	0.673
A_2	2.17492662E-02		HK (10^7Pa)	661	140/150	62	320	0.705	0.508
A_3	8.02001413E-04		F_A	83	150/160	63	310	0.505	0.263
A_4	-3.64703266E-05		E (GPa)	110.1			300	0.187	0.039
A_5	2.12357903E-06		G (GPa)	41.5			290		
			μ	0.327			280		
Density			σ_b (MPa)	75					
			B ($10^{-12}/Pa$)	2.18					
ρ (g/cm ³)	4.15								
Solarization		$\Delta\lambda$ (%)	-1.1						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.79950$	$v_d = 42.34$	$n_F - n_C = 0.018883$
		$n_e = 1.80399$	$v_e = 42.09$	$n_{F'} - n_{C'} = 0.019101$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42	1.75473	P _{d,C}	0.2976	RC (S)	1	2400	0.811	0.658				
n ₁₉₇₀	1970.09	1.76179	P _{e,d}	0.2378	RA (S)	3	2200	0.944	0.891				
n ₁₅₃₀	1529.58	1.76966	P _{g,F}	0.5661	D _W	1	2000	0.990	0.980				
n ₁₁₂₉	1128.64	1.77705	P' _{d,c'}	0.2482	D _A	3	1800	0.999	0.998				
n ₁₀₆₄	1064.00	1.77846	P' _{e,d}	0.2351	R _{OH} (S)	1	1600	0.999	0.998				
n _t	1013.98	1.77963	P' _{g,F'}	0.5021	RP (S)	1	1400	0.999	0.998				
n _s	852.11	1.78432			CR	1	1200	0.999	0.998				
n _{A'}	768.19	1.78763	Deviation of Relative Partial Dispersions				1060	0.999	0.998				
n _r	706.52	1.79073					Expansion Coefficient α (×10 ⁻⁷ /K)		1000	0.999	0.998		
n _C	656.27	1.79388							α (°C)		950	0.999	0.998
n _{C'}	643.85	1.79476									α		900
n _{He-Ne}	632.80	1.79559	°C		850	0.999							0.998
n _D	589.29	1.79934			-50/-40		800	0.999					0.998
n _d	587.56	1.79950					-40/-30		750	0.999			0.998
n _e	546.07	1.80399							-30/-20		700	0.999	0.998
n _F	486.13	1.81276	-20/-10								650	0.999	0.998
n _{F'}	479.99	1.81386			-10/0						600	0.999	0.998
n _g	435.84	1.82345					0/10				550	0.999	0.998
n _h	404.66	1.83254							10/20		500	0.999	0.998
n _i	365.01	1.84858	20/30								480	0.997	0.996
					30/40						460	0.995	0.994
							40/50				440	0.993	0.992
									50/60		420	0.991	0.986
			60/70								400	0.984	0.973
					70/80						390	0.978	0.960
							80/90				380	0.966	0.935
									90/100		370	0.941	0.890
			100/110								360	0.900	0.811
					110/120						350	0.815	0.665
							120/130				340	0.638	0.408
									130/140		330	0.316	0.102
			140/150								320	0.048	0.011
					150/160						310		
											300		
											290		
											280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.74950$	$v_d = 35.33$	$n_F - n_C = 0.021214$
		$n_e = 1.75453$	$v_e = 35.10$	$n_{F'} - n_{C'} = 0.021498$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42	1.70383	P _{d,C}	0.2941	RC (S)	1	2400	0.967	0.936				
n ₁₉₇₀	1970.09	1.71040	P _{e,d}	0.2371	RA (S)	1	2200	0.982	0.965				
n ₁₅₃₀	1529.58	1.71787	P _{g,F}	0.5789	D _W	1	2000	0.993	0.987				
n ₁₁₂₉	1128.64	1.72521	P' _{d,c'}	0.2447	D _A	1	1800	0.996	0.992				
n ₁₀₆₄	1064.00	1.72665	P' _{e,d}	0.2340	R _{OH} (S)	1	1600	0.998	0.995				
n _t	1013.98	1.72788	P' _{g,F'}	0.5121	RP (S)	1	1400	0.998	0.996				
n _s	852.11	1.73284			CR	4a	1200	0.999	0.997				
n _{A'}	768.19	1.73642	Deviation of Relative Partial Dispersions				1060	0.999	0.998				
n _r	706.52	1.73980					Expansion Coefficient α (×10 ⁻⁷ /K)		1000	0.999	0.998		
n _C	656.27	1.74326							α		950	0.999	0.998
n _{C'}	643.85	1.74424									°C		900
n _{He-Ne}	632.80	1.74516	-50/-40		850	0.999							0.998
n _D	589.29	1.74932			-40/-30		800	0.999					0.998
n _d	587.56	1.74950					-30/-20		750	0.999			0.998
n _e	546.07	1.75453							-20/-10		700	0.999	0.998
n _F	486.13	1.76447	-10/0								650	0.998	0.996
n _{F'}	479.99	1.76574			0/10						600	0.998	0.996
n _g	435.84	1.77675					10/20				550	0.998	0.996
n _h	404.66	1.78738							20/30		500	0.996	0.992
n _i	365.01	1.80661	30/40								480	0.994	0.989
					40/50						460	0.992	0.985
							50/60				440	0.990	0.980
									60/70		420	0.987	0.975
			70/80								400	0.981	0.963
					80/90						390	0.974	0.949
							90/100				380	0.963	0.928
									100/110		370	0.946	0.895
			110/120								360	0.919	0.845
					120/130						350	0.872	0.760
							130/140				340	0.759	0.576
									140/150		330	0.486	0.236
			150/160								320	0.118	0.014
											310		
											300		
											290		
											280		

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	$n_d = 1.79952$	$v_d = 42.24$	$n_F - n_C = 0.018928$
		$n_e = 1.80402$	$v_e = 41.98$	$n_{F'} - n_{C'} = 0.019154$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance										
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm								
n ₂₃₂₅	2325.42		P _{d,C}	0.2974	RC (S)	1	2400	0.903	0.815								
n ₁₉₇₀	1970.09		P _{e,d}	0.2377	RA (S)	2	2200	0.975	0.952								
n ₁₅₃₀	1529.58		P _{g,F}	0.5674	D _W	1	2000	0.989	0.978								
n ₁₁₂₉	1128.64	1.77750	P' _{d,c'}	0.2475	D _A	3	1800	0.997	0.994								
n ₁₀₆₄	1064.00	1.77880	P' _{e,d}	0.2349	R _{OH} (S)	1	1600	0.999	0.998								
n _t	1013.98	1.77991	P' _{g,F'}	0.5028	RP (S)	2	1400	0.999	0.998								
n _s	852.11	1.78443			CR		1200	0.999	0.998								
n _{A'}	768.19	1.78769	Deviation of Relative Partial Dispersions				1060	0.999	0.998								
n _r	706.52	1.79076					Expansion Coefficient α (×10 ⁻⁷ /K)				1000	0.999	0.998				
n _C	656.27	1.79389									°C				950	0.999	0.998
n _{C'}	643.85	1.79478													α		
n _{He-Ne}	632.80	1.79561	P _{F,e}	-0.0020	850	0.999											
n _D	589.29	1.79935	P _{g,F}	-0.0060	-50/-40	52	800	0.999	0.998								
n _d	587.56	1.79952	P _{C,t}	-0.0062	-40/-30	55	750	0.999	0.998								
n _e	546.07	1.80402	P _{C,s}	-0.0020	-30/-20	58	700	0.999	0.998								
n _F	486.13	1.81282	Thermal Properties		-20/-10	59	650	0.999	0.998								
n _{F'}	479.99	1.81393			T _g (°C)	583	-10/0	60	600	0.999	0.998						
n _g	435.84	1.82356			T _s (°C)	619	0/10	61	550	0.999	0.998						
n _h	404.66	1.83269			T ₁₀ ^{14.5} (°C)	537	10/20	63	500	0.998	0.995						
n _i	365.01	1.84872	T ₁₀ ¹³ (°C)	562	20/30	63	480	0.996	0.993								
			α _{-50/80°C} (10 ⁻⁷ /K)	62	30/40	64	460	0.995	0.990								
			α _{100/300°C} (10 ⁻⁷ /K)	79	40/50	64	440	0.992	0.985								
			λ (W/(m·K))	0.93	50/60	66	420	0.989	0.978								
Constants of Dispersion Formula					60/70	67	400	0.982	0.963								
			Mechanical Properties		70/80	67	390	0.974	0.949								
HK (10 ⁷ Pa)	628	80/90			68	380	0.961	0.923									
F _A	96	90/100			69	370	0.935	0.873									
E (GPa)	111.7	100/110			71	360	0.872	0.760									
A ₅	9.69165865E-07	G (GPa)	42.2	110/120	71	350	0.722	0.522									
Density			μ	0.322	120/130	72	340	0.424	0.179								
			σ _b (MPa)	141	130/140	74	330	0.112	0.013								
			ρ (g/cm ³)	4.60	140/150	74	320										
					150/160	75	310										
Solarization			B (10 ⁻¹² /Pa)	2.28					300								
			Temperature Coefficients of Refractive Index								290						
							dn/dt relative (×10 ⁻⁶ / °C)								280		

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			v _d = 43.68			n _F − n _C = 0.016483																									
						n _e = 1.72391			v _e = 43.39			n _F − n _C ′ = 0.016682																									
Refractive Indices						Relative Partial Dispersion				Chemical Properties (grade)				Internal Transmittance																							
		λ (nm)		n _λ						λ (nm)		τ5mm		τ10mm																							
n ₂₃₂₅		2325.42		1.68074		P _{d,C}		0.2967		RC (S)		1		2400		0.872		0.760																			
n ₁₉₇₀		1970.09		1.68697		P _{e,d}		0.2372		RA (S)		3		2200		0.954		0.910																			
n ₁₅₃₀		1529.58		1.69391		P _{g,F}		0.5673		D _W		1		2000		0.991		0.982																			
n ₁₁₂₉		1128.64		1.70040		P _{d,c} ′		0.2470		D _A		3		1800		0.999		0.998																			
n ₁₀₆₄		1064.00		1.70163		P _{e,d} ′		0.2344		R _{OH} (S)		1		1600		0.999		0.998																			
n _t		1013.98		1.70266		P _{g,F} ′		0.5023		RP (S)		2		1400		0.999		0.998																			
n _s		852.11		1.70676						CR		1		1200		0.999		0.998																			
n _A ′		768.19		1.70965		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ^{−7} /K)				1060		0.999		0.998																			
n _r		706.52		1.71235										1000		0.999		0.998																			
n _C		656.27		1.71511										P _{F,e}		−0.0002		°C		α		950		0.999		0.998											
n _C ′		643.85		1.71588		P _{g,F}		−0.0038		−50/−40		61		900		0.999		0.998																			
n _{He-Ne}		632.80		1.71660		P _{C,t}		0.0036		−40/−30		64		850		0.999		0.998																			
n _D		589.29		1.71985		P _{C,s}		0.0014		−30/−20		66		700		0.999		0.998																			
n _d		587.56		1.72000		Thermal Properties				−20/−10		67		650		0.999		0.998																			
n _e		546.07		1.72391						T _g (°C)		604		−10/0		68		600		0.999		0.998															
n _F		486.13		1.73159						T _s (°C)		640		0/10		69		550		0.999		0.998															
n _F ′		479.99		1.73256		T ₁₀ ^{14.5} (°C)		530		10/20		70		500		0.998		0.996																			
n _g		435.84		1.74094		T ₁₀ ¹³ (°C)		581		20/30		71		480		0.996		0.993																			
n _h		404.66		1.74893		α _{−50/80°C} (10 ^{−7} /K)		71		30/40		72		460		0.994		0.990																			
n _i		365.01		1.76316		α _{100/300°C} (10 ^{−7} /K)		88		40/50		73		440		0.992		0.985																			
						λ (W/(m·K))		0.95		50/60		74		420		0.984		0.975																			
										60/70		75		400		0.976		0.958																			
Constants of Dispersion Formula						Mechanical Properties				70/80		75		390		0.966		0.940																			
										80/90		76		380		0.946		0.901																			
A ₀		2.88897190E+00				HK (10 ⁷ Pa)		564		90/100		77		370		0.901		0.819																			
A ₁		−1.26328327E−02				F _A		149		100/110		79		360		0.788		0.625																			
A ₂		2.26898960E−02				E (GPa)		106.1		110/120		80		350		0.517		0.272																			
A ₃		1.15077142E−03				G (GPa)		40.3		120/130		81		340		0.127		0.020																			
A ₄		−8.54940157E−05				μ		0.317		130/140		83		330																							
A ₅		7.07758016E−06				σ _b (MPa)		70		140/150		84		320																							
						B (10 ^{−12} /Pa)		2.25		150/160		85		310																							
																300																					
																290																					
																280																					
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code																									
		dn/dt relative (×10 ^{−6} / °C)										λ ₈₀ (λ ₇₀)/λ ₅ 380/340																									
												Coloration of Internal Transmittance																									
												λτ ₈₀ /λτ 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																				
		100 ~ 120			2.7			3.2			3.5			3.5			3.6			3.7			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					

H-LaF72	720460	n _d = 1.72000	v _d = 46.02	n _F − n _C = 0.015645
		n _e = 1.72372	v _e = 45.77	n _F − n _C ' = 0.015811

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.68194	P _{d,C}	0.2985	RC (S)	1	2400	0.902	0.806
n ₁₉₇₀	1970.09	1.68799	P _{e,d}	0.2378	RA (S)	1	2200	0.982	0.949
n ₁₅₃₀	1529.58	1.69476	P _{g,F}	0.5650	D _W	1	2000	0.993	0.986
n ₁₁₂₉	1128.64	1.70111	P' _{d,c'}	0.2486	D _A	3	1800	0.998	0.996
n ₁₀₆₄	1064.00	1.70232	P' _{e,d}	0.2353	R _{OH} (S)	1	1600	0.998	0.996
n _t	1013.98	1.70333	P' _{g,F'}	0.5015	RP (S)	2	1400	0.998	0.996
n _s	852.11	1.70732			CR	1	1200	0.998	0.996
n _{A'}	768.19	1.71011	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.998	0.996
n _r	706.52	1.71271					1000	0.998	0.996
n _C	656.27	1.71533					950	0.998	0.996
n _{C'}	643.85	1.71607					900	0.998	0.996
n _{He-Ne}	632.80	1.71676	P _{F,e}	-0.0014	°C	α	850	0.998	0.996
n _D	589.29	1.71987	P _{g,F}	-0.0021	-50/-40	60	800	0.998	0.996
n _d	587.56	1.72000	P _{C,t}	0.0039	-40/-30	63	750	0.998	0.996
n _e	546.07	1.72372	P _{C,s}	0.0011	-30/-20	64	700	0.998	0.996
n _F	486.13	1.73097	Thermal Properties		-20/-10	65	650	0.998	0.996
n _{F'}	479.99	1.73188			-10/0	66	600	0.998	0.996
n _g	435.84	1.73981			0/10	67	550	0.998	0.996
n _h	404.66	1.74732			10/20	68	500	0.998	0.996
n _i	365.01	1.76051	T _g (°C)	660	20/30	70	480	0.997	0.994
			T _s (°C)	692	30/40	70	460	0.995	0.992
			T ₁₀ ^{14.5} (°C)	584	40/50	71	440	0.993	0.987
			T ₁₀ ¹³ (°C)	628	50/60	71	420	0.988	0.982
			α _{-50/80°C} (10 ⁻⁷ /K)	67	60/70	72	400	0.978	0.964
			α _{100/300°C} (10 ⁻⁷ /K)	82	70/80	72	390	0.967	0.946
			λ (W/(m·K))	0.98	80/90	73	380	0.948	0.910
					90/100	74	370	0.908	0.839
			Mechanical Properties		100/110	75	360	0.826	0.698
					110/120	76	350	0.638	0.423
					120/130	77	340	0.303	0.098
					130/140	78	330		
			HK (10 ⁷ Pa)	585	140/150	79	320		
			F _A	128	150/160	80	310		
			E (GPa)	98.1			300		
			G (GPa)	38.4			290		
			μ	0.277			280		
			σ _b (MPa)	70					
			B (10 ⁻¹² /Pa)	1.77					

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		Solarization	
ρ (g/cm ³)	3.88	△λ (%)	-1.2

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	380/340
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.76200$	$v_d = 40.09$	$n_F - n_C = 0.019010$
		$n_e = 1.76651$	$v_e = 39.86$	$n_{F'} - n_{C'} = 0.019232$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.71750	P _{d,C}	0.2956	RC (S)	1	2400	0.872	0.760			
n ₁₉₇₀	1970.09	1.72452	P _{e,d}	0.2372	RA (S)	3	2200	0.976	0.953			
n ₁₅₃₀	1529.58	1.73233	P _{g,F}	0.5734	D _W	1	2000	0.990	0.980			
n ₁₁₂₉	1128.64	1.73966	P' _{d,c'}	0.2459	D _A	4	1800	0.998	0.996			
n ₁₀₆₄	1064.00	1.74105	P' _{e,d}	0.2345	R _{OH} (S)	1	1600	0.998	0.996			
n _t	1013.98	1.74222	P' _{g,F'}	0.5085	RP (S)	1	1400	0.998	0.996			
n _s	852.11	1.74686			CR	1	1200	0.999	0.998			
n _{A'}	768.19	1.75016	Deviation of Relative Partial Dispersions				1060	0.999	0.998			
n _r	706.52	1.75325					1000				0.999	0.998
n _C	656.27	1.75638					950				0.999	0.998
n _{C'}	643.85	1.75727					900				0.999	0.998
n _{He-Ne}	632.80	1.75809	P _{F,e}	-0.0009	Expansion Coefficient α (×10 ⁻⁷ /K)		850	0.999	0.998			
n _D	589.29	1.76183	P _{g,F}	-0.0036			°C	α	800	0.999	0.998	
n _d	587.56	1.76200	P _{C,t}	0.0105			-50/-40	55	750	0.999	0.998	
n _e	546.07	1.76651	P _{C,s}	0.0042			-40/-30	57	700	0.999	0.998	
n _F	486.13	1.77539	Thermal Properties		-30/-20	59	650	0.999	0.998			
n _{F'}	479.99	1.77651			T _g (°C)		656	-20/-10	60	600	0.999	0.998
n _g	435.84	1.78629			T _s (°C)		682	-10/0	61	550	0.999	0.998
n _h	404.66	1.79568			T ₁₀ ^{14.5} (°C)		589	0/10	62	500	0.996	0.992
n _i	365.01	1.81262	T ₁₀ ¹³ (°C)		625	10/20	63	480	0.994	0.989		
			α _{-50/80°C} (10 ⁻⁷ /K)		62	20/30	63	460	0.992	0.984		
			α _{100/300°C} (10 ⁻⁷ /K)		74	30/40	64	440	0.990	0.980		
			λ (W/(m·K))		1.11	40/50	64	420	0.984	0.970		
Constants of Dispersion Formula						50/60	65	400	0.972	0.942		
						60/70	65	390	0.959	0.916		
A ₀	3.02351576E+00		Mechanical Properties		70/80	66	380	0.932	0.860			
A ₁	-1.45336956E-02				80/90	66	370	0.871	0.745			
A ₂	2.61746880E-02				90/100	67	360	0.713	0.487			
A ₃	1.46334106E-03				100/110	68	350	0.368	0.124			
A ₄	-1.07305803E-04		E (GPa)		103.1	110/120	69	340				
A ₅	9.60593182E-06		G (GPa)		39.3	120/130	70	330				
Density			μ		0.310	130/140	71	320				
			σ _b (MPa)		69	140/150	72	310				
			B (10 ⁻¹² /Pa)		1.84	150/160	72	300				
ρ (g/cm ³)		3.97										
Range of Temperature		Solarization		Temperature Coefficients of Refractive Index				290				
				dn/dt relative (×10 ⁻⁶ / °C)				280				

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	v _d = 44.27	n _F − n _C = 0.018110
		n _e = 1.80596	v _e = 44.05	n _F ′ − n _C ′ = 0.018298

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.75717	P _{d,C}	0.2993	RC (S)	1	2400	0.803	0.645
n ₁₉₇₀	1970.09	1.76442	P _{e,d}	0.2374	RA (S)	1	2200	0.935	0.874
n ₁₅₃₀	1529.58	1.77245	P _{g,F}	0.5610	D _W	1	2000	0.990	0.980
n ₁₁₂₉	1128.64	1.77986	P _{d,c} ′	0.2492	D _A	3	1800	0.999	0.998
n ₁₀₆₄	1064.00	1.78125	P _{e,d} ′	0.2350	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.78241	P _{g,F} ′	0.4979	RP (S)	1	1400	0.999	0.998
n _s	852.11	1.78700			CR	1	1200	0.999	0.998
n _A ′	768.19	1.79021	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.79321					1000	0.999	0.998
n _C	656.27	1.79624					950	0.999	0.998
n _C ′	643.85	1.79710					900	0.999	0.998
n _{He-Ne}	632.80	1.79790	P _{F,e}	-0.0025	°C	α	850	0.999	0.998
n _D	589.29	1.80150	P _{g,F}	-0.0091	-50/-40	48	800	0.999	0.998
n _d	587.56	1.80166	P _{C,t}	0.0090	-40/-30	50	750	0.999	0.998
n _e	546.07	1.80596	P _{C,s}	0.0036	-30/-20	50	700	0.999	0.998
n _F	486.13	1.81435	Thermal Properties		-20/-10	52	650	0.999	0.998
n _F ′	479.99	1.81540			-10/0	57	600	0.999	0.998
n _g	435.84	1.82451			0/10	54	550	0.999	0.998
n _h	404.66	1.83312			10/20	55	500	0.999	0.998
n _i	365.01	1.84826	T _g (°C)	658	20/30	59	480	0.997	0.994
			T _s (°C)	687	30/40	61	460	0.995	0.991
			T ₁₀ ^{14.5} (°C)	596	40/50	58	440	0.994	0.987
			T ₁₀ ¹³ (°C)	627	50/60	59	420	0.990	0.981
			α _{-50/80°C} (10 ⁻⁷ /K)	56	60/70	61	400	0.984	0.968
			α _{100/300°C} (10 ⁻⁷ /K)	74	70/80	62	390	0.976	0.953
			λ (W/(m·K))	0.92	80/90	62	380	0.963	0.927
					90/100	64	370	0.936	0.876
			Mechanical Properties		100/110	62	360	0.881	0.776
					110/120	64	350	0.747	0.558
					120/130	68	340	0.485	0.235
					130/140	70	330	0.156	0.024
			μ	0.319	140/150	71	320		
			σ _b (MPa)	63	150/160	72	310		
			B (10 ⁻¹² /Pa)	1.76			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		Solarization	
ρ (g/cm ³)	4.41	△λ (%)	-0.7

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	390/340
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	v _d = 46.76	n _F − n _C = 0.017168
		n _e = 1.80687	v _e = 46.52	n _F − n _{C'} = 0.017345

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance										
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm								
n ₂₃₂₅	2325.42	1.75864	P _{d,C}	0.3006	RC (S)	1	2400	0.826	0.682								
n ₁₉₇₀	1970.09	1.76610	P _{e,d}	0.2377	RA (S)	1	2200	0.959	0.920								
n ₁₅₃₀	1529.58	1.77430	P _{g,F}	0.5580	D _W	1	2000	0.993	0.986								
n ₁₁₂₉	1128.64	1.78174	P' _{d,c'}	0.2502	D _A	3	1800	0.999	0.998								
n ₁₀₆₄	1064.00	1.78312	P' _{e,d}	0.2352	R _{OH} (S)	1	1600	0.999	0.998								
n _t	1013.98	1.78426	P' _{g,F'}	0.4952	RP (S)	1	1400	0.999	0.998								
n _s	852.11	1.78874			CR	1	1200	0.999	0.998								
n _{A'}	768.19	1.79184	Deviation of Relative Partial Dispersions				1060	0.999	0.998								
n _r	706.52	1.79473					Expansion Coefficient α (×10 ⁻⁷ /K)				1000	0.999	0.998				
n _C	656.27	1.79763									°Cα				950	0.999	0.998
n _{C'}	643.85	1.79845													-50/-4053		
n _{He-Ne}	632.80	1.79921	-40/-3055														
n _D	589.29	1.80264					-30/-2057										
n _d	587.56	1.80279									-20/-1058						
n _e	546.07	1.80687													-10/059		
n _F	486.13	1.81480	0/1060														
n _{F'}	479.99	1.81579					10/2060										
n _g	435.84	1.82438									20/3061						
n _h	404.66	1.83241													30/4061		
n _i	365.01	1.84644	40/5062														
							50/6062										
											60/7063						
															70/8063		
			80/9064														
							90/10065										
											100/11066						
															110/12067		
			120/13068														
							130/14069										
											140/15070						
															150/16071		

H-ZLaF3	855366	n _d = 1.85544	v _d = 36.59	n _F − n _C = 0.023381
		n _e = 1.86099	v _e = 36.35	n _F − n _C ′ = 0.023687

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.80540	P _{d,C}	0.2943	RC (S)	1	2400	0.885	0.782
n ₁₉₇₀	1970.09	1.81252	P _{e,d}	0.2374	RA (S)	3	2200	0.970	0.940
n ₁₅₃₀	1529.58	1.82064	P _{g,F}	0.5795	D _W	1	2000	0.991	0.981
n ₁₁₂₉	1128.64	1.82866	P _{d,c} ′	0.2449	D _A	3	1800	0.998	0.996
n ₁₀₆₄	1064.00	1.83025	P _{e,d} ′	0.2343	R _{OH} (S)	1	1600	0.998	0.996
n _t	1013.98	1.83159	P _{g,F} ′	0.5134	RP (S)	1	1400	0.998	0.996
n _s	852.11	1.83706			CR	1	1200	0.998	0.996
n _A ′	768.19	1.84100	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.998	0.996
n _r	706.52	1.84474					1000	0.998	0.996
n _C	656.27	1.84856	P _{F,e}	-0.0017	°C	α	950	0.998	0.996
n _C ′	643.85	1.84964	P _{g,F}	-0.0033			900	0.998	0.996
n _{He-Ne}	632.80	1.85065	P _{C,t}	0.0084	-50/-40	53	850	0.998	0.996
n _D	589.29	1.85524	P _{C,s}	0.0036	-40/-30	56	800	0.998	0.996
n _d	587.56	1.85544	Thermal Properties		-30/-20	57	750	0.998	0.996
n _e	546.07	1.86099			-20/-10	58	700	0.998	0.996
n _F	486.13	1.87194	T _g (°C)	625	-10/0	59	650	0.998	0.996
n _F ′	479.99	1.87333	T _s (°C)	653	0/10	60	600	0.998	0.996
n _g	435.84	1.88549	T ₁₀ ^{14.5} (°C)	557	10/20	61	550	0.998	0.996
n _h	404.66	1.89719	T ₁₀ ¹³ (°C)	591	20/30	61	500	0.998	0.996
n _i	365.01	1.91828	α _{-50/80°C} (10 ⁻⁷ /K)	60	30/40	62	480	0.994	0.989
			α _{100/300°C} (10 ⁻⁷ /K)	75	40/50	62	460	0.988	0.976
			λ (W/(m·K))	0.98	50/60	63	440	0.982	0.964
					60/70	63	420	0.975	0.948
					70/80	64	400	0.959	0.911
					80/90	65	390	0.940	0.871
					90/100	66	380	0.904	0.803
					100/110	67	370	0.832	0.680
					110/120	68	360	0.680	0.449
					120/130	69	350	0.376	0.136
					130/140	70	340		
					140/150	71	330		
					150/160	72	320		
							310		
							300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	4.59	△λ (%)	-0.4

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	(390)/350
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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	$n_d = 1.80400$	$v_d = 46.58$	$n_F - n_C = 0.017262$
		$n_e = 1.80811$	$v_e = 46.33$	$n_F - n_{C'} = 0.017443$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.76102	$P_{d,C}$	0.3001	RC (S)	1	2400	0.834	0.705
n_{1970}	1970.09	1.76802	$P_{e,d}$	0.2381	RA (S)	2	2200	0.956	0.916
n_{1530}	1529.58	1.77579	$P_{g,F}$	0.5567	D_W	1	2000	0.990	0.978
n_{1129}	1128.64	1.78299	$P'_{d,c'}$	0.2500	D_A	3	1800	0.995	0.990
n_{1064}	1064.00	1.78434	$P'_{e,d}$	0.2356	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.78546	$P'_{g,F'}$	0.4936	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.78990			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.79302	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.79590					1000	0.999	0.998
n_C	656.27	1.79882					950	0.999	0.998
$n_{C'}$	643.85	1.79964					900	0.999	0.998
n_{He-Ne}	632.80	1.80041	$P_{F,e}$	-0.0028	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.80385	$P_{g,F}$	-0.0095	-50/-40	54	800	0.999	0.998
n_d	587.56	1.80400	$P_{C,t}$	0.0081	-40/-30	57	750	0.999	0.998
n_e	546.07	1.80811	$P_{C,s}$	0.0045	-30/-20	58	700	0.999	0.998
n_F	486.13	1.81608	Thermal Properties		-20/-10	59	650	0.999	0.998
$n_{F'}$	479.99	1.81708			-10/0	60	600	0.999	0.998
n_g	435.84	1.82569			0/10	61	550	0.999	0.998
n_h	404.66	1.83377			10/20	62	500	0.998	0.995
n_i	365.01	1.84783	T_g ($^{\circ}C$)	688	20/30	63	480	0.996	0.993
			T_s ($^{\circ}C$)	713	30/40	63	460	0.995	0.991
			$T_{10}^{14.5}$ ($^{\circ}C$)	619	40/50	64	440	0.993	0.986
			T_{10}^{13} ($^{\circ}C$)	663	50/60	64	420	0.990	0.981
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	61	60/70	64	400	0.987	0.973
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	76	70/80	65	390	0.983	0.963
			λ (W/(m $\cdot$ K))	1.00	80/90	66	380	0.974	0.948
					90/100	67	370	0.961	0.918
Constants of Dispersion Formula			Mechanical Properties		100/110	68	360	0.931	0.869
					110/120	69	350	0.891	0.795
A_0	3.17704600E+00				120/130	70	340	0.818	0.676
A_1	-1.49215351E-02				130/140	71	330	0.690	0.489
A_2	2.59816690E-02		HK (10^7 Pa)	712	140/150	72	320	0.460	0.223
A_3	1.02205007E-03		F_A	65	150/160	73	310	0.136	0.022
A_4	-6.86208852E-05		E (GPa)	123.2			300		
A_5	4.99362397E-06		G (GPa)	46.2			290		
Density			μ	0.334			280		
			σ_b (MPa)	110					
ρ (g/cm 3)	4.47		B (10^{-12} /Pa)	1.27					
Solarization		$\Delta\lambda$ (%)	-0.6						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZLaF50C	804466	$n_d = 1.80400$	$v_d = 46.58$	$n_F - n_C = 0.017262$
		$n_e = 1.80811$	$v_e = 46.33$	$n_{F'} - n_{C'} = 0.017443$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.3001	RC (S)	1	2400	0.869	0.755
n_{1970}	1970.09		$P_{e,d}$	0.2381	RA (S)	1	2200	0.966	0.932
n_{1530}	1529.58		$P_{g,F}$	0.5590	D_W	1	2000	0.988	0.975
n_{1129}	1128.64	1.78309	$P'_{d,c'}$	0.2500	D_A	3	1800	0.996	0.993
n_{1064}	1064.00	1.78441	$P'_{e,d}$	0.2356	$R_{OH}(S)$	1	1600	0.999	0.998
n_t	1013.98	1.78552	$P'_{g,F'}$	0.4965	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.78993			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.79303	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.79590					1000	0.999	0.998
n_C	656.27	1.79882					950	0.999	0.998
$n_{C'}$	643.85	1.79964					900	0.999	0.998
n_{He-Ne}	632.80	1.80040	$P_{F,e}$	-0.0028	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.80386	$P_{g,F}$	-0.0072	-50/-40	58	800	0.999	0.998
n_d	587.56	1.80400	$P_{C,t}$	0.0047	-40/-30	59	750	0.999	0.998
n_e	546.07	1.80811	$P_{C,s}$	0.0028	-30/-20	60	700	0.999	0.998
n_F	486.13	1.81608	Thermal Properties		-20/-10	60	650	0.999	0.998
$n_{F'}$	479.99	1.81707			-10/0	64	600	0.999	0.998
n_g	435.84	1.82573	T_g ($^{\circ}C$)	694	0/10	65	550	0.999	0.998
n_h	404.66	1.83385	T_s ($^{\circ}C$)	721	10/20	65	500	0.998	0.997
n_i	365.01	1.84795	$T_{10}^{14.5}$ ($^{\circ}C$)	625	20/30	66	480	0.998	0.996
			T_{10}^{13} ($^{\circ}C$)	669	30/40	66	460	0.997	0.994
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	64	40/50	66	440	0.995	0.990
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	79	50/60	69	420	0.993	0.986
			λ (W/(m·K))	0.85	60/70	70	400	0.987	0.975
					70/80	70	390	0.981	0.963
			Mechanical Properties		80/90	70	380	0.971	0.942
					90/100	72	370	0.949	0.900
			HK (10^7Pa)	712	100/110	73	360	0.899	0.808
			F_A	116	110/120	74	350	0.778	0.606
			E (GPa)	122.0	120/130	76	340	0.533	0.284
			G (GPa)	47.0	130/140	77	330	0.195	0.038
			μ	0.299	140/150	77	320		
			σ_b (MPa)	119	150/160	78	310		
			B ($10^{-12}/Pa$)				300		
							290		
							280		

Constants of Dispersion Formula	
A_0	3.17409614E+00
A_1	-1.33203094E-02
A_2	2.81374701E-02
A_3	2.83359178E-04
A_4	4.54411400E-05
A_5	-1.18800392E-06

Density		Solarization	
ρ (g/cm ³)	4.49	$\triangle\lambda$ (%)	-0.7

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	3.3	3.6	3.9	4.0	4.1	4.4	4.6	5.1	5.3	5.6
-40 ~ -20	3.3	3.6	3.9	4.0	4.1	4.4	4.5	5.2	5.4	5.6
-20 ~ 0	3.3	3.7	4.0	4.0	4.1	4.3	4.5	5.3	5.4	5.6
0 ~ 20	3.4	3.6	4.0	4.1	4.2	4.4	4.6	5.3	5.5	5.6
20 ~ 40	3.3	3.6	4.1	4.2	4.3	4.4	4.7	5.3	5.4	5.7
40 ~ 60	3.4	3.7	4.2	4.2	4.3	4.5	4.8	5.3	5.5	5.9
60 ~ 80	3.4	3.8	4.3	4.3	4.4	4.6	4.9	5.5	5.7	6.0
80 ~ 100	3.5	3.9	4.4	4.5	4.6	4.7	4.9	5.6	5.7	6.2
100 ~ 120	3.6	4.1	4.5	4.6	4.7	4.7	5.1	5.7	5.8	6.3
120 ~ 140	3.7	4.2	4.6	4.7	4.8	4.8	5.2	5.7	5.9	6.5
140 ~ 160	3.8	4.3	4.6	4.7	4.8	4.9	5.3	5.9	6.1	6.7

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	380/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	359/331

Constants of dn/dt		
D_0	D_1	D_2
1.90E-06	1.15E-08	-1.71E-11
E_0	E_1	λ_{TK}
8.52E-07	3.28E-10	2.15E-02

H-ZLaF51	805396	$n_d = 1.80450$	$v_d = 39.64$	$n_F - n_C = 0.020298$
		$n_e = 1.80932$	$v_e = 39.39$	$n_{F'} - n_{C'} = 0.020549$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.75651	$P_{d,C}$	0.2961	RC (S)	1	2400	0.825	0.681
n_{1970}	1970.09	1.76414	$P_{e,d}$	0.2375	RA (S)	3	2200	0.950	0.903
n_{1530}	1529.58	1.77262	$P_{g,F}$	0.5730	D_W	1	2000	0.990	0.980
n_{1129}	1128.64	1.78054	$P'_{d,c'}$	0.2467	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.78205	$P'_{e,d}$	0.2346	$R_{OH}(S)$	1	1600	0.999	0.998
n_t	1013.98	1.78330	$P'_{g,F'}$	0.5081	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.78830			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.79183	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.79513					1000	0.999	0.998
n_C	656.27	1.79849	$P_{F,e}$	-0.0018	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.79943	$P_{g,F}$	-0.0048	-50/-40	48	900	0.999	0.998
n_{He-Ne}	632.80	1.80032	$P_{C,t}$	0.0162	-40/-30	51	850	0.999	0.998
n_D	589.29	1.80432	$P_{C,s}$	0.0065	-30/-20	52	800	0.999	0.998
n_d	587.56	1.80450	Thermal Properties		-20/-10	54	750	0.999	0.998
n_e	546.07	1.80932			-10/0	54	700	0.999	0.998
n_F	486.13	1.81879	T_g ($^{\circ}C$)	597	0/10	55	650	0.999	0.998
$n_{F'}$	479.99	1.81998	T_s ($^{\circ}C$)	630	10/20	56	600	0.999	0.998
n_g	435.84	1.83042	$T_{10}^{14.5}$ ($^{\circ}C$)	533	20/30	57	550	0.999	0.998
n_h	404.66	1.84042	T_{10}^{13} ($^{\circ}C$)	568	30/40	57	500	0.997	0.993
n_i	365.01	1.85838	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	55	40/50	58	480	0.995	0.989
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	70	50/60	58	460	0.992	0.984
			λ (W/(m·K))	0.92	60/70	58	440	0.988	0.977
					70/80	59	420	0.981	0.963
Constants of Dispersion Formula			Mechanical Properties		80/90	59	400	0.966	0.933
					90/100	60	390	0.948	0.899
A_0	3.16743537E+00		HK (10^7Pa)	664	100/110	61	380	0.913	0.833
A_1	-1.61763813E-02		F_A	76	110/120	62	370	0.838	0.702
A_2	2.88108896E-02		E (GPa)	121.8	120/130	63	360	0.668	0.446
A_3	1.51509661E-03		G (GPa)	45.7	130/140	64	350	0.358	0.128
A_4	-1.00494023E-04		μ	0.332	140/150	66	340		
A_5	9.19692892E-06		σ_b (MPa)	69	150/160	67	330		
Density			B ($10^{-12}/Pa$)	1.99			320		
							310		
ρ (g/cm ³)	4.26						300		
Solarization							290		
							280		
$\Delta\lambda$ (%)	-0.6								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZLaF51A	805396	n _d = 1.80450	v _d = 39.62	n _F − n _C = 0.020304
		n _e = 1.80932	v _e = 39.37	n _F − n _{C'} = 0.020555

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm	
n ₂₃₂₅	2325.42	1.75819	P _{d,C}	0.2965	RC (S)	1	2400	0.810	0.656	
n ₁₉₇₀	1970.09	1.76514	P _{e,d}	0.2373	RA (S)	2	2200	0.933	0.870	
n ₁₅₃₀	1529.58	1.77300	P _{g,F}	0.5731	D _W	1	2000	0.972	0.944	
n ₁₁₂₉	1128.64	1.78059	P' _{d,c'}	0.2468	D _A	3	1800	0.990	0.980	
n ₁₀₆₄	1064.00	1.78207	P' _{e,d}	0.2344	R _{OH} (S)	1	1600	0.996	0.992	
n _t	1013.98	1.78331	P' _{g,F'}	0.5077	RP (S)	1	1400	0.995	0.990	
n _s	852.11	1.78828			CR		1200	0.999	0.998	
n _{A'}	768.19	1.79181	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.79512						1000	0.999	0.998
n _C	656.27	1.79848						950	0.999	0.998
n _{C'}	643.85	1.79943						900	0.999	0.998
n _{He-Ne}	632.80	1.80032						850	0.999	0.998
n _D	589.29	1.80432	P _{F,e}	-0.0022	°C	α	800	0.999	0.998	
n _d	587.56	1.80450	P _{g,F}	-0.0047	-50/-40	54	750	0.999	0.998	
n _e	546.07	1.80932	P _{C,t}	0.0151	-40/-30	55	700	0.999	0.998	
n _F	486.13	1.81878	P _{C,s}	0.0069	-30/-20	55	650	0.999	0.998	
n _{F'}	479.99	1.81998	Thermal Properties		-20/-10	55	600	0.999	0.998	
n _g	435.84	1.83042			T _g (°C)	598	-10/0	56	550	0.998
n _h	404.66	1.84042	T _s (°C)	639	0/10	58	500	0.997	0.993	
n _i	365.01	1.85828	T ₁₀ ^{14.5} (°C)	537	10/20	58	480	0.996	0.991	
			T ₁₀ ¹³ (°C)	572	20/30	60	460	0.993	0.986	
			α _{-50/80°C} (10 ⁻⁷ /K)	59	30/40	61	440	0.991	0.981	
			α _{100/300°C} (10 ⁻⁷ /K)	75	40/50	62				
			Mechanical Properties		50/60	63	390	0.964	0.929	
					60/70	64	380	0.941	0.885	
					70/80	65	370	0.877	0.770	
					80/90	66	360	0.774	0.599	
					HK (10 ⁷ Pa)	700	90/100	67	350	0.509
			F _A	132	100/110	68	340	0.170	0.029	
			E (GPa)	113.8	110/120	69	330			
			G (GPa)	43.5	120/130	70	320			
			μ	0.307	130/140	71	310			
			σ _b (MPa)	100	140/150	73	300			
			B (10 ⁻¹² /Pa)	1.86	150/160	73	290			

Constants of Dispersion Formula	
A ₀	3.16404838E+00
A ₁	-1.45380356E-02
A ₂	3.12370776E-02
A ₃	7.28139985E-04
A ₄	1.72607758E-05
A ₅	2.62079760E-06

Density		Solarization	
ρ (g/cm ³)	4.24	△λ (%)	-0.5

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	3.5	3.7	4.2	4.2	4.3	4.5	4.8	5.4	5.5	6.3
-40 ~ -20	3.6	3.8	4.3	4.4	4.4	4.7	5.0	5.6	5.7	6.6
-20 ~ 0	3.8	4.0	4.5	4.6	4.6	4.9	5.2	5.9	6.0	6.8
0 ~ 20	4.0	4.2	4.8	4.8	4.9	5.1	5.5	6.1	6.2	7.1
20 ~ 40	4.3	4.5	5.0	5.1	5.1	5.4	5.7	6.4	6.5	7.4
40 ~ 60	4.5	4.7	5.3	5.3	5.4	5.7	6.0	6.7	6.8	7.7
60 ~ 80	4.7	4.9	5.5	5.6	5.6	5.9	6.3	7.0	7.1	8.0
80 ~ 100	4.9	5.2	5.7	5.8	5.9	6.2	6.5	7.2	7.3	8.3
100 ~ 120	5.1	5.3	5.9	6.0	6.1	6.4	6.7	7.5	7.6	8.6
120 ~ 140	5.3	5.5	6.1	6.2	6.2	6.5	6.9	7.7	7.8	8.8
140 ~ 160	5.4	5.6	6.3	6.3	6.4	6.7	7.1	7.9	8.0	9.0

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	405/345
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	372/341

Constants of dn/dt		
D ₀	D ₁	D ₂
3.46E-06	1.84E-08	-2.91E-11
E ₀	E ₁	λ_{TK}
6.36E-07	3.69E-10	2.59E-01

H-ZLaF52	806410	$n_d = 1.80610$	$v_d = 40.95$	$n_F - n_C = 0.019686$
		$n_e = 1.81077$	$v_e = 40.69$	$n_{F'} - n_{C'} = 0.019924$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.75948	$P_{d,C}$	0.2972	RC (S)	1	2400	0.800	0.640
n_{1970}	1970.09	1.76685	$P_{e,d}$	0.2372	RA (S)	3	2200	0.930	0.865
n_{1530}	1529.58	1.77506	$P_{g,F}$	0.5679	D_W	1	2000	0.992	0.984
n_{1129}	1128.64	1.78274	$P'_{d,c'}$	0.2474	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.78421	$P'_{e,d}$	0.2344	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.78543	$P'_{g,F'}$	0.5029	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.79030			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.79376	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.79699					1000	0.999	0.998
n_C	656.27	1.80025					950	0.999	0.998
$n_{C'}$	643.85	1.80117					900	0.999	0.998
n_{He-Ne}	632.80	1.80204	$P_{F,e}$	-0.0018	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.80592	$P_{g,F}$	-0.0077	-50/-40	47	800	0.999	0.998
n_d	587.56	1.80610	$P_{C,t}$	0.0143	-40/-30	50	750	0.999	0.998
n_e	546.07	1.81077	$P_{C,s}$	0.0068	-30/-20	51	700	0.999	0.998
n_F	486.13	1.81994	Thermal Properties		-20/-10	52	650	0.999	0.998
$n_{F'}$	479.99	1.82110			-10/0	53	600	0.999	0.998
n_g	435.84	1.83112	T_g ($^{\circ}C$)	637	0/10	54	550	0.999	0.998
n_h	404.66	1.84069	T_s ($^{\circ}C$)	663	10/20	54	500	0.999	0.998
n_i	365.01	1.85767	$T_{10}^{14.5}$ ($^{\circ}C$)	590	20/30	55	480	0.997	0.995
			T_{10}^{13} ($^{\circ}C$)	613	30/40	56	460	0.995	0.992
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	54	40/50	56	440	0.992	0.985
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	64	50/60	56	420	0.986	0.976
			λ (W/(m·K))	0.90	60/70	57	400	0.981	0.953
					70/80	57	390	0.975	0.928
			Mechanical Properties		80/90	58	380	0.953	0.885
					90/100	58	370	0.910	0.804
			HK (10^7Pa)	651	100/110	59	360	0.817	0.644
			F_A	76	110/120	60	350	0.616	0.364
			E (GPa)	113.9	120/130	60	340	0.270	0.071
			G (GPa)	43.7	130/140	61	330		
			μ	0.303	140/150	62	320		
			σ_b (MPa)	92	150/160	62	310		
			B ($10^{-12}/Pa$)	1.80			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		Solarization	
ρ (g/cm ³)	4.35	$\triangle\lambda$ (%)	-0.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.83400$	$v_d = 37.34$	$n_F - n_C = 0.022333$
		$n_e = 1.83930$	$v_e = 37.09$	$n_F - n_{C'} = 0.022629$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.78596	$P_{d,C}$	0.2946	RC (S)	1	2400	0.828	0.685
n_{1970}	1970.09	1.79278	$P_{e,d}$	0.2373	RA (S)	3	2200	0.932	0.864
n_{1530}	1529.58	1.80056	$P_{g,F}$	0.5821	D_W	1	2000	0.967	0.933
n_{1129}	1128.64	1.80829	$P'_{d,c'}$	0.2453	D_A	3	1800	0.983	0.962
n_{1064}	1064.00	1.80983	$P'_{e,d}$	0.2342	R_{OH} (S)	1	1600	0.992	0.980
n_t	1013.98	1.81113	$P'_{g,F'}$	0.5157	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.81639			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.82019	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.82376					1000	0.999	0.998
n_C	656.27	1.82742					950	0.999	0.998
$n_{C'}$	643.85	1.82845					900	0.999	0.998
n_{He-Ne}	632.80	1.82942	$P_{F,e}$	-0.0017	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.83381	$P_{g,F}$	0.0005	-50/-40	48	800	0.999	0.998
n_d	587.56	1.83400	$P_{C,t}$	0.0084	-40/-30	50	750	0.999	0.998
n_e	546.07	1.83930	$P_{C,s}$	0.0039	-30/-20	51	700	0.999	0.996
n_F	486.13	1.84975	Thermal Properties		-20/-10	53	650	0.999	0.995
$n_{F'}$	479.99	1.85108			-10/0	54	600	0.999	0.995
n_g	435.84	1.86275	T_g ($^{\circ}C$)	596	0/10	54	550	0.999	0.994
n_h	404.66	1.87398	T_s ($^{\circ}C$)	626	10/20	55	500	0.997	0.989
n_i	365.01	1.89424	$T_{10}^{14.5}$ ($^{\circ}C$)	535	20/30	56	480	0.994	0.984
			T_{10}^{13} ($^{\circ}C$)	573	30/40	56	460	0.991	0.977
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	54	40/50	57	440	0.986	0.967
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	69	50/60	57	420	0.983	0.952
			λ (W/(m·K))	0.99	60/70	57	400	0.964	0.913
					70/80	58	390	0.942	0.871
Constants of Dispersion Formula			Mechanical Properties		80/90	58	380	0.901	0.792
					90/100	59	370	0.809	0.633
A_0	3.26066843E+00		HK (10^7Pa)	631	100/110	60	360	0.605	0.343
A_1	-1.43061602E-02		F_A	80	110/120	61	350	0.250	0.057
A_2	3.42503276E-02		E (GPa)	110.9	120/130	62	340		
A_3	9.45194718E-04		G (GPa)	41.6	130/140	63	330		
A_4	1.66625589E-05		μ	0.335	140/150	64	320		
A_5	3.78744906E-06		σ_b (MPa)	72	150/160	65	310		
Density			B ($10^{-12}/Pa$)	2.07			300		
							290		
ρ (g/cm ³)	4.56						280		
Solarization									
$\Delta\lambda$ (%)	-0.4								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZLaF53A	834373	$n_d = 1.83399$	$v_d = 37.32$	$n_F - n_C = 0.022350$
		$n_e = 1.83929$	$v_e = 37.06$	$n_{F'} - n_{C'} = 0.022645$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2949	RC (S)	1	2400	0.828	0.685
n_{1970}	1970.09		$P_{e,d}$	0.2371	RA (S)	2	2200	0.932	0.864
n_{1530}	1529.58		$P_{g,F}$	0.5781	D_W	1	2000	0.967	0.933
n_{1129}	1128.64	1.80833	$P'_{d,c'}$	0.2455	D_A	3	1800	0.983	0.962
n_{1064}	1064.00	1.80986	$P'_{e,d}$	0.2340	R_{OH} (S)	1	1600	0.992	0.980
n_t	1013.98	1.81115	$P'_{g,F'}$	0.5118	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.81640			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.82018	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.82375					1000	0.999	0.998
n_C	656.27	1.82740					950	0.999	0.998
$n_{C'}$	643.85	1.82843					900	0.999	0.998
n_{He-Ne}	632.80	1.82940	$P_{F,e}$	-0.0016	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.83379	$P_{g,F}$	-0.0035	-50/-40	50	800	0.999	0.998
n_d	587.56	1.83399	$P_{C,t}$	0.0061	-40/-30	50	750	0.999	0.998
n_e	546.07	1.83929	$P_{C,s}$	0.0022	-30/-20	51	700	0.999	0.996
n_F	486.13	1.84975	Thermal Properties		-20/-10	52	650	0.999	0.995
$n_{F'}$	479.99	1.85108			-10/0	53	600	0.999	0.995
n_g	435.84	1.86267			0/10	55	550	0.999	0.994
n_h	404.66	1.87385			10/20	55	500	0.997	0.989
n_i	365.01	1.89398	T_g ($^{\circ}C$)	601	20/30	56	480	0.994	0.984
			T_s ($^{\circ}C$)	638	30/40	57	460	0.991	0.977
			$T_{10}^{14.5}$ ($^{\circ}C$)	537	40/50	58	440	0.986	0.967
			T_{10}^{13} ($^{\circ}C$)	575	50/60	59	420	0.983	0.952
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	55	60/70	59	400	0.964	0.913
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	72	70/80	61	390	0.942	0.871
			λ (W/(m·K))	0.93	80/90	63	380	0.901	0.792
					90/100	63	370	0.809	0.633
Constants of Dispersion Formula			Mechanical Properties		100/110	64	360	0.605	0.343
					110/120	65	350	0.250	0.057
A_0	3.26143209E+00				120/130	66	340		
A_1	-1.43517211E-02				130/140	67	330		
A_2	3.32434970E-02		HK (10^7Pa)	659	140/150	69	320		
A_3	1.38002825E-03		F_A	138	150/160	69	310		
A_4	-5.71390956E-05		E (GPa)	114.3			300		
A_5	7.72746022E-06		G (GPa)	43.3			290		
Density			μ	0.320			280		
			σ_b (MPa)	97					
ρ (g/cm ³)	4.46		B ($10^{-12}/Pa$)	2.09					
Solarization		$\Delta\lambda$ (%)	-0.6						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	7.2	7.4	8.1	8.2	8.2	8.5	8.9	9.8	9.9	11.0
-40 ~ -20	7.1	7.4	8.1	8.2	8.2	8.6	9.0	9.9	10.0	11.2
-20 ~ 0	7.2	7.5	8.2	8.2	8.3	8.7	9.1	10.0	10.1	11.3
0 ~ 20	7.3	7.6	8.3	8.4	8.4	8.8	9.2	10.2	10.3	11.6
20 ~ 40	7.4	7.7	8.4	8.5	8.6	8.9	9.4	10.4	10.5	11.8
40 ~ 60	7.5	7.8	8.6	8.7	8.7	9.1	9.6	10.6	10.8	12.1
60 ~ 80	7.6	7.9	8.7	8.8	8.9	9.3	9.8	10.9	11.0	12.4
80 ~ 100	7.7	8.0	8.9	9.0	9.1	9.5	10.0	11.1	11.2	12.7
100 ~ 120	7.8	8.2	9.0	9.1	9.2	9.6	10.1	11.3	11.4	12.9
120 ~ 140	7.9	8.3	9.1	9.2	9.3	9.8	10.3	11.5	11.7	13.2
140 ~ 160	8.0	8.3	9.3	9.4	9.4	9.9	10.4	11.7	11.8	13.4

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/350
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	380/349

Constants of dn/dt		
D ₀	D ₁	D ₂
8.12E-06	1.24E-08	-1.99E-11
E ₀	E ₁	λ_{TK}
8.18E-07	7.97E-10	2.67E-01

H-ZLaF54	816466	$n_d = 1.81600$	$v_d = 46.55$	$n_F - n_C = 0.017528$
		$n_e = 1.82017$	$v_e = 46.33$	$n_{F'} - n_{C'} = 0.017704$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.77344	$P_{d,C}$	0.3001	RC (S)	1	2400	0.888	0.789
n_{1970}	1970.09	1.78023	$P_{e,d}$	0.2379	RA (S)	2	2200	0.980	0.960
n_{1530}	1529.58	1.78779	$P_{g,F}$	0.5551	D_W	1	2000	0.992	0.984
n_{1129}	1128.64	1.79484	$P'_{d,c'}$	0.2502	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.79618	$P'_{e,d}$	0.2355	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.79729	$P'_{g,F'}$	0.4925	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.80174			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.80487	Expansion Coefficient α ($\times 10^{-7}/K$)				1060	0.999	0.998
n_r	706.52	1.80780					1000	0.999	0.998
n_C	656.27	1.81074	Deviation of Relative Partial Dispersions		$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.81157					900	0.999	0.998
n_{He-Ne}	632.80	1.81235	$P_{F,e}$	-0.0024	-50/-40	54	850	0.999	0.998
n_D	589.29	1.81584	$P_{g,F}$	-0.0112	-40/-30	57	800	0.999	0.998
n_d	587.56	1.81600	$P_{C,t}$	0.0017	-30/-20	59	750	0.999	0.998
n_e	546.07	1.82017	$P_{C,s}$	0.0013	-20/-10	60	700	0.999	0.998
n_F	486.13	1.82827	Thermal Properties		-10/0	61	650	0.999	0.998
$n_{F'}$	479.99	1.82928			0/10	62	600	0.999	0.998
n_g	435.84	1.83800	T_g ($^{\circ}C$)	715	10/20	63	550	0.999	0.998
n_h	404.66	1.84618	T_s ($^{\circ}C$)	740	20/30	64	500	0.999	0.998
n_i	365.01	1.86037	$T_{10}^{14.5}$ ($^{\circ}C$)	643	30/40	64	460	0.998	0.996
			T_{10}^{13} ($^{\circ}C$)	662	40/50	64	440	0.997	0.994
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	62	50/60	65	420	0.995	0.991
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	75	60/70	66	400	0.983	0.966
			λ (W/(m·K))	0.84	70/80	66	390	0.980	0.960
					80/90	67	380	0.975	0.949
Constants of Dispersion Formula			Mechanical Properties		90/100	68	370	0.970	0.942
					100/110	69	360	0.959	0.919
A_0	3.21873957E+00		HK (10^7Pa)	702	110/120	70	350	0.940	0.885
A_1	-1.45164245E-02		F_A	64	120/130	71	340	0.914	0.835
A_2	2.60917155E-02		E (GPa)	126.0	130/140	72	330	0.876	0.768
A_3	1.26701532E-03		G (GPa)	47.4	140/150	73	320	0.815	0.663
A_4	-1.06020539E-04		μ	0.330	150/160	74	310	0.597	0.357
A_5	6.86627719E-06		σ_b (MPa)	86			300	0.585	0.343
Density		5.04	B ($10^{-12}/Pa$)	1.23			290	0.438	0.192
							280	0.212	0.045
Solarization		$\Delta\lambda$ (%)	-3.9						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.81600$	$v_d = 46.55$	$n_F - n_C = 0.017528$
		$n_e = 1.82017$	$v_e = 46.33$	$n_F - n_{C'} = 0.017704$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42		P _{d,C}	0.3001	RC (S)	1	2400	0.867	0.751		
n ₁₉₇₀	1970.09		P _{e,d}	0.2379	RA (S)	1	2200	0.965	0.931		
n ₁₅₃₀	1529.58		P _{g,F}	0.5574	D _W	1	2000	0.986	0.972		
n ₁₁₂₉	1128.64	1.79487	P' _{d,c'}	0.2497	D _A	3	1800	0.996	0.992		
n ₁₀₆₄	1064.00	1.79619	P' _{e,d}	0.2355	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.79731	P' _{g,F'}	0.4942	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.80175			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.80488	Deviation of Relative Partial Dispersions				1060	0.999	0.998		
n _r	706.52	1.80779					Expansion Coefficient α (×10 ⁻⁷ /K)		1000	0.999	0.998
n _C	656.27	1.81074							950	0.999	0.998
n _{C'}	643.85	1.81158							900	0.999	0.998
n _{He-Ne}	632.80	1.81235	P _{F,e}	-0.0024	°C	α			850	0.999	0.998
n _D	589.29	1.81585	P _{g,F}	-0.0089	-50/-40	57	800	0.999	0.998		
n _d	587.56	1.81600	P _{C,t}	0.0005	-40/-30	58	750	0.999	0.998		
n _e	546.07	1.82017	P _{C,s}	0.0008	-30/-20	60	700	0.999	0.998		
n _F	486.13	1.82827	Thermal Properties		-20/-10	61	650	0.999	0.998		
n _{F'}	479.99	1.82929			T _g (°C)	718	-10/0	62	600	0.999	0.998
n _g	435.84	1.83804	T _s (°C)	744	0/10	63	550	0.999	0.998		
n _h	404.66	1.84625	T ₁₀ ^{14.5} (°C)	646	10/20	63	500	0.998	0.997		
n _i	365.01	1.86049	T ₁₀ ¹³ (°C)	666	20/30	63	480	0.997	0.995		
			α _{-50/80°C} (10 ⁻⁷ /K)	61	30/40	63	460	0.996	0.992		
			α _{100/300°C} (10 ⁻⁷ /K)	76	40/50	64	440	0.994	0.988		
			λ (W/(m·K))	0.83	50/60	64	420	0.991	0.982		
Constants of Dispersion Formula					60/70	67	400	0.985	0.971		
			Mechanical Properties		70/80	67	390	0.980	0.961		
HK (10 ⁷ Pa)	693	80/90			69	380	0.971	0.942			
A ₀	3.21683817E+00		F _A	71	90/100	69	370	0.953	0.908		
A ₁	-1.36724876E-02		E (GPa)	123.0	100/110	69	360	0.920	0.846		
A ₂	2.76347913E-02		G (GPa)	47.4	110/120	70	350	0.847	0.718		
A ₃	7.16568289E-04		μ	0.298	120/130	70	340	0.701	0.491		
A ₄	-1.97668563E-05		σ _b (MPa)		130/140	73	330	0.432	0.186		
A ₅	2.19878744E-06		B (10 ⁻¹² /Pa)	1.12	140/150	74	320	0.137	0.019		
Density		Solarization									
ρ (g/cm ³)	4.99										
		Δλ (%)	-0.3								
Range of Temperature		Temperature Coefficients of Refractive Index									
		dn/dt relative (×10 ⁻⁶ / °C)									

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	v _d = 42.72	n _F − n _C = 0.019541
		n _e = 1.83944	v _e = 42.49	n _F − n _{C'} = 0.019757

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.79048	P _{d,C}	0.2989	RC (S)	1	2400	0.903	0.808
n ₁₉₇₀	1970.09	1.79707	P _{e,d}	0.2369	RA (S)	1	2200	0.979	0.954
n ₁₅₃₀	1529.58	1.80452	P _{g,F}	0.5650	D _W	1	2000	0.993	0.985
n ₁₁₂₉	1128.64	1.81175	P' _{d,c'}	0.2490	D _A	3	1800	0.999	0.998
n ₁₀₆₄	1064.00	1.81316	P' _{e,d}	0.2343	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.81435	P' _{g,F'}	0.5011	RP (S)	1	1400	0.999	0.998
n _s	852.11	1.81912			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.82253	Expansion Coefficient α (×10 ⁻⁷ /K)				1060	0.999	0.998
n _r	706.52	1.82573					1000	0.999	0.998
n _C	656.27	1.82897	Deviation of Relative Partial Dispersions		°C	α	950	0.999	0.998
n _{C'}	643.85	1.82989	P _{F,e}	-0.0025			900	0.999	0.998
n _{He-Ne}	632.80	1.83076	P _{g,F}	-0.0077	-50/-40	60	850	0.999	0.998
n _D	589.29	1.83463	P _{C,t}	0.0010	-40/-30	62	800	0.999	0.998
n _d	587.56	1.83481	P _{C,s}	0.0011	-30/-20	64	750	0.999	0.998
n _e	546.07	1.83944	Thermal Properties		-20/-10	65	700	0.999	0.998
n _F	486.13	1.84851			-10/0	66	650	0.999	0.998
n _{F'}	479.99	1.84965	T _g (°C)	711	0/10	67	600	0.999	0.998
n _g	435.84	1.85955	T _s (°C)	739	10/20	68	550	0.999	0.998
n _h	404.66	1.86893	T ₁₀ ^{14.5} (°C)	640	20/30	69	500	0.999	0.998
n _i	365.01	1.88543	T ₁₀ ¹³ (°C)	687	30/40	70	480	0.997	0.994
			α _{-50/80°C} (10 ⁻⁷ /K)	68	40/50	71	460	0.995	0.990
			α _{100/300°C} (10 ⁻⁷ /K)	84	50/60	71	440	0.992	0.984
			λ (W/(m·K))	0.88	60/70	72	420	0.987	0.974
					70/80	72	400	0.978	0.957
			Mechanical Properties		80/90	73	390	0.969	0.939
					90/100	74	380	0.956	0.913
			HK (10 ⁷ Pa)	679	100/110	75	370	0.934	0.866
			F _A	69	110/120	76	360	0.897	0.801
			E (GPa)	121.8	120/130	77	350	0.829	0.681
			G (GPa)	45.1	130/140	79	340	0.726	0.522
			μ	0.349	140/150	80	330	0.544	0.290
			σ _b (MPa)	69	150/160	81	320	0.250	0.065
			B (10 ⁻¹² /Pa)	1.23			310		
							300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	4.66	△λ (%)	-0.4

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
	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	
λ ₈₀ (λ ₇₀)/λ ₅	390/320
Coloration of Internal Transmittance	
λτ ₈₀ /λτ 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-ZLaF55B	835427	$n_d = 1.83480$	$v_d = 42.73$	$n_F - n_C = 0.019536$
		$n_e = 1.83944$	$v_e = 42.47$	$n_{F'} - n_{C'} = 0.019763$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2979	RC (S)	1	2400	0.878	0.767
n_{1970}	1970.09		$P_{e,d}$	0.2375	RA (S)	1	2200	0.962	0.923
n_{1530}	1529.58		$P_{g,F}$	0.5661	D_W	1	2000	0.982	0.965
n_{1129}	1128.64	1.81180	$P'_{d,c'}$	0.2484	D_A	3	1800	0.994	0.986
n_{1064}	1064.00	1.81318	$P'_{e,d}$	0.2348	R_{OH} (S)	1	1600	0.998	0.995
n_t	1013.98	1.81435	$P'_{g,F'}$	0.5014	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.81911			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.82252	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.82573					1000	0.999	0.998
n_C	656.27	1.82898					950	0.999	0.998
$n_{C'}$	643.85	1.82989					900	0.999	0.998
n_{He-Ne}	632.80	1.83075	$P_{F,e}$	-0.0023	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.83462	$P_{g,F}$	-0.0065	-50/-40	59	800	0.999	0.998
n_d	587.56	1.83480	$P_{C,t}$	0.0017	-40/-30	60	750	0.999	0.998
n_e	546.07	1.83944	$P_{C,s}$	0.0023	-30/-20	60	700	0.999	0.998
n_F	486.13	1.84851	Thermal Properties		-20/-10	62	650	0.999	0.998
$n_{F'}$	479.99	1.84966			-10/0	63	600	0.999	0.998
n_g	435.84	1.85957	T_g ($^{\circ}C$)	701	0/10	63	550	0.999	0.998
n_h	404.66	1.86898	T_s ($^{\circ}C$)	745	10/20	65	500	0.998	0.995
n_i	365.01	1.88548	$T_{10}^{14.5}$ ($^{\circ}C$)	635	20/30	66	480	0.997	0.993
			T_{10}^{13} ($^{\circ}C$)	682	30/40	67	460	0.995	0.990
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	64	40/50	68	440	0.992	0.984
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	80	50/60	68	420	0.987	0.974
			λ (W/(m·K))	0.94	60/70	69	400	0.978	0.957
					70/80	70	390	0.969	0.939
			Mechanical Properties		80/90	71	380	0.956	0.913
					90/100	72	370	0.929	0.863
			HK (10^7Pa)	733	100/110	73	360	0.869	0.753
			F_A	135	110/120	73	350	0.712	0.504
			E (GPa)	122.3	120/130	74	340	0.409	0.168
			G (GPa)	46.6	130/140	76	330		
			μ	0.313	140/150	77	320		
			σ_b (MPa)	135	150/160	77	310		
			B ($10^{-12}/Pa$)	1.15			300		
							290		
							280		

Constants of Dispersion Formula	
A_0	3.27268654E+00
A_1	-1.24121074E-02
A_2	3.25240977E-02
A_3	2.80005824E-04
A_4	6.56199252E-05
A_5	-1.14502008E-06

Density		Solarization	
ρ (g/cm ³)	4.62	$\triangle\lambda$ (%)	-0.8

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	2.3	2.5	3.0	3.1	3.1	3.4	3.7	4.3	4.4	5.1
-40 ~ -20	2.4	2.6	3.1	3.1	3.2	3.5	3.7	4.3	4.4	5.1
-20 ~ 0	2.5	2.7	3.2	3.3	3.4	3.6	3.9	4.5	4.5	5.2
0 ~ 20	2.7	2.9	3.4	3.5	3.5	3.8	4.1	4.6	4.7	5.4
20 ~ 40	3.0	3.2	3.7	3.7	3.8	4.0	4.3	4.8	4.9	5.6
40 ~ 60	3.2	3.4	3.9	3.9	4.0	4.2	4.5	5.0	5.1	5.8
60 ~ 80	3.4	3.6	4.1	4.2	4.2	4.4	4.7	5.3	5.3	6.0
80 ~ 100	3.7	3.9	4.3	4.4	4.5	4.7	4.9	5.5	5.5	6.2
100 ~ 120	3.9	4.1	4.6	4.6	4.7	4.9	5.1	5.7	5.7	6.3
120 ~ 140	4.1	4.3	4.8	4.8	4.9	5.1	5.3	5.8	5.9	6.5
140 ~ 160	4.3	4.5	5.0	5.0	5.1	5.3	5.5	6.0	6.1	6.6

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	390/335
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	363/334

Constants of dn/dt		
D_0	D_1	D_2
1.17E-06	1.86E-08	-1.96E-11
E_0	E_1	λ_{TK}
6.71E-07	-3.97E-10	1.98E-01

H-ZLaF56B	806333	$n_d = 1.80610$	$v_d = 33.27$	$n_F - n_C = 0.024229$
		$n_e = 1.81184$	$v_e = 33.03$	$n_{F'} - n_{C'} = 0.024579$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.75720	$P_{d,C}$	0.2922	RC (S)	1	2400	0.931	0.867
n_{1970}	1970.09	1.76373	$P_{e,d}$	0.2369	RA (S)	1	2200	0.980	0.959
n_{1530}	1529.58	1.77128	$P_{g,F}$	0.5927	D_W	1	2000	0.992	0.984
n_{1129}	1128.64	1.77899	$P'_{d,c'}$	0.2429	D_A	2	1800	0.996	0.993
n_{1064}	1064.00	1.78055	$P'_{e,d}$	0.2335	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.78188	$P'_{g,F'}$	0.5248	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.78735			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.79134	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.79513					1000	0.998	0.996
n_C	656.27	1.79902					950	0.998	0.996
$n_{C'}$	643.85	1.80013					900	0.998	0.996
n_{He-Ne}	632.80	1.80117	$P_{F,e}$	-0.0009	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.80589	$P_{g,F}$	0.0043	-50/-40	66	800	0.998	0.996
n_d	587.56	1.80610	$P_{C,t}$	0.0061	-40/-30	70	750	0.998	0.996
n_e	546.07	1.81184	$P_{C,s}$	0.0014	-30/-20	71	700	0.998	0.996
n_F	486.13	1.82325	Thermal Properties		-20/-10	71	650	0.998	0.996
$n_{F'}$	479.99	1.82471			-10/0	72	600	0.998	0.996
n_g	435.84	1.83761	T_g ($^{\circ}C$)	669	0/10	73	550	0.996	0.994
n_h	404.66	1.85023	T_s ($^{\circ}C$)	705	10/20	74	500	0.993	0.986
n_i	365.01	1.87349	$T_{10}^{14.5}$ ($^{\circ}C$)	601	20/30	74	480	0.990	0.981
			T_{10}^{13} ($^{\circ}C$)	633	30/40	75	460	0.986	0.973
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	73	40/50	76	440	0.981	0.962
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	88	50/60	76	420	0.970	0.940
			λ (W/(m·K))	1.07	60/70	77	400	0.944	0.890
					70/80	77	390	0.915	0.836
			Mechanical Properties		80/90	78	380	0.853	0.725
					90/100	78	370	0.692	0.478
			HK (10^7Pa)	624	100/110	80	360	0.370	0.138
			F_A	119	110/120	81	350		
			E (GPa)	109.5	120/130	82	340		
			G (GPa)	41.4	130/140	83	330		
			μ	0.322	140/150	84	320		
			σ_b (MPa)	117	150/160	85	310		
			B ($10^{-12}/Pa$)	1.57			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	3.75	$\triangle\lambda$ (%)	-0.7

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	
$\lambda_{80}(\lambda_{70})/\lambda_5$	415/360
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	$n_d = 1.80000$	$v_d = 29.84$	$n_F - n_C = 0.026806$
		$n_e = 1.80633$	$v_e = 29.62$	$n_{F'} - n_{C'} = 0.027224$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.74747	$P_{d,C}$	0.2899	RC (S)	1	2400	0.945	0.893
n_{1970}	1970.09	1.75431	$P_{e,d}$	0.2361	RA (S)	1	2200	0.983	0.966
n_{1530}	1529.58	1.76226	$P_{g,F}$	0.5999	D_W	1	2000	0.996	0.992
n_{1129}	1128.64	1.77044	$P'_{d,c'}$	0.2410	D_A	1	1800	0.996	0.992
n_{1064}	1064.00	1.77212	$P'_{e,d}$	0.2325	R_{OH} (S)	1	1600	0.996	0.992
n_t	1013.98	1.77354	$P'_{g,F'}$	0.5304	RP (S)	1	1400	0.996	0.992
n_s	852.11	1.77945			CR	1	1200	0.996	0.992
$n_{A'}$	768.19	1.78380	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.996	0.992
n_r	706.52	1.78795					1000	0.996	0.992
n_C	656.27	1.79223	$P_{F,e}$	0.0000	$^{\circ}C$	α	950	0.996	0.992
$n_{C'}$	643.85	1.79344	$P_{g,F}$	0.0058	-50/-40	65	900	0.996	0.992
n_{He-Ne}	632.80	1.79459	$P_{C,t}$	0.0125	-40/-30	68	850	0.996	0.992
n_D	589.29	1.79977	$P_{C,s}$	0.0047	-30/-20	70	800	0.996	0.992
n_d	587.56	1.80000	Thermal Properties		-20/-10	71	750	0.996	0.992
n_e	546.07	1.80633			-10/0	72	700	0.996	0.992
n_F	486.13	1.81903	T_g ($^{\circ}C$)	623	0/10	73	650	0.996	0.992
$n_{F'}$	479.99	1.82067	T_s ($^{\circ}C$)	658	10/20	74	600	0.996	0.988
n_g	435.84	1.83511	$T_{10}^{14.5}$ ($^{\circ}C$)	547	20/30	75	550	0.993	0.983
n_h	404.66	1.84939	T_{10}^{13} ($^{\circ}C$)	592	30/40	75	500	0.984	0.970
n_i	365.01	1.87619	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	73	40/50	76	480	0.981	0.964
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	89	50/60	77	460	0.977	0.957
			λ (W/(m·K))	1.19	60/70	77	440	0.972	0.946
					70/80	78	420	0.964	0.927
Constants of Dispersion Formula			Mechanical Properties		80/90	78	400	0.939	0.880
					90/100	79	390	0.910	0.826
A_0	3.12168528E+00		HK (10^7Pa)	543	100/110	80	380	0.848	0.716
A_1	-1.38673767E-02		F_A	167	110/120	81	370	0.694	0.475
A_2	3.73009678E-02		E (GPa)	100.6	120/130	82	360	0.347	0.117
A_3	1.94247273E-03		G (GPa)	39.0	130/140	83	350	0.042	0.013
A_4	-9.80256201E-05		μ	0.290	140/150	84	340		
A_5	1.64841569E-05		σ_b (MPa)	83	150/160	84	330		
Density			B ($10^{-12}/Pa$)	2.52			320		
							310		
ρ (g/cm ³)	3.73						300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.85150$	$v_d = 40.78$	$n_F - n_C = 0.020880$
		$n_e = 1.85646$	$v_e = 40.53$	$n_{F'} - n_{C'} = 0.021134$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.80328	$P_{d,C}$	0.2969	RC (S)	1	2400	0.861	0.742
n_{1970}	1970.09	1.81065	$P_{e,d}$	0.2375	RA (S)	3	2200	0.972	0.945
n_{1530}	1529.58	1.81893	$P_{g,F}$	0.5694	D_W	1	2000	0.995	0.990
n_{1129}	1128.64	1.82685	$P'_{d,c'}$	0.2470	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.82837	$P'_{e,d}$	0.2347	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.82965	$P'_{g,F'}$	0.5044	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.83478			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.83842	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.84183					1000	0.999	0.998
n_C	656.27	1.84530	$P_{F,e}$	-0.0022	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.84628	$P_{g,F}$	-0.0064	-50/-40	56	900	0.999	0.998
n_{He-Ne}	632.80	1.84719	$P_{C,t}$	0.0118	-40/-30	58	850	0.999	0.998
n_D	589.29	1.85132	$P_{C,s}$	0.0056	-30/-20	60	800	0.999	0.998
n_d	587.56	1.85150	Thermal Properties		-20/-10	61	750	0.999	0.998
n_e	546.07	1.85646			-10/0	63	700	0.999	0.998
n_F	486.13	1.86618	T_g ($^{\circ}C$)	677	0/10	63	650	0.999	0.998
$n_{F'}$	479.99	1.86741	T_s ($^{\circ}C$)	701	10/20	64	600	0.999	0.998
n_g	435.84	1.87807	$T_{10}^{14.5}$ ($^{\circ}C$)	632	20/30	65	550	0.998	0.996
n_h	404.66	1.88823	T_{10}^{13} ($^{\circ}C$)	667	30/40	66	500	0.996	0.993
n_i	365.01	1.90623	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	62	40/50	66	480	0.994	0.990
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	78	50/60	67	460	0.991	0.987
			λ (W/(m·K))	1.02	60/70	67	440	0.988	0.979
					70/80	68	420	0.982	0.971
Constants of Dispersion Formula			Mechanical Properties		80/90	69	400	0.972	0.950
					90/100	70	390	0.961	0.929
A_0	3.33177670E+00		HK (10^7Pa)	720	100/110	71	380	0.942	0.893
A_1	-1.58867083E-02		F_A	68	110/120	72	370	0.906	0.829
A_2	3.20181245E-02		E (GPa)	121.8	120/130	73	360	0.827	0.693
A_3	1.14888430E-03		G (GPa)	46.4	130/140	74	350	0.666	0.451
A_4	-4.03184280E-05		μ	0.312	140/150	76	340	0.357	0.131
A_5	5.06235629E-06		σ_b (MPa)	65	150/160	77	330	0.059	0.010
Density			B ($10^{-12}/Pa$)	1.25			320		
							310		
ρ (g/cm ³)	4.72						300		
Solarization							290		
							280		
$\Delta\lambda$ (%)	-0.4								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZLaF60GT	850323	$n_d = 1.85026$	$v_d = 32.27$	$n_F - n_C = 0.026349$
		$n_e = 1.85649$	$v_e = 32.05$	$n_{F'} - n_{C'} = 0.026727$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.79843	P _{d,C}	0.2911	RC (S)	1	2400	0.942	0.882
n ₁₉₇₀	1970.09	1.80513	P _{e,d}	0.2364	RA (S)	1	2200	0.986	0.959
n ₁₅₃₀	1529.58	1.81293	P _{g,F}	0.5909	D _W	1	2000	0.993	0.985
n ₁₁₂₉	1128.64	1.82100	P' _{d,c'}	0.2421	D _A	1	1800	0.998	0.996
n ₁₀₆₄	1064.00	1.82266	P' _{e,d}	0.2331	R _{OH} (S)	1	1600	0.998	0.996
n _t	1013.98	1.82407	P' _{g,F'}	0.5231	RP (S)	2	1400	0.998	0.996
n _s	852.11	1.82993			CR	1	1200	0.998	0.996
n _{A'}	768.19	1.83424	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.998	0.996
n _r	706.52	1.83835					1000	0.998	0.996
n _C	656.27	1.84259	P _{F,e}	-0.0003	°C	α	950	0.998	0.996
n _{C'}	643.85	1.84379	P _{g,F}	0.0009	-50/-40	65	900	0.998	0.996
n _{He-Ne}	632.80	1.84491	P _{C,t}	0.0064	-40/-30	67	850	0.998	0.996
n _D	589.29	1.85003	P _{C,s}	0.0026	-30/-20	70	800	0.998	0.996
n _d	587.56	1.85026	Thermal Properties		-20/-10	71	750	0.998	0.996
n _e	546.07	1.85649			T _g (°C)	617	-10/0	71	700
n _F	486.13	1.86893			0/10	73	650	0.998	0.996
n _{F'}	479.99	1.87052			10/20	74	600	0.998	0.996
n _g	435.84	1.88450			20/30	75	550	0.996	0.994
n _h	404.66	1.89819			30/40	76	500	0.993	0.989
n _i	365.01	1.92348			40/50	77	480	0.989	0.983
					50/60	77	460	0.985	0.974
					60/70	78	440	0.979	0.960
					70/80	79	420	0.963	0.929
Constants of Dispersion Formula					80/90	80	400	0.935	0.877
					90/100	81	390	0.904	0.820
A ₀	3.30260921E+00		Mechanical Properties		100/110	82	380	0.849	0.726
A ₁	-1.39415408E-02				HK (10 ⁷ Pa)	625	90/100	81	370
A ₂	3.82606507E-02				110/120	83	360	0.476	0.231
A ₃	1.95805494E-03				120/130	84	350	0.110	0.019
A ₄	-1.07295242E-04				130/140	85	340		
A ₅	1.47824013E-05				140/150	86	330		
Density					150/160	87	320		
							310		
Solarization							300		
							290		
ρ (g/cm ³)	4.00						280		
Range of Temperature	Temperature Coefficients of Refractive Index								
	dn/dt relative (×10 ⁻⁶ / °C)								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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		v _d = 32.27		n _F – n _C = 0.026349											
					n _e = 1.85649		v _e = 32.05		n _F – n _C ′ = 0.026727											
Refractive Indices					Relative Partial Dispersion			Chemical Properties (grade)			Internal Transmittance									
	λ (nm)		n _λ											λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅		2325.42				P _{d,C}		0.2911		RC (S)		1		2400		0.969		0.939		
n ₁₉₇₀		1970.09				P _{e,d}		0.2364		RA (S)		1		2200		0.987		0.974		
n ₁₅₃₀		1529.58				P _{g,F}		0.5928		D _W		1		2000		0.995		0.989		
n ₁₁₂₉		1128.64		1.82128		P _{d,c} ′		0.2421		D _A		1		1800		0.997		0.993		
n ₁₀₆₄		1064.00		1.82287		P _{e,d} ′		0.2331		R _{OH} (S)		1		1600		0.999		0.998		
n _t		1013.98		1.82426		P _{g,F} ′		0.5249		RP (S)		1		1400		0.999		0.998		
n _s		852.11		1.83001						CR		1		1200		0.999		0.998		
n _A ′		768.19		1.83428										1060		0.999		0.998		
n _r		706.52		1.83837		Deviation of Relative Partial Dispersions				Expansion Coefficient α (×10 ⁻⁷ /K)				1000		0.999		0.998		
n _C		656.27		1.84259										ΔP _{F,e}		-0.0003		°C		α
n _C ′		643.85		1.84379		ΔP _{g,F}		0.0028		-50/-40		57		900		0.999		0.998		
n _{He-Ne}		632.80		1.84491		ΔP _{C,t}		-0.0008		-40/-30		59		850		0.999		0.998		
n _D		589.29		1.85003		ΔP _{C,s}		-0.0004		-30/-20		60		800		0.999		0.998		
n _d		587.56		1.85026		Thermal Properties				-20/-10		60		750		0.999		0.998		
n _e		546.07		1.85649						Tg (°C)		743		-10/0		64		600		0.998
n _F		486.13		1.86893		Ts (°C)		795		0/10		64		550		0.996		0.993		
n _F ′		479.99		1.87052		T ₁₀ ^{14.5} (°C)		682		10/20		65		500		0.990		0.980		
n _g		435.84		1.88455		T ₁₀ ¹³ (°C)		704		20/30		65		480		0.986		0.972		
n _h		404.66		1.89826		α _{-50/80°C} (10 ⁻⁷ /K)		65		30/40		65		460		0.980		0.961		
n _i		365.01		1.92358		α _{100/300°C} (10 ⁻⁷ /K)		79		40/50		66		440		0.971		0.944		
						λ (W/(m·K))		0.87		50/60		66		420		0.954		0.910		
										60/70		68		400		0.913		0.833		
Constants of Dispersion Formula											70/80		69		390		0.872		0.761	
													80/90		69		380		0.797	
A ₀		3.30037670E+00			HK (10 ⁷ Pa)		603		90/100		71		370		0.640		0.410			
A ₁		-1.19927180E-02			F _A		147		100/110		71		360		0.355		0.126			
A ₂		3.94905653E-02			E (GPa)		111.4		110/120		72		350							
A ₃		1.56664097E-03			G (GPa)		42.9		120/130		75		340							
A ₄		-4.50656039E-05			μ		0.299		130/140		76		330							
A ₅		1.12714689E-05			σ _b (MPa)		118		140/150		76		320							
					B (10 ⁻¹² /Pa)		1.76		150/160		79		310							
													300							
													290							
													280							
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code								
		dn/dt relative (×10 ⁻⁶ / °C)														λ ₈₀ (λ ₇₀)/λ ₅		(400)/360		
		t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance								
-60 ~ -40		2.5	2.8	3.1	3.2	3.4	3.8	4.3	4.9	5.2	6.3					λτ ₈₀ /λτ ₅		395/357		
-40 ~ -20		2.5	2.8	3.2	3.3	3.4	3.9	4.5	5.1	5.3	6.6	Constants of dn/dt								
-20 ~ 0		2.7	3.0	3.3	3.4	3.6	4.2	4.7	5.3	5.6	6.8					D ₀		D ₁		D ₂
0 ~ 20		2.7	3.0	3.4	3.5	3.6	4.2	4.8	5.5	5.7	7.1	6.73E-07		1.31E-08		-2.05E-11				
20 ~ 40		2.8	3.2	3.6	3.7	3.8	4.4	5.0	5.7	5.9	7.3	E ₀		E ₁		λ _{TK}				
40 ~ 60		2.8	3.3	3.7	3.7	3.8	4.5	5.2	5.9	6.1	7.6	8.31E-07		7.05E-10		2.74E-01				
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									

H-ZLaF64	871407	$n_d = 1.87070$	$v_d = 40.73$	$n_F - n_C = 0.021378$
		$n_e = 1.87578$	$v_e = 40.48$	$n_F - n_{C'} = 0.021636$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2966	RC (S)	1	2400	0.900	0.810
n_{1970}	1970.09		$P_{e,d}$	0.2376	RA (S)	1	2200	0.973	0.947
n_{1530}	1529.58		$P_{g,F}$	0.5683	D_W	1	2000	0.988	0.976
n_{1129}	1128.64		$P'_{d,c'}$	0.2468	D_A	2	1800	0.996	0.993
n_{1064}	1064.00		$P'_{e,d}$	0.2348	R_{OH} (S)	1	1600	0.998	0.997
n_t	1013.98	1.84858	$P'_{g,F'}$	0.5033	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.85367			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.85735	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.86082					1000	0.999	0.998
n_C	656.27	1.86436					950	0.999	0.998
$n_{C'}$	643.85	1.86536					900	0.999	0.998
n_{He-Ne}	632.80	1.86629	$P_{F,e}$	-0.0023	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.87052	$P_{g,F}$	-0.0076	-50/-40	62	800	0.999	0.998
n_d	587.56	1.87070	$P_{C,t}$	0.0007	-40/-30	62	750	0.999	0.998
n_e	546.07	1.87578	$P_{C,s}$	0.0019	-30/-20	63	700	0.999	0.998
n_F	486.13	1.88573	Thermal Properties		-20/-10	66	650	0.999	0.998
$n_{F'}$	479.99	1.88699			-10/0	67	600	0.999	0.998
n_g	435.84	1.89788			0/10	67	550	0.998	0.997
n_h	404.66	1.90822			10/20	69	500	0.996	0.992
n_i	365.01	1.92642			20/30	70	480	0.993	0.986
					30/40	71	460	0.989	0.979
			T_g ($^{\circ}C$)	719	40/50	72	440	0.985	0.970
			T_s ($^{\circ}C$)	746	50/60	72	420	0.978	0.957
			$T_{10}^{14.5}$ ($^{\circ}C$)	689	60/70	72	400	0.966	0.933
			T_{10}^{13} ($^{\circ}C$)	706	70/80	73	390	0.954	0.911
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	68	80/90	75	380	0.934	0.873
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	84	90/100	76	370	0.902	0.814
			λ (W/(m·K))	0.88	100/110	76	360	0.853	0.727
					110/120	77	350	0.773	0.598
			Mechanical Properties		120/130	77	340	0.645	0.416
					130/140	80	330	0.427	0.182
					140/150	81	320	0.164	0.027
					150/160	83	310		
			μ	0.316			300		
			σ_b (MPa)	116			290		
			B ($10^{-12}/Pa$)	0.90			280		

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		Solarization	
ρ (g/cm ³)	4.84	$\triangle\lambda$ (%)	-0.8

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.87408$	$v_d = 30.55$	$n_F - n_C = 0.028610$
		$n_e = 1.88085$	$v_e = 30.34$	$n_{F'} - n_{C'} = 0.029035$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42	1.82063	P _{d,C}	0.2894	RC (S)	1	2400	0.928	0.861				
n ₁₉₇₀	1970.09	1.82703	P _{e,d}	0.2366	RA (S)	1	2200	0.982	0.964				
n ₁₅₃₀	1529.58	1.83463	P _{g,F}	0.6012	D _W	1	2000	0.997	0.994				
n ₁₁₂₉	1128.64	1.84284	P' _{d,c'}	0.2404	D _A	3	1800	0.997	0.994				
n ₁₀₆₄	1064.00	1.84457	P' _{e,d}	0.2332	R _{OH} (S)	1	1600	0.997	0.994				
n _t	1013.98	1.84606	P' _{g,F'}	0.5328	RP (S)	2	1400	0.997	0.994				
n _s	852.11	1.85226			CR		1200	0.997	0.994				
n _{A'}	768.19	1.85685	Deviation of Relative Partial Dispersions				1060	0.997	0.994				
n _r	706.52	1.86126					1000	0.997	0.994				
n _C	656.27	1.86580	P _{F,e}	0.0006	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.997	0.994				
n _{C'}	643.85	1.86710	P _{g,F}	0.0083			°C	α	900	0.997	0.994		
n _{He-Ne}	632.80	1.86830	P _{C,t}	0.0018	-50/-40	73	850	0.997	0.994				
n _D	589.29	1.87384	P _{C,s}	-0.0005	-40/-30	76	800	0.997	0.994				
n _d	587.56	1.87408	Thermal Properties			-30/-20	78	750	0.997	0.994			
n _e	546.07	1.88085				-20/-10	80	700	0.997	0.994			
n _F	486.13	1.89441	T _g (°C)	665	-10/0	81	650	0.997	0.994				
n _{F'}	479.99	1.89614	T _s (°C)	697	0/10	82	600	0.995	0.990				
n _g	435.84	1.91161	T ₁₀ ^{14.5} (°C)	625	10/20	83	550	0.993	0.985				
n _h	404.66	1.92693	T ₁₀ ¹³ (°C)	651	20/30	84	500	0.985	0.967				
n _i	365.01	1.95549	α _{-50/80°C} (10 ⁻⁷ /K)	82	30/40	85	480	0.979	0.956				
			α _{100/300°C} (10 ⁻⁷ /K)	98	40/50	85	460	0.973	0.943				
			λ (W/(m·K))	0.67	50/60	86	440	0.964	0.926				
					60/70	86	420	0.944	0.892				
Constants of Dispersion Formula			Mechanical Properties			70/80	87	400	0.896	0.805			
						80/90	88	390	0.846	0.718			
A ₀	3.37787954E+00		HK (10 ⁷ Pa)	545	90/100	89	380	0.750	0.568				
A ₁	-1.31762604E-02		F _A	136	100/110	90	370	0.555	0.316				
A ₂	4.34183952E-02		E (GPa)	124.8	110/120	92	360	0.213	0.051				
A ₃	1.40530101E-03		G (GPa)	47.6	120/130	92	350						
A ₄	2.38841484E-05		μ	0.310	130/140	93	340						
A ₅	1.02947705E-05		σ _b (MPa)		140/150	94	330						
Density		Solarization		B (10 ⁻¹² /Pa)	1.28		320						
ρ (g/cm ³)	4.55	△λ (%)	-0.7				310						
							300						
Range of Temperature							Temperature Coefficients of Refractive Index				290		
							dn/dt relative (×10 ⁻⁶ / °C)				280		

H-ZLaF66A	801350	n _d = 1.80100	v _d = 34.97	n _F − n _C = 0.022907
		n _e = 1.80642	v _e = 34.72	n _F − n _{C'} = 0.023227

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42	1.75440	P _{d,C}	0.2938	RC (S)	1	2400	0.936	0.876				
n ₁₉₇₀	1970.09	1.76062	P _{e,d}	0.2366	RA (S)	1	2200	0.979	0.958				
n ₁₅₃₀	1529.58	1.76782	P _{g,F}	0.5876	D _W	1	2000	0.991	0.983				
n ₁₁₂₉	1128.64	1.77518	P' _{d,c'}	0.2441	D _A	2	1800	0.996	0.992				
n ₁₀₆₄	1064.00	1.77667	P' _{e,d}	0.2333	R _{OH} (S)	1	1600	0.998	0.996				
n _t	1013.98	1.77795	P' _{g,F'}	0.5205	RP (S)	1	1400	0.998	0.996				
n _s	852.11	1.78317			CR	1	1200	0.998	0.996				
n _{A'}	768.19	1.78697	Deviation of Relative Partial Dispersions				1060	0.998	0.996				
n _r	706.52	1.79058					Expansion Coefficient α (×10 ⁻⁷ /K)				1000	0.998	0.996
n _C	656.27	1.79427					°Cα				950	0.998	0.996
n _{C'}	643.85	1.79533									900		
n _{He-Ne}	632.80	1.79632	P _{F,e}	-0.0012	-50/-40	66	850	0.998	0.996				
n _D	589.29	1.80079	P _{g,F}	0.0021	-40/-30	69	800	0.998	0.996				
n _d	587.56	1.80100	P _{C,t}	0.0029	-30/-20	71	750	0.998	0.996				
n _e	546.07	1.80642	P _{C,s}	0.0002	-20/-10	72	700	0.998	0.996				
n _F	486.13	1.81718	Thermal Properties		-10/0	74	650	0.998	0.996				
n _{F'}	479.99	1.81855			Tg (°C)	677	0/10	74	600	0.998	0.996		
n _g	435.84	1.83064			Ts (°C)	719	10/20	75	550	0.997	0.994		
n _h	404.66	1.84242			T ₁₀ ^{14.5} (°C)	618	20/30	76	500	0.994	0.989		
n _i	365.01	1.86397			T ₁₀ ¹³ (°C)	668	30/40	77	480	0.991	0.983		
					α _{-50/80°C} (10 ⁻⁷ /K)	76	40/50	78	460	0.987	0.975		
					α _{100/300°C} (10 ⁻⁷ /K)	93	440	0.982	0.963				
					λ (W/(m·K))	1.15	420	0.970	0.942				
							400	0.946	0.895				
Constants of Dispersion Formula					60/70	79	390	0.920	0.845				
					70/80	79	380	0.866	0.751				
A ₀	3.14021962E+00	Mechanical Properties		80/90	80	370	0.748	0.558					
A ₁	-1.26812790E-02			90/100	81	360	0.491	0.241					
A ₂	3.37217299E-02			100/110	82	350	0.155	0.024					
A ₃	1.19133791E-03			110/120	83	340							
A ₄	-2.03909360E-05			120/130	85	330							
A ₅	7.64423823E-06			130/140	86	320							
Density		Solarization		140/150	87	310							
ρ (g/cm ³)	3.76	△λ (%)	-1.3	150/160	88	300							
Range of Temperature	Temperature Coefficients of Refractive Index						290						
	dn/dt relative (×10 ⁻⁶ / °C)						280						

Coloration Code		
λ ₈₀ (λ ₇₀)/λ ₅		425/355
Coloration of Internal Transmittance		
λτ ₈₀ /λτ 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	$n_d = 1.88100$	$v_d = 40.13$	$n_F - n_C = 0.021952$
		$n_e = 1.88622$	$v_e = 39.90$	$n_{F'} - n_{C'} = 0.022209$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.83527	$P_{d,C}$	0.2961	RC (S)	1	2400	0.945	0.893
n_{1970}	1970.09	1.84141	$P_{e,d}$	0.2378	RA (S)	2	2200	0.980	0.972
n_{1530}	1529.58	1.84851	$P_{g,F}$	0.5699	D_W	1	2000	0.994	0.989
n_{1129}	1128.64	1.85576	$P'_{d,c'}$	0.2467	D_A	2	1800	0.999	0.998
n_{1064}	1064.00	1.85723	$P'_{e,d}$	0.2350	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.85849	$P'_{g,F'}$	0.5057	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.86362			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.86735	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.87088					1000	0.999	0.998
n_C	656.27	1.87450					950	0.999	0.998
$n_{C'}$	643.85	1.87552					900	0.999	0.998
n_{He-Ne}	632.80	1.87648	$P_{F,e}$	-0.0020	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.88081	$P_{g,F}$	-0.0071	-50/-40	64	800	0.999	0.998
n_d	587.56	1.88100	$P_{C,t}$	-0.0053	-40/-30	66	750	0.999	0.998
n_e	546.07	1.88622	$P_{C,s}$	-0.0011	-30/-20	68	700	0.999	0.998
n_F	486.13	1.89645	Thermal Properties		-20/-10	69	650	0.999	0.998
$n_{F'}$	479.99	1.89773			-10/0	70	600	0.999	0.998
n_g	435.84	1.90896			0/10	71	550	0.999	0.998
n_h	404.66	1.91961			10/20	73	500	0.994	0.989
n_i	365.01	1.93853	T_g ($^{\circ}C$)	715	20/30	74	480	0.990	0.981
			T_s ($^{\circ}C$)	754	30/40	74	460	0.985	0.969
			$T_{10}^{14.5}$ ($^{\circ}C$)	647	40/50	75	440	0.977	0.956
			T_{10}^{13} ($^{\circ}C$)	677	50/60	75	420	0.970	0.940
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	71	60/70	76	400	0.950	0.903
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	86	70/80	76	390	0.928	0.862
			λ (W/(m·K))	0.84	80/90	77	380	0.891	0.794
					90/100	78	370	0.839	0.704
Constants of Dispersion Formula			Mechanical Properties		100/110	79	360	0.753	0.567
					110/120	80	350	0.604	0.364
A_0	3.43263393E+00				120/130	81	340	0.361	0.130
A_1	-1.31007856E-02				130/140	82	330	0.102	0.010
A_2	3.45483476E-02		HK (10^7Pa)	710	140/150	84	320		
A_3	1.34177704E-03		F_A	71	150/160	85	310		
A_4	-7.37786129E-05		E (GPa)	122.0			300		
A_5	7.34356017E-06		G (GPa)	46.9			290		
			μ	0.300			280		
			σ_b (MPa)	92					
			B ($10^{-12}/Pa$)	1.09					
Density		Solarization							
ρ (g/cm ³)	5.20	$\triangle\lambda$ (%)	-0.5						

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.88300$	$v_d = 40.79$	$n_F - n_C = 0.021645$
		$n_e = 1.88815$	$v_e = 40.56$	$n_{F'} - n_{C'} = 0.021897$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$	
n_{2325}	2325.42	1.83774	$P_{d,C}$	0.2971	RC (S)	1	2400	0.949	0.900	
n_{1970}	1970.09	1.84375	$P_{e,d}$	0.2379	RA (S)	1	2200	0.993	0.985	
n_{1530}	1529.58	1.85077	$P_{g,F}$	0.5692	D_W	1	2000	0.999	0.998	
n_{1129}	1128.64	1.85799	$P'_{d,c'}$	0.2475	D_A	2	1800	0.999	0.998	
n_{1064}	1064.00	1.85944	$P'_{e,d}$	0.2352	$R_{OH}(S)$	1	1600	0.999	0.998	
n_t	1013.98	1.86069	$P'_{g,F'}$	0.5046	RP (S)	1	1400	0.999	0.998	
n_s	852.11	1.86579			CR	1	1200	0.999	0.998	
$n_{A'}$	768.19	1.86950	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998	
n_r	706.52	1.87299					1000	0.999	0.998	
n_C	656.27	1.87657					950	0.999	0.998	
$n_{C'}$	643.85	1.87758					900	0.999	0.998	
n_{He-Ne}	632.80	1.87853					850	0.999	0.998	
n_D	589.29	1.88281	$P_{F,e}$	-0.0029	$^{\circ}C$	α	800	0.999	0.998	
n_d	587.56	1.88300	$P_{g,F}$	-0.0067	-50/-40	61	750	0.999	0.998	
n_e	546.07	1.88815	$P_{C,t}$	-0.0041	-40/-30	62	700	0.999	0.998	
n_F	486.13	1.89821	$P_{C,s}$	-0.0003	-30/-20	64	650	0.999	0.998	
$n_{F'}$	479.99	1.89948	Thermal Properties		-20/-10	65	600	0.999	0.998	
n_g	435.84	1.91053	Tg ($^{\circ}C$)		698	-10/0	66	550	0.997	0.995
n_h	404.66	1.92097	Ts ($^{\circ}C$)		746	0/10	67	500	0.994	0.992
n_i	365.01	1.93924	$T_{10}^{14.5}$ ($^{\circ}C$)		629	10/20	68	480	0.991	0.989
			T_{10}^{13} ($^{\circ}C$)		667	20/30	69	460	0.988	0.985
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)		68	30/40	70	440	0.984	0.981
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)		83	40/50	70			

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		Solarization	
ρ (g/cm ³)	5.47	$\Delta\lambda$ (%)	-2.1

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.88300$	$v_d = 39.22$	$n_F - n_C = 0.022515$
		$n_e = 1.88835$	$v_e = 38.97$	$n_{F'} - n_{C'} = 0.022798$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2954	RC (S)	1	2400	0.898	0.807
n_{1970}	1970.09		$P_{e,d}$	0.2376	RA (S)	1	2200	0.970	0.940
n_{1530}	1529.58	1.84942	$P_{g,F}$	0.5698	D_W	1	2000	0.988	0.976
n_{1129}	1128.64	1.85707	$P'_{d,c'}$	0.2456	D_A	2	1800	0.995	0.991
n_{1064}	1064.00	1.85859	$P'_{e,d}$	0.2347	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.85990	$P'_{g,F'}$	0.5049	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.86519			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.86902	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.87265					1000	0.999	0.998
n_C	656.27	1.87635					950	0.999	0.998
$n_{C'}$	643.85	1.87740					900	0.999	0.998
n_{He-Ne}	632.80	1.87837	$P_{F,e}$	-0.0013	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.88281	$P_{g,F}$	-0.0086	-50/-40	63	800	0.999	0.998
n_d	587.56	1.88300	$P_{C,t}$	0.0005	-40/-30	65	750	0.999	0.998
n_e	546.07	1.88835	$P_{C,s}$	0.0011	-30/-20	67	700	0.999	0.998
n_F	486.13	1.89887	Thermal Properties		-20/-10	68	650	0.999	0.998
$n_{F'}$	479.99	1.90019			-10/0	69	600	0.999	0.998
n_g	435.84	1.91170	T_g ($^{\circ}C$)	720	0/10	70	550	0.998	0.996
n_h	404.66	1.92270	T_s ($^{\circ}C$)	748	10/20	71	500	0.995	0.990
n_i	365.01	1.94220	$T_{10}^{14.5}$ ($^{\circ}C$)	673	20/30	72	480	0.991	0.983
			T_{10}^{13} ($^{\circ}C$)	703	30/40	73	460	0.987	0.975
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	71	40/50	73	440	0.982	0.964
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	83	50/60	74	420	0.974	0.949
			λ (W/(m·K))	0.78	60/70	75	400	0.957	0.915
					70/80	76	390	0.939	0.881
			Mechanical Properties		80/90	77	380	0.910	0.828
					90/100	78	370	0.861	0.741
			HK (10^7Pa)	700	100/110	79	360	0.771	0.594
			F_A	74	110/120	80	350	0.605	0.366
			E (GPa)	124.4	120/130	81	340	0.333	0.111
			G (GPa)	46.7	130/140	82	330		
			μ	0.333	140/150	84	320		
			σ_b (MPa)	125	150/160	85	310		
			B ($10^{-12}/Pa$)	0.93			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	5.12	$\triangle\lambda$ (%)	-0.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.90366$	$v_d = 31.32$	$n_F - n_C = 0.028857$
		$n_e = 1.91048$	$v_e = 31.08$	$n_{F'} - n_{C'} = 0.029295$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.84663	$P_{d,C}$	0.2911	RC (S)	1	2400	0.904	0.817
n_{1970}	1970.09	1.85408	$P_{e,d}$	0.2363	RA (S)	2	2200	0.979	0.958
n_{1530}	1529.58	1.86274	$P_{g,F}$	0.5947	D_W	1	2000	0.998	0.996
n_{1129}	1128.64	1.87166	$P'_{d,c'}$	0.2420	D_A	2	1800	0.998	0.996
n_{1064}	1064.00	1.87348	$P'_{e,d}$	0.2328	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.87504	$P'_{g,F'}$	0.5260	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.88144			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.88615	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.89065					1000	0.998	0.996
n_C	656.27	1.89526	$P_{F,e}$	-0.0002	$^{\circ}C$	α	950	0.998	0.996
$n_{C'}$	643.85	1.89657	$P_{g,F}$	0.0031	-50/-40	59	900	0.998	0.996
n_{He-Ne}	632.80	1.89781	$P_{C,t}$	0.0088	-40/-30	61	850	0.998	0.996
n_D	589.29	1.90341	$P_{C,s}$	0.0033	-30/-20	62	800	0.998	0.996
n_d	587.56	1.90366	Thermal Properties		-20/-10	64	750	0.998	0.996
n_e	546.07	1.91048			-10/0	65	700	0.998	0.996
n_F	486.13	1.92412	T_g ($^{\circ}C$)	679	0/10	66	650	0.998	0.996
$n_{F'}$	479.99	1.92587	T_s ($^{\circ}C$)	707	10/20	66	600	0.998	0.996
n_g	435.84	1.94128	$T_{10}^{14.5}$ ($^{\circ}C$)	595	20/30	67	550	0.996	0.994
n_h	404.66	1.95645	T_{10}^{13} ($^{\circ}C$)	643	30/40	68	500	0.990	0.984
n_i	365.01	1.98472	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	66	40/50	68	480	0.984	0.977
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	82	50/60	69	460	0.977	0.969
			λ (W/(m·K))	1.04	60/70	70	440	0.968	0.954
					70/80	70	420	0.950	0.927
Constants of Dispersion Formula			Mechanical Properties		80/90	71	400	0.914	0.859
					90/100	71	390	0.874	0.784
A_0	3.48854243E+00		HK (10^7Pa)	640	100/110	73	380	0.790	0.635
A_1	-1.59982726E-02		F_A	80	110/120	74	370	0.591	0.348
A_2	4.28443509E-02		E (GPa)	117.6	120/130	75	360	0.229	0.053
A_3	2.18903241E-03		G (GPa)	45.6	130/140	76	350		
A_4	-1.15672643E-04		μ	0.288	140/150	77	340		
A_5	1.78697063E-05		σ_b (MPa)	63	150/160	77	330		
Density		Solarization		B ($10^{-12}/Pa$)	2.01		320		
ρ (g/cm ³)	4.54						310		
							300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.90366$	$v_d = 31.32$	$n_F - n_C = 0.028857$
		$n_e = 1.91048$	$v_e = 31.08$	$n_F - n_{C'} = 0.029295$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.84663	$P_{d,C}$	0.2911	RC (S)	1	2400	0.867	0.751
n_{1970}	1970.09	1.85408	$P_{e,d}$	0.2363	RA (S)	2	2200	0.947	0.897
n_{1530}	1529.58	1.86274	$P_{g,F}$	0.5947	D_W	1	2000	0.982	0.964
n_{1129}	1128.64	1.87166	$P'_{d,c'}$	0.2420	D_A	2	1800	0.992	0.984
n_{1064}	1064.00	1.87348	$P'_{e,d}$	0.2328	R_{OH} (S)	1	1600	0.997	0.995
n_t	1013.98	1.87504	$P'_{g,F'}$	0.5260	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.88144			CR	1	1200	0.999	0.997
$n_{A'}$	768.19	1.88615	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.89065					1000	0.999	0.998
n_C	656.27	1.89526					950	0.999	0.998
$n_{C'}$	643.85	1.89657					900	0.999	0.998
n_{He-Ne}	632.80	1.89781	$P_{F,e}$	-0.0002	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.90341	$P_{g,F}$	0.0031	-50/-40	59	800	0.999	0.998
n_d	587.56	1.90366	$P_{C,t}$	0.0088	-40/-30	61	750	0.999	0.998
n_e	546.07	1.91048	$P_{C,s}$	0.0033	-30/-20	62	700	0.999	0.998
n_F	486.13	1.92412	Thermal Properties		-20/-10	64	650	0.999	0.998
$n_{F'}$	479.99	1.92587			-10/0	65	600	0.998	0.997
n_g	435.84	1.94128			0/10	66	550	0.997	0.995
n_h	404.66	1.95645			10/20	66	500	0.994	0.988
n_i	365.01	1.98472	T_g ($^{\circ}C$)	679	20/30	67	480	0.991	0.983
			T_s ($^{\circ}C$)	707	30/40	68	460	0.987	0.975
			$T_{10}^{14.5}$ ($^{\circ}C$)	595	40/50	68	440	0.982	0.964
			T_{10}^{13} ($^{\circ}C$)	643	50/60	69	420	0.971	0.942
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	66	60/70	70	400	0.941	0.886
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	82	70/80	70	390	0.904	0.817
			λ (W/(m·K))	1.04	80/90	71	380	0.817	0.668
					90/100	71	370	0.611	0.374
Constants of Dispersion Formula			Mechanical Properties		100/110	73	360	0.268	0.073
					110/120	74	350		
A_0	3.48854243E+00				120/130	75	340		
A_1	-1.59982726E-02				130/140	76	330		
A_2	4.28443509E-02		HK (10^7Pa)	640	140/150	77	320		
A_3	2.18903241E-03		F_A	80	150/160	77	310		
A_4	-1.15672643E-04		E (GPa)	117.6			300		
A_5	1.78697063E-05		G (GPa)	45.6			290		
			μ	0.288			280		
			σ_b (MPa)	63					
			B ($10^{-12}/Pa$)	2.01					
Density		Solarization							
ρ (g/cm ³)	4.54	$\triangle\lambda$ (%)	-0.4						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.90366$	$v_d = 31.32$	$n_F - n_C = 0.028857$
		$n_e = 1.91048$	$v_e = 31.08$	$n_{F'} - n_{C'} = 0.029295$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2911	RC (S)	1	2400	0.871	0.758
n_{1970}	1970.09		$P_{e,d}$	0.2363	RA (S)	1	2200	0.959	0.919
n_{1530}	1529.58		$P_{g,F}$	0.5967	D_W	1	2000	0.983	0.966
n_{1129}	1128.64	1.87171	$P'_{d,c'}$	0.2420	D_A	2	1800	0.994	0.988
n_{1064}	1064.00	1.87351	$P'_{e,d}$	0.2328	$R_{OH}(S)$	1	1600	0.998	0.996
n_t	1013.98	1.87507	$P'_{g,F'}$	0.5281	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.88146			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.88615	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.89064					1000	0.999	0.998
n_C	656.27	1.89526	$P_{F,e}$	-0.0002	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.89657	$P_{g,F}$	0.0052	-50/-40	62	900	0.999	0.998
n_{He-Ne}	632.80	1.89779	$P_{C,t}$	0.0078	-40/-30	63	850	0.999	0.998
n_D	589.29	1.90340	$P_{C,s}$	0.0027	-30/-20	64	800	0.999	0.998
n_d	587.56	1.90366	Thermal Properties		-20/-10	65	750	0.999	0.998
n_e	546.07	1.91048			-10/0	67	700	0.999	0.998
n_F	486.13	1.92412	T_g ($^{\circ}C$)	684	0/10	68	650	0.999	0.998
$n_{F'}$	479.99	1.92587	T_s ($^{\circ}C$)	708	10/20	68	600	0.999	0.997
n_g	435.84	1.94134	$T_{10}^{14.5}$ ($^{\circ}C$)	560	20/30	70	550	0.998	0.995
n_h	404.66	1.95653	T_{10}^{13} ($^{\circ}C$)	648	30/40	70	500	0.993	0.986
n_i	365.01	1.98473	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	68	40/50	71	480	0.990	0.980
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	85	50/60	73	460	0.984	0.969
			λ (W/(m·K))	0.91	60/70	73	440	0.974	0.949
					70/80	74	420	0.954	0.910
Constants of Dispersion Formula			Mechanical Properties		80/90	75	400	0.901	0.812
					90/100	76	390	0.839	0.704
A_0	3.48732094E+00		HK (10^7Pa)	690	100/110	76	380	0.713	0.508
A_1	-1.53300569E-02		F_A	131	110/120	79	370	0.471	0.222
A_2	4.38552114E-02		E (GPa)	121.8	120/130	79	360	0.160	0.026
A_3	1.76295737E-03		G (GPa)	46.7	130/140	80	350		
A_4	-3.48293322E-05		μ	0.302	140/150	81	340		
A_5	1.26414315E-05		σ_b (MPa)	99	150/160	83	330		
Density		Solarization		B ($10^{-12}/Pa$)	1.20		320		
ρ (g/cm ³)	4.53						310		
		$\triangle\lambda$ (%)	-0.9				300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZLaF71	901313	$n_d = 1.90056$	$v_d = 31.25$	$n_F - n_C = 0.028820$
		$n_e = 1.90737$	$v_e = 31.02$	$n_{F'} - n_{C'} = 0.029250$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2915	RC (S)	1	2400	0.898	0.807
n_{1970}	1970.09		$P_{e,d}$	0.2363	RA (S)	1	2200	0.968	0.937
n_{1530}	1529.58		$P_{g,F}$	0.5940	D_W	1	2000	0.988	0.976
n_{1129}	1128.64	1.86868	$P'_{d,c'}$	0.2424	D_A	2	1800	0.996	0.992
n_{1064}	1064.00	1.87048	$P'_{e,d}$	0.2328	$R_{OH}(S)$	1	1600	0.998	0.996
n_t	1013.98	1.87202	$P'_{g,F'}$	0.5258	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.87839			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.88308	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.88756					1000	0.999	0.998
n_C	656.27	1.89216					950	0.999	0.998
$n_{C'}$	643.85	1.89347					900	0.999	0.998
n_{He-Ne}	632.80	1.89471	$P_{F,e}$	-0.0007	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.90031	$P_{g,F}$	0.0023	-50/-40	49	800	0.999	0.998
n_d	587.56	1.90056	$P_{C,t}$	0.0073	-40/-30	51	750	0.999	0.998
n_e	546.07	1.90737	$P_{C,s}$	0.0024	-30/-20	52	700	0.999	0.998
n_F	486.13	1.92098	Thermal Properties		-20/-10	53	650	0.999	0.998
$n_{F'}$	479.99	1.92272			-10/0	54	600	0.998	0.996
n_g	435.84	1.93810			0/10	55	550	0.995	0.990
n_h	404.66	1.95321			10/20	55	500	0.986	0.973
n_i	365.01	1.98128	T_g ($^{\circ}C$)	628	20/30	56	480	0.980	0.960
			T_s ($^{\circ}C$)	669	30/40	57	460	0.970	0.941
			$T_{10}^{14.5}$ ($^{\circ}C$)	576	40/50	59	440	0.953	0.908
			T_{10}^{13} ($^{\circ}C$)	601	50/60	60	420	0.919	0.845
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	56	60/70	61	400	0.841	0.707
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	72	70/80	61	390	0.762	0.580
			λ (W/(m·K))	1.01	80/90	62	380	0.625	0.391
					90/100	63	370	0.407	0.165
Constants of Dispersion Formula			Mechanical Properties		100/110	63	360	0.143	0.020
					110/120	64	350		
A_0	3.47712019E+00				120/130	65	340		
A_1	-1.55817118E-02				130/140	67	330		
A_2	4.24591568E-02		HK (10^7Pa)	726	140/150	68	320		
A_3	2.29943116E-03		F_A	116	150/160	69	310		
A_4	-1.31276838E-04		E (GPa)	122.2			300		
A_5	1.81883661E-05		G (GPa)	46.4			290		
Density			μ	0.316			280		
			σ_b (MPa)	120					
ρ (g/cm ³)	4.50		B ($10^{-12}/Pa$)	1.96					
Solarization									
			$\Delta\lambda$ (%)	-0.9					

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	5.4	5.7	6.3	6.4	6.5	6.8	7.2	8.2	8.3	9.6
-40 ~ -20	5.7	6.0	6.6	6.7	6.8	7.1	7.6	8.6	8.7	10.1
-20 ~ 0	6.0	6.3	7.0	7.1	7.2	7.5	8.0	9.0	9.1	10.6
0 ~ 20	6.4	6.7	7.4	7.5	7.6	7.9	8.4	9.5	9.6	11.1
20 ~ 40	6.8	7.0	7.8	7.9	8.0	8.4	8.8	9.9	10.1	11.6
40 ~ 60	7.1	7.4	8.2	8.3	8.4	8.8	9.3	10.4	10.6	12.2
60 ~ 80	7.5	7.8	8.6	8.7	8.8	9.2	9.7	10.9	11.1	12.7
80 ~ 100	7.8	8.1	8.9	9.1	9.1	9.6	10.1	11.3	11.5	13.2
100 ~ 120	8.1	8.4	9.3	9.4	9.5	9.9	10.5	11.7	11.9	13.6
120 ~ 140	8.4	8.7	9.6	9.7	9.8	10.2	10.8	12.1	12.3	14.1
140 ~ 160	8.6	8.9	9.9	10.0	10.1	10.5	11.1	12.4	12.6	14.5

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(420)/365
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	412/362

Constants of dn/dt		
D ₀	D ₁	D ₂
6.48E-06	2.19E-08	-3.00E-11
E ₀	E ₁	λ_{TK}
7.26E-07	6.11E-10	2.92E-01

H-ZLaF72	911353	$n_d = 1.91082$	$v_d = 35.25$	$n_F - n_C = 0.025839$
		$n_e = 1.91695$	$v_e = 35.01$	$n_F - n_{C'} = 0.026194$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.85959	P _{d,C}	0.2937	RC (S)	1	2400	0.931	0.867		
n ₁₉₇₀	1970.09	1.86612	P _{e,d}	0.2372	RA (S)	1	2200	0.987	0.974		
n ₁₅₃₀	1529.58	1.87377	P _{g,F}	0.5836	D _W	1	2000	0.997	0.994		
n ₁₁₂₉	1128.64	1.88177	P' _{d,c'}	0.2439	D _A	1	1800	0.997	0.994		
n ₁₀₆₄	1064.00	1.88343	P' _{e,d}	0.2340	R _{OH} (S)	1	1600	0.997	0.994		
n _t	1013.98	1.88484	P' _{g,F'}	0.5165	RP (S)	1	1400	0.997	0.994		
n _s	852.11	1.89068			CR	1	1200	0.997	0.994		
n _{A'}	768.19	1.89497	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.997	0.994		
n _r	706.52	1.89905					1000	0.997	0.994		
n _C	656.27	1.90323					950	0.997	0.994		
n _{C'}	643.85	1.90443	900	0.997			0.994				
n _{He-Ne}	632.80	1.90554	P _{F,e}	-0.0017			°C	α	850	0.997	0.994
n _D	589.29	1.91060	P _{g,F}	-0.0014	-50/-40	58	800	0.997	0.994		
n _d	587.56	1.91082	P _{C,t}	0.0008	-40/-30	61	750	0.997	0.994		
n _e	546.07	1.91695	P _{C,s}	0.0007	-30/-20	63	700	0.997	0.994		
n _F	486.13	1.92907	Thermal Properties		-20/-10	64	650	0.997	0.994		
n _{F'}	479.99	1.93062			T _g (°C)	707	-10/0	65	600	0.997	0.994
n _g	435.84	1.94415			T _s (°C)	763	0/10	66	550	0.992	0.987
n _h	404.66	1.95720			T ₁₀ ^{14.5} (°C)	655	10/20	67	500	0.983	0.969
n _i	365.01	1.98078			T ₁₀ ¹³ (°C)	680	20/30	68	480	0.980	0.960
					α _{-50/80°C} (10 ⁻⁷ /K)	67	30/40	69	460	0.974	0.948
					α _{100/300°C} (10 ⁻⁷ /K)	83	40/50	69	440	0.966	0.931

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		Solarization	
ρ (g/cm ³)	4.88	$\triangle\lambda$ (%)	-0.9

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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		v _d = 35.25		n _F − n _C = 0.025839										
					n _e = 1.91695		v _e = 35.01		n _{F'} − n _{C'} = 0.026194										
Refractive Indices					Relative Partial Dispersion			Chemical Properties (grade)			Internal Transmittance								
	λ (nm)		n _λ								λ (nm)	τ5mm	τ10mm						
n ₂₃₂₅		2325.42				P _{d,C}		0.2937		RC (S)		1		2400	0.709	0.502			
n ₁₉₇₀		1970.09				P _{e,d}		0.2372		RA (S)		1		2200	0.908	0.824			
n ₁₅₃₀		1529.58				P _{g,F}		0.5836		D _W		1		2000	0.959	0.919			
n ₁₁₂₉		1128.64		1.88174		P' _{d,c'}		0.2439		D _A		1		1800	0.988	0.977			
n ₁₀₆₄		1064.00		1.88340		P' _{e,d}		0.2340		R _{OH} (S)		1		1600	0.995	0.990			
n _t		1013.98		1.88483		P' _{g,F'}		0.5165		RP (S)		1		1400	0.999	0.998			
n _s		852.11		1.89070						CR		1		1200	0.999	0.998			
n _{A'}		768.19		1.89498										1060	0.999	0.998			
n _r		706.52		1.89906		Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)			1000			0.999	0.998			
n _C		656.27		1.90323								P _{F,e}			-0.0017			950	
n _{C'}		643.85		1.90443		P _{g,F}		-0.0014		°C		α		900			0.999	0.998	
n _{He-Ne}		632.80		1.90554		P _{C,t}		0.0012		-50/-40		60		850			0.999	0.998	
n _D		589.29		1.91060		P _{C,s}		-0.0001		-40/-30		62		800			0.999	0.998	
n _d		587.56		1.91082					-30/-20			64		750			0.999	0.998	
n _e		546.07		1.91695					-20/-10			65		700			0.999	0.998	
n _F		486.13		1.92907		Thermal Properties			-10/0			67		650			0.999	0.998	
n _{F'}		479.99		1.93062		T _g (°C)		714		0/10		68		600			0.999	0.998	
n _g		435.84		1.94415		T _s (°C)		760		10/20		68		550			0.998	0.996	
n _h		404.66		1.95722		T ₁₀ ^{14.5} (°C)		657		20/30		69		500			0.993	0.986	
n _i		365.01		1.98087		T ₁₀ ¹³ (°C)		682		30/40		70		480			0.989	0.979	
						α _{-50/80°C} (10 ⁻⁷ /K)		68		40/50		71		460			0.984	0.968	
						α _{100/300°C} (10 ⁻⁷ /K)		83		50/60		72		440			0.976	0.952	
						λ (W/(m·K))		0.96		60/70		73		420			0.960	0.922	
										70/80		73		400			0.925	0.856	
Constants of Dispersion Formula											80/90		74		390			0.890	0.792
A ₀		3.52696534E+00									90/100		75		380			0.827	0.684
A ₁		-1.46159641E-02									100/110		75		370			0.711	0.506
A ₂		4.03353950E-02									110/120		76		360			0.495	0.245
A ₃		1.52005930E-03									120/130		77		350			0.195	0.038
A ₄		-3.40993875E-05									130/140		78		340				
A ₅		7.83574753E-06									140/150		79		330				
											150/160		79		320				
Density					Solarization										310				
ρ (g/cm ³)	4.82				Δλ (%)			-1.3							300				
															290				
															280				
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code							
		dn/dt relative (×10 ⁻⁶ / °C)													λ ₈₀ (λ ₇₀)/λ ₅		(400)/355		
				t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance					
		-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	λτ ₈₀ /λτ ₅		392/351			
		-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	Constants of dn/dt					
		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	D ₀		D ₁		D ₂	
		60 ~ 80		3.1	4.1	4.2	4.4	4.6	5.1	5.5	5.9	6.1	7.7	1.20E-06		1.30E-08		-2.28E-11	
		80 ~ 100		3.1	6.0	4.4	4.6	4.8	5.3	5.6	5.9	6.3	7.8	E ₀		E ₁		λ _{TK}	
		100 ~ 120		3.2	4.0	4.6	4.9	5.1	5.4	5.6	6.1	6.4	8.1	7.80E-07		5.81E-10		2.31E-01	
		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						

H-ZLaF75	950294	$n_d = 1.95000$	$v_d = 29.37$	$n_F - n_C = 0.032350$
		$n_e = 1.95764$	$v_e = 29.15$	$n_{F'} - n_{C'} = 0.032852$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.88995	$P_{d,C}$	0.2896	RC (S)	1	2400	0.926	0.857
n_{1970}	1970.09	1.89709	$P_{e,d}$	0.2362	RA (S)	1	2200	0.976	0.953
n_{1530}	1529.58	1.90559	$P_{g,F}$	0.5991	D_W	1	2000	0.983	0.966
n_{1129}	1128.64	1.91477	$P'_{d,c'}$	0.2408	D_A	1	1800	0.996	0.992
n_{1064}	1064.00	1.91670	$P'_{e,d}$	0.2326	R_{OH} (S)	1	1600	0.996	0.992
n_t	1013.98	1.91837	$P'_{g,F'}$	0.5303	RP (S)	1	1400	0.996	0.992
n_s	852.11	1.92534			CR	1	1200	0.996	0.992
$n_{A'}$	768.19	1.93052	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.996	0.992
n_r	706.52	1.93550					1000	0.996	0.992
n_C	656.27	1.94063	$P_{F,e}$	0.0002	$^{\circ}C$	α	950	0.996	0.992
$n_{C'}$	643.85	1.94209	$P_{g,F}$	0.0043	-50/-40	61	900	0.996	0.992
n_{He-Ne}	632.80	1.94347	$P_{C,t}$	0.0057	-40/-30	64	850	0.996	0.992
n_D	589.29	1.94973	$P_{C,s}$	0.0018	-30/-20	65	800	0.996	0.992
n_d	587.56	1.95000	Thermal Properties		-20/-10	66	750	0.996	0.992
n_e	546.07	1.95764			-10/0	67	700	0.996	0.992
n_F	486.13	1.97298	T_g ($^{\circ}C$)	677	0/10	68	650	0.996	0.992
$n_{F'}$	479.99	1.97494	T_s ($^{\circ}C$)	714	10/20	69	600	0.996	0.992
n_g	435.84	1.99236	$T_{10}^{14.5}$ ($^{\circ}C$)	617	20/30	69	550	0.991	0.982
n_h	404.66	2.00958	T_{10}^{13} ($^{\circ}C$)	653	30/40	70	500	0.981	0.962
n_i	365.01	2.04179	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	68	40/50	71	480	0.968	0.937
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	83	50/60	71	460	0.953	0.908
			λ (W/(m·K))	1.05	60/70	72	440	0.929	0.863
					70/80	72	420	0.870	0.757
Constants of Dispersion Formula			Mechanical Properties		80/90	73	400	0.730	0.533
					90/100	74	390	0.604	0.365
A_0	3.64549592E+00		HK (10^7Pa)	625	100/110	75	380	0.426	0.181
A_1	-1.53200140E-02		F_A	66	110/120	76	370	0.212	0.045
A_2	4.96183427E-02		E (GPa)	120.0	120/130	77	360	0.165	0.027
A_3	2.32042227E-03		G (GPa)	45.7	130/140	78	350		
A_4	-9.17626876E-05		μ	0.314	140/150	79	340		
A_5	1.92554151E-05		σ_b (MPa)	61	150/160	80	330		
Density		Solarization		B ($10^{-12}/Pa$)	1.25		320		
ρ (g/cm ³)	4.77	$\Delta\lambda$ (%)	-2.4				310		
							300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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

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H-ZLaF77A	954323	$n_d = 1.95375$	$v_d = 32.32$	$n_F - n_C = 0.029506$
		$n_e = 1.96073$	$v_e = 32.09$	$n_{F'} - n_{C'} = 0.029940$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.89738	$P_{d,C}$	0.2918	RC (S)	1	2400	0.917	0.840
n_{1970}	1970.09	1.90433	$P_{e,d}$	0.2366	RA (S)	1	2200	0.976	0.952
n_{1530}	1529.58	1.91250	$P_{g,F}$	0.5904	D_W	1	2000	0.989	0.979
n_{1129}	1128.64	1.92116	$P'_{d,c'}$	0.2425	D_A	1	1800	0.996	0.993
n_{1064}	1064.00	1.92298	$P'_{e,d}$	0.2331	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.92453	$P'_{g,F'}$	0.5224	RP (S)	1	1400	0.999	0.999
n_s	852.11	1.93102			CR	1	1200	0.999	0.999
$n_{A'}$	768.19	1.93582	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.999
n_r	706.52	1.94042					1000	0.999	0.999
n_C	656.27	1.94514					950	0.999	0.999
$n_{C'}$	643.85	1.94649					900	0.999	0.999
n_{He-Ne}	632.80	1.94775	$P_{F,e}$	-0.0006	$^{\circ}C$	α	850	0.999	0.999
n_D	589.29	1.95349	$P_{g,F}$	0.0005	-50/-40	61	800	0.999	0.999
n_d	587.56	1.95375	$P_{C,t}$	0.0018	-40/-30	64	750	0.999	0.999
n_e	546.07	1.96073	$P_{C,s}$	0.0006	-30/-20	65	700	0.999	0.999
n_F	486.13	1.97465	Thermal Properties		-20/-10	67	650	0.999	0.998
$n_{F'}$	479.99	1.97643			-10/0	69	600	0.999	0.998
n_g	435.84	1.99207	T_g ($^{\circ}C$)	723	0/10	70	550	0.998	0.996
n_h	404.66	2.00732	T_s ($^{\circ}C$)	763	10/20	71	500	0.993	0.986
n_i	365.01	2.03539	$T_{10}^{14.5}$ ($^{\circ}C$)	680	20/30	72	480	0.989	0.978
			T_{10}^{13} ($^{\circ}C$)	716	30/40	73	460	0.983	0.967
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	70	40/50	74	440	0.976	0.953
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	87	50/60	74	420	0.963	0.927
			λ (W/(m·K))	1.01	60/70	75	400	0.927	0.860
					70/80	75	390	0.894	0.800
			Mechanical Properties		80/90	76	380	0.825	0.680
					90/100	76	370	0.686	0.470
			HK (10^7Pa)	730	100/110	77	360	0.424	0.180
			F_A	61	110/120	78	350	0.141	0.020
			E (GPa)	128.5	120/130	80	340		
			G (GPa)	49.5	130/140	81	330		
			μ	0.297	140/150	82	320		
			σ_b (MPa)	61	150/160	83	310		
			B ($10^{-12}/Pa$)	0.79			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	4.94	$\triangle\lambda$ (%)	-1.3

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.90069$	$v_d = 37.10$	$n_F - n_C = 0.024280$
		$n_e = 1.90645$	$v_e = 36.88$	$n_{F'} - n_{C'} = 0.024580$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm	
n ₂₃₂₅	2325.42	1.85201	P _{d,C}	0.2953	RC (S)	1	2400	0.943	0.890	
n ₁₉₇₀	1970.09	1.85828	P _{e,d}	0.2372	RA (S)	1	2200	0.987	0.974	
n ₁₅₃₀	1529.58	1.86561	P _{g,F}	0.5754	D _W	1	2000	0.998	0.996	
n ₁₁₂₉	1128.64	1.87323	P' _{d,c'}	0.2457	D _A	2	1800	0.998	0.997	
n ₁₀₆₄	1064.00	1.87480	P' _{e,d}	0.2343	R _{OH} (S)	1	1600	0.998	0.997	
n _t	1013.98	1.87614	P' _{g,F'}	0.5102	RP (S)	1	1400	0.998	0.997	
n _s	852.11	1.88167			CR	1	1200	0.998	0.997	
n _{A'}	768.19	1.88573	Deviation of Relative Partial Dispersions				1060	0.998	0.997	
n _r	706.52	1.88958					1000	0.998	0.997	
n _C	656.27	1.89352	P _{F,e}	-0.0023	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.998	0.997	
n _{C'}	643.85	1.89465	P _{g,F}	-0.0066			°C	α	900	0.998
n _{He-Ne}	632.80	1.89571	P _{C,t}	-0.0041	-50/-40	58	850	0.998	0.997	
n _D	589.29	1.90048	P _{C,s}	-0.0014	-40/-30	60	800	0.998	0.997	
n _d	587.56	1.90069	Thermal Properties			-30/-20	61	750	0.998	0.996
n _e	546.07	1.90645				-20/-10	63	700	0.998	0.996
n _F	486.13	1.91780	T _g (°C)		690	-10/0	64	650	0.998	0.996
n _{F'}	479.99	1.91923	T _s (°C)		732	0/10	65	600	0.998	0.996
n _g	435.84	1.93177	T ₁₀ ^{14.5} (°C)		625	10/20	66	550	0.995	0.992
n _h	404.66	1.94382	T ₁₀ ¹³ (°C)		663	20/30	67	500	0.991	0.984
n _i	365.01	1.96535	α _{-50/80°C} (10 ⁻⁷ /K)		65	30/40	68	480	0.987	0.975
			α _{100/300°C} (10 ⁻⁷ /K)		84	40/50	68	460	0.980	0.962
			λ (W/(m·K))		0.75	50/60	69	440	0.970	0.948
						60/70	69	420	0.958	0.917
Constants of Dispersion Formula			Mechanical Properties			70/80	70	400	0.927	0.860
						80/90	71	390	0.898	0.806
A ₀	3.49532543E+00		HK (10 ⁷ Pa)		670	90/100	72	380	0.845	0.723
A ₁	-1.33990335E-02		F _A		72	100/110	73	370	0.775	0.611
A ₂	3.79713413E-02		E (GPa)		121.8	110/120	74	360	0.652	0.439
A ₃	1.56188624E-03		G (GPa)		46.7	120/130	75	350	0.429	0.194
A ₄	-7.42686015E-05		μ		0.303	130/140	76	340	0.133	0.030
A ₅	8.65884802E-06		σ _b (MPa)		94	140/150	77	330		
Density			B (10 ⁻¹² /Pa)			150/160	78	320		
								310		
ρ (g/cm ³)	5.05		Solarization					300		
								290		
Range of Temperature			Temperature Coefficients of Refractive Index				280			
							dn/dt relative (×10 ⁻⁶ / °C)			

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.92119$	$v_d = 23.96$	$n_F - n_C = 0.038453$
		$n_e = 1.93024$	$v_e = 23.77$	$n_{F'} - n_{C'} = 0.039142$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.85550	$P_{d,C}$	0.2858	RC (S)	1	2400	0.986	0.972
n_{1970}	1970.09	1.86269	$P_{e,d}$	0.2354	RA (S)	1	2200	0.989	0.978
n_{1530}	1529.58	1.87136	$P_{g,F}$	0.6184	D_W	1	2000	0.994	0.988
n_{1129}	1128.64	1.88103	$P'_{d,c'}$	0.2371	D_A	1	1800	0.998	0.996
n_{1064}	1064.00	1.88312	$P'_{e,d}$	0.2312	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	1.88494	$P'_{g,F'}$	0.5462	RP (S)	1	1400	0.998	0.996
n_s	852.11	1.89268			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.89855	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.90425					1000	0.998	0.996
n_C	656.27	1.91020	$P_{F,e}$	0.0018	$^{\circ}C$	α	950	0.998	0.996
$n_{C'}$	643.85	1.91191	$P_{g,F}$	0.0146	-50/-40	68	900	0.998	0.996
n_{He-Ne}	632.80	1.91351	$P_{C,t}$	0.0007	-40/-30	71	850	0.998	0.996
n_D	589.29	1.92086	$P_{C,s}$	-0.0023	-30/-20	72	800	0.998	0.996
n_d	587.56	1.92119	Thermal Properties		-20/-10	73	750	0.998	0.996
n_e	546.07	1.93024			-10/0	74	700	0.998	0.996
n_F	486.13	1.94865	T_g ($^{\circ}C$)	661	0/10	75	650	0.996	0.992
$n_{F'}$	479.99	1.95105	T_s ($^{\circ}C$)	701	10/20	76	600	0.994	0.988
n_g	435.84	1.97243	$T_{10}^{14.5}$ ($^{\circ}C$)	618	20/30	77	550	0.989	0.979
n_h	404.66	1.99406	T_{10}^{13} ($^{\circ}C$)	638	30/40	77	500	0.977	0.953
n_i	365.01	2.03605	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	74	40/50	78	480	0.968	0.937
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	91	50/60	79	460	0.956	0.914
			λ (W/(m·K))	1.02	60/70	81	440	0.933	0.871
					70/80	82	420	0.887	0.788
			Mechanical Properties		80/90	83	400	0.792	0.627
					90/100	84	390	0.691	0.478
			HK (10^7Pa)	626	100/110	85	380	0.503	0.253
			F_A	96	110/120	86	370	0.214	0.046
			E (GPa)	114.7	120/130	87	360		
			G (GPa)	44.6	130/140	88	350		
			μ	0.285	140/150	89	340		
			σ_b (MPa)	102	150/160	90	330		
			B ($10^{-12}/Pa$)	2.25			320		
							310		
							300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	3.86	$\triangle\lambda$ (%)	-1.2

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 2.00069$	$v_d = 25.46$	$n_F - n_C = 0.039308$
		$n_e = 2.00996$	$v_e = 25.26$	$n_{F'} - n_{C'} = 0.039985$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.93290	$P_{d,C}$	0.2862	RC (S)	1	2400	0.955	0.912
n_{1970}	1970.09	1.94015	$P_{e,d}$	0.2358	RA (S)	1	2200	0.983	0.966
n_{1530}	1529.58	1.94903	$P_{g,F}$	0.6159	D_W	1	2000	0.990	0.980
n_{1129}	1128.64	1.95916	$P'_{d,c'}$	0.2376	D_A	1	1800	0.997	0.994
n_{1064}	1064.00	1.96137	$P'_{e,d}$	0.2318	R_{OH} (S)	1	1600	0.997	0.994
n_t	1013.98	1.96328	$P'_{g,F'}$	0.5447	RP (S)	1	1400	0.997	0.994
n_s	852.11	1.97139			CR	1	1200	0.997	0.994
$n_{A'}$	768.19	1.97747	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.997	0.994
n_r	706.52	1.98335					1000	0.997	0.994
n_C	656.27	1.98944					950	0.997	0.994
$n_{C'}$	643.85	1.99119					900	0.997	0.994
n_{He-Ne}	632.80	1.99284	$P_{F,e}$	0.0019	$^{\circ}C$	α	850	0.997	0.994
n_D	589.29	2.00035	$P_{g,F}$	0.0146	-50/-40	64	800	0.997	0.994
n_d	587.56	2.00069	$P_{C,t}$	0.0020	-40/-30	67	750	0.997	0.994
n_e	546.07	2.00996	$P_{C,s}$	-0.0023	-30/-20	69	700	0.997	0.994
n_F	486.13	2.02875	Thermal Properties		-20/-10	70	650	0.997	0.994
$n_{F'}$	479.99	2.03118			-10/0	71	600	0.995	0.991
n_g	435.84	2.05296	T_g ($^{\circ}C$)	700	0/10	72	550	0.994	0.989
n_h	404.66	2.07475	T_s ($^{\circ}C$)	748	10/20	73	500	0.967	0.941
n_i	365.01		$T_{10}^{14.5}$ ($^{\circ}C$)	629	20/30	74	480	0.953	0.912
			T_{10}^{13} ($^{\circ}C$)	675	30/40	75	460	0.931	0.870
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	73	40/50	76	440	0.893	0.798
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	89	50/60	76	420	0.816	0.662
			λ (W/(m·K))	1.19	60/70	77	400	0.669	0.441
					70/80	78	390	0.559	0.312
			Mechanical Properties		80/90	78	380	0.373	0.135
					90/100	79	370	0.144	0.024
			HK (10^7Pa)	630	100/110	79	360		
			F_A	78	110/120	80	350		
			E (GPa)	123.5	120/130	81	340		
			G (GPa)	46.3	130/140	82	330		
			μ	0.355	140/150	83	320		
			σ_b (MPa)	75	150/160	84	310		
			B ($10^{-12}/Pa$)	1.22			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	4.76	$\triangle\lambda$ (%)	-1.1

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 2.00069$	$v_d = 25.46$	$n_F - n_C = 0.039308$
		$n_e = 2.00996$	$v_e = 25.26$	$n_{F'} - n_{C'} = 0.039985$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.93290	$P_{d,C}$	0.2862	RC (S)	1	2400	0.933	0.870
n_{1970}	1970.09	1.94015	$P_{e,d}$	0.2358	RA (S)	1	2200	0.976	0.953
n_{1530}	1529.58	1.94903	$P_{g,F}$	0.6159	D_W	1	2000	0.989	0.979
n_{1129}	1128.64	1.95916	$P'_{d,c'}$	0.2376	D_A	1	1800	0.994	0.989
n_{1064}	1064.00	1.96137	$P'_{e,d}$	0.2318	R_{OH} (S)	1	1600	0.998	0.995
n_t	1013.98	1.96328	$P'_{g,F'}$	0.5447	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.97139			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.97747	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.98335					1000	0.999	0.998
n_C	656.27	1.98944					950	0.999	0.998
$n_{C'}$	643.85	1.99119					900	0.999	0.998
n_{He-Ne}	632.80	1.99284	$P_{F,e}$	0.0019	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	2.00035	$P_{g,F}$	0.0146	-50/-40	64	800	0.999	0.998
n_d	587.56	2.00069	$P_{C,t}$	0.0020	-40/-30	67	750	0.999	0.998
n_e	546.07	2.00996	$P_{C,s}$	-0.0023	-30/-20	69	700	0.998	0.997
n_F	486.13	2.02875	Thermal Properties		-20/-10	70	650	0.997	0.995
$n_{F'}$	479.99	2.03118			-10/0	71	600	0.996	0.993
n_g	435.84	2.05296	T_g ($^{\circ}C$)	700	0/10	72	550	0.992	0.985
n_h	404.66	2.07475	T_s ($^{\circ}C$)	748	10/20	73	500	0.981	0.962
n_i	365.01		$T_{10}^{14.5}$ ($^{\circ}C$)	629	20/30	74	480	0.972	0.946
			T_{10}^{13} ($^{\circ}C$)	675	30/40	75	460	0.960	0.922
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	73	40/50	76	440	0.939	0.881
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	89	50/60	76	420	0.895	0.801
			λ (W/(m·K))	1.19	60/70	77	400	0.797	0.636
					70/80	78	390	0.696	0.484
			Mechanical Properties		80/90	78	380	0.513	0.264
					90/100	79	370	0.239	0.057
			HK (10^7Pa)	630	100/110	79	360		
			F_A	78	110/120	80	350		
			E (GPa)	123.5	120/130	81	340		
			G (GPa)	46.3	130/140	82	330		
			μ	0.355	140/150	83	320		
			σ_b (MPa)	75	150/160	84	310		
			B ($10^{-12}/Pa$)	1.22			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	4.76	$\triangle\lambda$ (%)	-1.0

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	
$\lambda_{80}(\lambda_{70})/\lambda_5$	(440)/370
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	419/369

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	$n_d = 2.00100$	$v_d = 29.14$	$n_F - n_C = 0.034352$
		$n_e = 2.00912$	$v_e = 28.92$	$n_{F'} - n_{C'} = 0.034895$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance										
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm								
n ₂₃₂₅	2325.42	1.93864	P _{d,C}	0.2896	RC (S)	1	2400	0.935	0.875								
n ₁₉₇₀	1970.09	1.94582	P _{e,d}	0.2364	RA (S)	1	2200	0.979	0.959								
n ₁₅₃₀	1529.58	1.95440	P _{g,F}	0.5997	D _W	1	2000	0.990	0.981								
n ₁₁₂₉	1128.64	1.96381	P' _{d,c'}	0.2407	D _A	1	1800	0.996	0.993								
n ₁₀₆₄	1064.00	1.96583	P' _{e,d}	0.2327	R _{OH} (S)	1	1600	0.999	0.998								
n _t	1013.98	1.96756	P' _{g,F'}	0.5304	RP (S)	1	1400	0.999	0.998								
n _s	852.11	1.97488			CR	1	1200	0.999	0.998								
n _{A'}	768.19	1.98035	Deviation of Relative Partial Dispersions				1060	0.999	0.998								
n _r	706.52	1.98561					Expansion Coefficient α (×10 ⁻⁷ /K)				1000	0.999	0.998				
n _C	656.27	1.99105									α (×10 ⁻⁷ /K)				950	0.999	0.998
n _{C'}	643.85	1.99260													α (×10 ⁻⁷ /K)		
n _{He-Ne}	632.80	1.99406	P _{F,e}	-0.0002	°C	α											
n _D	589.29	2.00070	P _{g,F}	0.0045	-50/-40	61	800	0.999	0.998								
n _d	587.56	2.00100	P _{C,t}	0.0025	-40/-30	64	750	0.999	0.998								
n _e	546.07	2.00912	P _{C,s}	0.0004	-30/-20	65	700	0.999	0.998								
n _F	486.13	2.02540	Thermal Properties		-20/-10	67	650	0.999	0.998								
n _{F'}	479.99	2.02749			T _g (°C)	725	-10/0	68	600	0.999	0.998						
n _g	435.84	2.04600			T _s (°C)	761	0/10	70	550	0.997	0.995						
n _h	404.66	2.06424			T ₁₀ ^{14.5} (°C)	682	10/20	71	500	0.992	0.984						
n _i	365.01	2.09830	T ₁₀ ¹³ (°C)	718	20/30	72	480	0.988	0.976								
			α _{-50/80°C} (10 ⁻⁷ /K)	70	30/40	74	460	0.982	0.964								
			α _{100/300°C} (10 ⁻⁷ /K)	88	40/50	75	440	0.972	0.945								
			λ (W/(m·K))	1.10	50/60	75	420	0.951	0.904								
					60/70	76	400	0.906	0.820								
Constants of Dispersion Formula			Mechanical Properties		70/80	76	390	0.848	0.719								
					80/90	77	380	0.739	0.546								
A ₀	3.83282270E+00	HK (10 ⁷ Pa)			720	90/100	78	370	0.515	0.265							
A ₁	-1.56183327E-02	F _A			61	100/110	79	360	0.205	0.042							
A ₂	5.35172772E-02	E (GPa)	133.7	110/120	80	350											
A ₃	2.75764007E-03	G (GPa)	50.0	120/130	82	340											
A ₄	-1.28130130E-04	μ	0.338	130/140	83	330											
A ₅	2.18199756E-05	σ _b (MPa)	81	140/150	84	320											
		B (10 ⁻¹² /Pa)	0.74	150/160	85	310											
						300											
Range of Temperature	Temperature Coefficients of Refractive Index																
	dn/dt relative (×10 ⁻⁶ / °C)																

H-ZLaF82GT			001291		n _d = 2.00100		v _d = 29.14		n _F – n _C = 0.034352											
					n _e = 2.00912		v _e = 28.92		n _{F'} – n _{C'} = 0.034895											
Refractive Indices					Relative Partial Dispersion			Chemical Properties (grade)			Internal Transmittance									
	λ (nm)	n _λ		λ (nm)							τ5mm	τ10mm								
n ₂₃₂₅		2325.42	1.93864		P _{d,C}		0.2896		RC (S)		1		2400	0.916	0.840					
n ₁₉₇₀		1970.09	1.94582		P _{e,d}		0.2364		RA (S)		1		2200	0.974	0.948					
n ₁₅₃₀		1529.58	1.95440		P _{g,F}		0.5997		D _W		1		2000	0.988	0.975					
n ₁₁₂₉		1128.64	1.96381		P' _{d,c'}		0.2407		D _A		1		1800	0.995	0.990					
n ₁₀₆₄		1064.00	1.96583		P' _{e,d}		0.2327		R _{OH} (S)		1		1600	0.999	0.997					
n _t		1013.98	1.96756		P' _{g,F'}		0.5304		RP (S)		1		1400	0.999	0.998					
n _s		852.11	1.97488						CR		1		1200	0.999	0.998					
n _{A'}		768.19	1.98035		Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)			1060		0.999	0.998						
n _r		706.52	1.98561								°C		α		1000	0.999	0.998			
n _C		656.27	1.99105		ΔP _{F,e}		-0.0002		-50/-40		61		950	0.999	0.998					
n _{C'}		643.85	1.99260		ΔP _{g,F}		0.0045		-40/-30		64		900	0.999	0.998					
n _{He-Ne}		632.80	1.99406		ΔP _{C,t}		0.0025		-30/-20		65		850	0.999	0.998					
n _D		589.29	2.00070		ΔP _{C,s}		0.0004		-20/-10		67		800	0.999	0.998					
n _d		587.56	2.00100		Thermal Properties			Mechanical Properties			70		75	750	0.999	0.998				
n _e		546.07	2.00912								T _g (°C)		725		-10/0		68		600	0.999
n _F		486.13	2.02540		T _s (°C)		761		0/10		70		550	0.998	0.996					
n _{F'}		479.99	2.02749		T ₁₀ ^{14.5} (°C)		682		10/20		71		500	0.993	0.987					
n _g		435.84	2.04600		T ₁₀ ¹³ (°C)		718		20/30		72		480	0.989	0.979					
n _h		404.66	2.06424		α _{-50/80°C} (10 ⁻⁷ /K)		70		30/40		74		460	0.984	0.969					
n _i		365.01	2.09830		α _{100/300°C} (10 ⁻⁷ /K)		88		40/50		75		440	0.977	0.954					
					λ (W/(m·K))		1.10		50/60		75		420	0.959	0.919					
									60/70		76		400	0.922	0.850					
Constants of Dispersion Formula					Mechanical Properties		HK (10 ⁷ Pa)		720		70/80		76		390	0.872	0.761			
											80/90		77		380	0.769	0.591			
A ₀		3.83282270E+00			F _A		61		90/100		78		370	0.547	0.299					
A ₁		-1.56183327E-02			E (GPa)		133.7		100/110		79		360	0.226	0.051					
A ₂		5.35172772E-02			G (GPa)		50.0		110/120		80		350							
A ₃		2.75764007E-03			μ		0.338		120/130		82		340							
A ₄		-1.28130130E-04			σ _b (MPa)		81		130/140		83		330							
A ₅		2.18199756E-05			B (10 ⁻¹² /Pa)		0.74		140/150		84		320							
									150/160		85		310							
													300							
													290							
													280							
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code								
		dn/dt relative (×10 ⁻⁶ / °C)																		
		t	s	C	C'	He-Ne	d	e	F	F'	g	Coloration of Internal Transmittance								
-60 ~ -40		2.2	2.9	3.4	3.4	3.5	3.8	4.5	5.8	5.9	7.3				λτ ₈₀ /λτ ₅			381/360		
-40 ~ -20		2.2	2.9	3.4	3.4	3.5	3.9	4.5	5.9	5.9	7.4	Constants of dn/dt								
-20 ~ 0		2.3	3.0	3.5	3.5	3.6	4.0	4.6	6.1	6.1	7.7				D ₀			D ₁		
0 ~ 20		2.2	3.0	3.6	3.7	3.7	4.2	4.8	6.3	6.4	8.1	-2.90E-07								
20 ~ 40		2.3	3.0	3.7	3.7	3.8	4.3	4.9	6.6	6.6	8.3				E ₀			E ₁		
40 ~ 60		2.3	3.1	3.8	3.8	3.9	4.5	5.0	6.8	6.8	8.6	9.83E-07								
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									

H-ZLaF86	883270	$n_d = 1.88252$	$v_d = 27.00$	$n_F - n_C = 0.032686$
		$n_e = 1.89022$	$v_e = 26.78$	$n_{F'} - n_{C'} = 0.033246$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.82367	$P_{d,C}$	0.2876	RC (S)	1	2400	0.969	0.938
n_{1970}	1970.09	1.83046	$P_{e,d}$	0.2356	RA (S)	1	2200	0.987	0.975
n_{1530}	1529.58	1.83859	$P_{g,F}$	0.6125	D_W	1	2000	0.995	0.991
n_{1129}	1128.64	1.84749	$P'_{d,c'}$	0.2391	D_A	1	1800	0.998	0.997
n_{1064}	1064.00	1.84939	$P'_{e,d}$	0.2316	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.85103	$P'_{g,F'}$	0.5417	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.85790			CR		1200	0.999	0.998
$n_{A'}$	768.19	1.86304	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.86800					1000	0.999	0.998
n_C	656.27	1.87312					950	0.999	0.998
$n_{C'}$	643.85	1.87457					900	0.999	0.998
n_{He-Ne}	632.80	1.87595	$P_{F,e}$	0.0017	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.88223	$P_{g,F}$	0.0137	-50/-40	60	800	0.999	0.998
n_d	587.56	1.88252	$P_{C,t}$	0.0049	-40/-30	63	750	0.999	0.998
n_e	546.07	1.89022	$P_{C,s}$	0.0004	-30/-20	63	700	0.998	0.997
n_F	486.13	1.90581	Thermal Properties		-20/-10	65	650	0.998	0.997
$n_{F'}$	479.99	1.90782			-10/0	68	600	0.997	0.995
n_g	435.84	1.92583			0/10	69	550	0.993	0.987
n_h	404.66	1.94392			10/20	70	500	0.982	0.965
n_i	365.01	1.97855			20/30	73	480	0.975	0.950
					30/40	74	460	0.964	0.929
			T_g ($^{\circ}C$)	717	40/50	75	440	0.944	0.891
			T_s ($^{\circ}C$)	762	50/60	75	420	0.902	0.813
			$T_{10}^{14.5}$ ($^{\circ}C$)	678	60/70	75	400	0.804	0.647
			T_{10}^{13} ($^{\circ}C$)	709	70/80	76	390	0.701	0.491
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	70	80/90	76	380	0.512	0.262
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	83	90/100	76	370	0.230	0.053
			λ (W/(m·K))	1.13	100/110	77	360		
					110/120	78	350		
					120/130	79	340		
					130/140	80	330		
					140/150	81	320		
					150/160	83	310		
							300		
							290		
							280		

Constants of Dispersion Formula		Solarization		Mechanical Properties	
A_0	3.39234287E+00	$\Delta\lambda$ (%)	-0.7	HK (10^7Pa)	608
A_1	-1.39491556E-02			F_A	94
A_2	4.74887284E-02			E (GPa)	112.2
A_3	2.28412158E-03			G (GPa)	43.3
A_4	-8.32791862E-05			μ	0.294
A_5	2.34034525E-05			σ_b (MPa)	97
				B ($10^{-12}/Pa$)	1.66

Density		Solarization		Mechanical Properties	
ρ (g/cm ³)	4.05	$\Delta\lambda$ (%)	-0.7	HK (10^7Pa)	608

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 2.05090$	$v_d = 26.94$	$n_F - n_C = 0.039005$
		$n_e = 2.06011$	$v_e = 26.74$	$n_F - n_{C'} = 0.039645$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.98329	$P_{d,C}$	0.2884	RC (S)	1	2400	0.953	0.907
n_{1970}	1970.09	1.99055	$P_{e,d}$	0.2361	RA (S)	1	2200	0.985	0.970
n_{1530}	1529.58	1.99938	$P_{g,F}$	0.6040	D_W	1	2000	0.994	0.988
n_{1129}	1128.64	2.00940	$P'_{d,c'}$	0.2396	D_A	1	1800	0.998	0.996
n_{1064}	1064.00	2.01158	$P'_{e,d}$	0.2323	R_{OH} (S)	1	1600	0.998	0.996
n_t	1013.98	2.01348	$P'_{g,F'}$	0.5340	RP (S)	2	1400	0.998	0.996
n_s	852.11	2.02155			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	2.02764	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	2.03354					1000	0.998	0.996
n_C	656.27	2.03965					950	0.998	0.996
$n_{C'}$	643.85	2.04140					900	0.998	0.996
n_{He-Ne}	632.80	2.04306	$P_{F,e}$	0.0000	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	2.05057	$P_{g,F}$	0.0052	-50/-40	65	800	0.998	0.996
n_d	587.56	2.05090	$P_{C,t}$	0.0003	-40/-30	68	750	0.998	0.996
n_e	546.07	2.06011	$P_{C,s}$	-0.0010	-30/-20	71	700	0.998	0.996
n_F	486.13	2.07865	Thermal Properties		-20/-10	69	650	0.998	0.996
$n_{F'}$	479.99	2.08104			-10/0	71	600	0.996	0.994
n_g	435.84	2.10221	T_g ($^{\circ}C$)	749	0/10	74	550	0.992	0.986
n_h	404.66	2.12327	T_s ($^{\circ}C$)	784	10/20	73	500	0.976	0.953
n_i	365.01	2.16304	$T_{10}^{14.5}$ ($^{\circ}C$)	726	20/30	76	480	0.963	0.928
			T_{10}^{13} ($^{\circ}C$)	743	30/40	78	460	0.944	0.892
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	74	40/50	75	440	0.914	0.835
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	90	50/60	80	420	0.854	0.729
			λ (W/(m·K))	1.02	60/70	82	400	0.727	0.529
					70/80	78	390	0.618	0.382
			Mechanical Properties		80/90	82	380	0.459	0.211
					90/100	81	370	0.245	0.062
			HK (10^7Pa)	699	100/110	81	360		
			F_A	63	110/120	85	350		
			E (GPa)	131.4	120/130	83	340		
			G (GPa)	50.2	130/140	86	330		
			μ	0.308	140/150	86	320		
			σ_b (MPa)	86	150/160	88	310		
			B ($10^{-12}/Pa$)	0.62			300		
							290		
							280		

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		Solarization	
ρ (g/cm ³)	5.27	$\triangle\lambda$ (%)	-1.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 2.00272$	$v_d = 19.32$	$n_F - n_C = 0.051908$
		$n_e = 2.01489$	$v_e = 19.16$	$n_F - n_{C'} = 0.052967$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.2815	RC (S)	1	2400	0.967	0.936
n_{1970}	1970.09		$P_{e,d}$	0.2345	RA (S)	1	2200	0.983	0.966
n_{1530}	1529.58		$P_{g,F}$	0.6419	D_W	1	2000	0.993	0.987
n_{1129}	1128.64	1.95027	$P'_{d,c'}$	0.2334	D_A	1	1800	0.997	0.993
n_{1064}	1064.00	1.95293	$P'_{e,d}$	0.2298	$R_{OH}(S)$	1	1600	0.998	0.996
n_t	1013.98	1.95525	$P'_{g,F'}$	0.5666	RP (S)	1	1400	0.999	0.997
n_s	852.11	1.96520			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.97282	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.998	0.996
n_r	706.52	1.98028					1000	0.998	0.995
n_C	656.27	1.98811	$P_{F,e}$	0.0046	$^{\circ}C$	α	950	0.997	0.995
$n_{C'}$	643.85	1.99036	$P_{g,F}$	0.0304	-50/-40	67	900	0.998	0.995
n_{He-Ne}	632.80	1.99250	$P_{C,t}$	-0.0007	-40/-30	69	850	0.997	0.994
n_D	589.29	2.00228	$P_{C,s}$	-0.0054	-30/-20	71	800	0.997	0.993
n_d	587.56	2.00272	Thermal Properties		-20/-10	71	750	0.996	0.992
n_e	546.07	2.01489			-10/0	71	700	0.996	0.991
n_F	486.13	2.04002	T_g ($^{\circ}C$)	519	10/20	73	650	0.994	0.989
$n_{F'}$	479.99	2.04333	T_s ($^{\circ}C$)	558	20/30	74	600	0.993	0.986
n_g	435.84	2.07334	$T_{10}^{14.5}$ ($^{\circ}C$)	496	30/40	74	550	0.985	0.970
n_h	404.66	2.10453	T_{10}^{13} ($^{\circ}C$)	514	40/50	74	500	0.961	0.924
n_i	365.01		$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	75	50/60	75	480	0.943	0.889
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	91	60/70	77	460	0.915	0.838
			λ (W/(m·K))	0.72	70/80	79	440	0.857	0.734
					80/90	79	420	0.675	0.456
Constants of Dispersion Formula			Mechanical Properties		90/100	81	400	0.195	0.038
					100/110	81	390		
A_0	3.77070363E+00		HK (10^7Pa)	403	110/120	81	380		
A_1	-1.89710141E-02		F_A	251	120/130	82	370		
A_2	6.72915528E-02		E (GPa)	84.8	130/140	82	360		
A_3	7.22871114E-03		G (GPa)	33.6	140/150	86	350		
A_4	-6.15434682E-04		μ	0.263	150/160	86	340		
A_5	8.70566270E-05		σ_b (MPa)	53			330		
Density		Solarization		B ($10^{-12}/Pa$)	2.11		320		
ρ (g/cm ³)	5.10	$\Delta\lambda$ (%)	-3.5				310		
							300		
							290		
							280		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.49700$	$v_d = 81.61$	$n_F - n_C = 0.006090$
		$n_e = 1.49845$	$v_e = 81.20$	$n_F - n_{C'} = 0.006139$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.47950	$P_{d,C}$	0.3054	RC (S)	1	2400	0.999	0.998
n_{1970}	1970.09	1.48263	$P_{e,d}$	0.2381	RA (S)	2	2200	0.999	0.998
n_{1530}	1529.58	1.48606	$P_{g,F}$	0.5386	D_W	1	2000	0.999	0.998
n_{1129}	1128.64	1.48910	$P'_{d,c'}$	0.2557	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.48965	$P'_{e,d}$	0.2362	R_{OH} (S)	2	1600	0.999	0.998
n_t	1013.98	1.49010	$P'_{g,F'}$	0.4789	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.49183			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.49301	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.49407					1000	0.999	0.998
n_C	656.27	1.49514					950	0.999	0.998
$n_{C'}$	643.85	1.49543					900	0.999	0.998
n_{He-Ne}	632.80	1.49571	$P_{F,e}$	0.0113	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.49694	$P_{g,F}$	0.0305	-50/-40	115	800	0.999	0.998
n_d	587.56	1.49700	$P_{C,t}$	-0.1080	-40/-30	118	750	0.999	0.998
n_e	546.07	1.49845	$P_{C,s}$	-0.0528	-30/-20	121	700	0.999	0.998
n_F	486.13	1.50123	Thermal Properties		-20/-10	123	650	0.999	0.998
$n_{F'}$	479.99	1.50157			-10/0	125	600	0.999	0.998
n_g	435.84	1.50451			0/10	127	550	0.999	0.998
n_h	404.66	1.50721			10/20	128	500	0.999	0.998
n_i	365.01	1.51173	T_g ($^{\circ}C$)	464	20/30	130	480	0.999	0.998
			T_s ($^{\circ}C$)	489	30/40	133	460	0.999	0.998
			$T_{10}^{14.5}$ ($^{\circ}C$)	421	40/50	136	440	0.999	0.998
			T_{10}^{13} ($^{\circ}C$)	442	50/60	138	420	0.999	0.998
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	124	60/70	140	400	0.999	0.998
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	152	70/80	142	390	0.999	0.998
			λ (W/(m·K))	0.74	80/90	144	380	0.999	0.998
			β_d	58	90/100	145	370	0.995	0.993

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		Solarization	
ρ (g/cm ³)	3.67	$\triangle\lambda$ (%)	-2.4

Mechanical Properties	
HK (10 ⁷ Pa)	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

130/140	149
140/150	150
150/160	151

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 ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.45860$	$v_d = 90.19$	$n_F - n_C = 0.005085$
		$n_e = 1.45981$	$v_e = 89.77$	$n_F - n_{C'} = 0.005122$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.44358	$P_{d,C}$	0.3068	RC (S)	1	2400	0.999	0.998
n_{1970}	1970.09	1.44630	$P_{e,d}$	0.2380	RA (S)	2	2200	0.999	0.998
n_{1530}	1529.58	1.44928	$P_{g,F}$	0.5388	D_W	2	2000	0.999	0.998
n_{1129}	1128.64	1.45191	$P'_{d,c'}$	0.2558	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.45238	$P'_{e,d}$	0.2362	R_{OH} (S)	4	1600	0.999	0.998
n_t	1013.98	1.45277	$P'_{g,F'}$	0.4783	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.45425			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.45524	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.45615					1000	0.999	0.998
n_C	656.27	1.45704					950	0.999	0.998
$n_{C'}$	643.85	1.45729	$P_{F,e}$	0.0139	$^{\circ}C$	α	900	0.999	0.998
n_{He-Ne}	632.80	1.45752	$P_{g,F}$	0.0450	-50/-40	123	850	0.999	0.998
n_D	589.29	1.45855	$P_{C,t}$	-0.1374	-40/-30	126	800	0.999	0.998
n_d	587.56	1.45860	$P_{C,s}$	-0.0682	-30/-20	128	750	0.999	0.998
n_e	546.07	1.45981	Thermal Properties		-20/-10	130	700	0.999	0.998
n_F	486.13	1.46212			-10/0	132	650	0.999	0.998
$n_{F'}$	479.99	1.46241			0/10	133	600	0.999	0.998
n_g	435.84	1.46486	T_g ($^{\circ}C$)	442	10/20	135	550	0.999	0.998
n_h	404.66	1.46710	T_s ($^{\circ}C$)	467	20/30	138	500	0.999	0.998
n_i	365.01	1.47085	$T_{10}^{14.5}$ ($^{\circ}C$)	423	30/40	140	480	0.999	0.998
			T_{10}^{13} ($^{\circ}C$)	436	40/50	143	460	0.999	0.998
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	134	50/60	144	440	0.999	0.998
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	164	60/70	145	420	0.999	0.998
			λ (W/(m·K))	0.71	70/80	146	400	0.999	0.998
			β_d	48	80/90	147	390	0.999	0.998
Constants of Dispersion Formula			Mechanical Properties		90/100	149	380	0.999	0.998
					100/110	150	370	0.999	0.998
					110/120	151	360	0.998	0.996
A_0	2.10866977E+00		HK (10^7Pa)	354	120/130	153	350	0.997	0.994
A_1	-4.81589397E-03		F_A	459	130/140	155	340	0.993	0.986
A_2	7.02478609E-03		E (GPa)	68.9	140/150	157	330	0.984	0.968
A_3	-2.48667024E-05		G (GPa)	26.2	150/160	160	320	0.967	0.935
A_4	1.78185408E-05		μ	0.313			310	0.935	0.874
A_5	-1.09874507E-06		σ_b (MPa)	48			300	0.883	0.779
Density		Solarization					290	0.809	0.654
ρ (g/cm ³)	3.64				B ($10^{-12}/Pa$)	0.60	280	0.721	0.520
		$\triangle\lambda$ (%)	-0.5						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.43700$	$v_d = 95.10$	$n_F - n_C = 0.004595$
		$n_e = 1.43810$	$v_e = 94.66$	$n_F - n_{C'} = 0.004628$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.42310	$P_{d,C}$	0.3069	RC (S)	1	2400	0.999	0.998
n_{1970}	1970.09	1.42566	$P_{e,d}$	0.2394	RA (S)	3	2200	0.999	0.998
n_{1530}	1529.58	1.42846	$P_{g,F}$	0.5332	D_W	2	2000	0.999	0.998
n_{1129}	1128.64	1.43091	$P'_{d,c'}$	0.2550	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.43134	$P'_{e,d}$	0.2377	R_{OH} (S)	4	1600	0.999	0.998
n_t	1013.98	1.43170	$P'_{g,F'}$	0.4754	RP (S)	3	1400	0.999	0.998
n_s	852.11	1.43306			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.43396	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.43478					1000	0.999	0.998
n_C	656.27	1.43559					950	0.999	0.998
$n_{C'}$	643.85	1.43582					900	0.999	0.998
n_{He-Ne}	632.80	1.43603	$P_{F,e}$	0.0171	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.43696	$P_{g,F}$	0.0475	-50/-40	129	800	0.999	0.998
n_d	587.56	1.43700	$P_{C,t}$	-0.1544	-40/-30	131	750	0.999	0.998
n_e	546.07	1.43810	$P_{C,s}$	-0.0780	-30/-20	132	700	0.999	0.998
n_F	486.13	1.44019	Thermal Properties		-20/-10	134	650	0.999	0.998
$n_{F'}$	479.99	1.44044			-10/0	134	600	0.999	0.998
n_g	435.84	1.44264			0/10	137	550	0.999	0.998
n_h	404.66	1.44466			10/20	140	500	0.999	0.998
n_i	365.01	1.44803	T_g ($^{\circ}C$)	409	20/30	140	480	0.999	0.998
			T_s ($^{\circ}C$)	443	30/40	143	460	0.998	0.997
			$T_{10}^{14.5}$ ($^{\circ}C$)	377	40/50	145	440	0.998	0.997
			T_{10}^{13} ($^{\circ}C$)	390	50/60	145	420	0.998	0.997
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	139	60/70	147	400	0.998	0.997
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	170	70/80	149	390	0.998	0.997
			λ (W/(m·K))	0.97	80/90	150	380	0.998	0.997
			β_d	45	90/100	152	370	0.997	0.995
Constants of Dispersion Formula			Mechanical Properties		100/110	154	360	0.994	0.988
					110/120	156	350	0.986	0.973
					120/130	159	340	0.965	0.932
					130/140	160	330	0.925	0.856
Density			μ	0.333	140/150	164	320	0.845	0.714
			σ_b (MPa)	32	150/160	168	310	0.716	0.513
Solarization			B ($10^{-12}/Pa$)	0.59			300	0.535	0.286
							290	0.367	0.135
							280	0.205	0.042

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index										Coloration Code	
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)										Coloration of Internal Transmittance	
	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	$\lambda_{80}(\lambda_{70})/\lambda_5$ 330/280	
-40 ~ -20	-6.0	-5.8	-5.7	-5.7	-5.6	-5.5	-5.3	-5.1	-5.1	-4.9	Coloration of Internal Transmittance	
-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	$\lambda\tau_{80}/\lambda\tau_5$ 326/280	
20 ~ 40	-7.0	-6.8	-6.7	-6.7	-6.6	-6.4	-6.4	-6.2	-6.1	-5.9	Constants of dn/dt	
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	D_0	D_1
120 ~ 140	-7.4	-7.3	-7.2	-7.1	-7.1	-7.0	-6.8	-6.7	-6.7	-6.6	-2.28E-05	-4.73E-09
140 ~ 160	-7.5	-7.4	-7.2	-7.2	-7.1	-7.0	-6.9	-6.8	-6.7	-6.5	E_0	E_1
											λ_{TK}	
											6.79E-07	-1.59E-10
											1.98E-07	

D-K9	516641	$n_d = 1.51633$	$v_d = 64.06$	$n_F - n_C = 0.008060$
		$n_e = 1.51825$	$v_e = 63.87$	$n_{F'} - n_{C'} = 0.008114$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.48801	P _{d,C}	0.3089	RC (S)	1	2400	0.878	0.771		
n ₁₉₇₀	1970.09	1.49383	P _{e,d}	0.2382	RA (S)	1	2200	0.939	0.882		
n ₁₅₃₀	1529.58	1.50003	P _{g,F}	0.5347	D _W	1	2000	0.985	0.970		
n ₁₁₂₉	1128.64	1.50516	P' _{d,c'}	0.2576	D _A	1	1800	0.995	0.990		
n ₁₀₆₄	1064.00	1.50603	P' _{e,d}	0.2366	R _{OH} (S)	2	1600	0.999	0.998		
n _t	1013.98	1.50673	P' _{g,F'}	0.4745	RP (S)	1	1400	0.999	0.998		
n _s	852.11	1.50929			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.51094					1060	0.999	0.998		
n _r	706.52	1.51241									
n _C	656.27	1.51384	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1000	0.999	0.998		
n _{C'}	643.85	1.51424									
n _{He-Ne}	632.80	1.51461	P _{F,e}	-0.0020	°C	α	950	0.999	0.998		
n _D	589.29	1.51625	P _{g,F}	-0.0025	-50/-40	49	900	0.999	0.998		
n _D	589.29	1.51625	P _{C,t}	0.0316	-40/-30	49	850	0.999	0.998		
n _d	587.56	1.51633	P _{C,s}	0.0104	-30/-20	50	800	0.999	0.998		
n _e	546.07	1.51825	Thermal Properties		-20/-10	51	750	0.999	0.998		
n _F	486.13	1.52190									
n _{F'}	479.99	1.52236	T _g (°C)		500	-10/0	53	700	0.999	0.998	
n _g	435.84	1.52621	T _s (°C)		560	0/10	54	650	0.999	0.998	
n _h	404.66	1.52976	T ₁₀ ^{14.5} (°C)		450	10/20	55	600	0.999	0.998	
n _i	365.01	1.53574	T ₁₀ ¹³ (°C)		465	20/30	56	550	0.999	0.998	
			α _{-50/80°C} (10 ⁻⁷ /K)		55	30/40	57	500	0.999	0.998	
			α _{100/300°C} (10 ⁻⁷ /K)		70	40/50	58	480	0.999	0.998	
			λ (W/(m·K))		1.31	50/60	59	460	0.999	0.998	
			β _d		55	60/70	60	440	0.999	0.998	
Constants of Dispersion Formula					70/80	61	420	0.999	0.998		
					60/70	60	400	0.999	0.998		
A ₀	2.27095299E+00		Mechanical Properties		80/90	61	390	0.998	0.997		
A ₁	-1.08648469E-02										
A ₂	1.05786491E-02		HK (10 ⁷ Pa)		581	90/100	61	380	0.997	0.996	
A ₃	1.54454636E-04		F _A		81	100/110	64	370	0.996	0.995	
A ₄	5.64088446E-06		E (GPa)		79.0	110/120	65	360	0.993	0.987	
A ₅	-4.709999004E-07		G (GPa)		32.7	120/130	66	350	0.987	0.976	
			μ		0.208	130/140	66	340	0.973	0.950	
			σ _b (MPa)		92	140/150	68	330	0.947	0.898	
Density		Solarization		B (10 ⁻¹² /Pa)		2.73	150/160	69	320	0.891	0.794
ρ (g/cm ³)	2.39							310	0.774	0.598	
Temperature Coefficients of Refractive Index dn/dt relative (×10 ⁻⁶ / °C)							300	0.556	0.308		
							290	0.256	0.066		
							280				
Range of Temperature											

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.59201$	$v_d = 67.00$	$n_F - n_C = 0.008833$
		$n_e = 1.59412$	$v_e = 66.73$	$n_{F'} - n_{C'} = 0.008899$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.56449	P _{d,C}	0.3057	RC (S)	1	2400	0.915	0.837		
n ₁₉₇₀	1970.09	1.56973	P _{e,d}	0.2389	RA (S)	1	2200	0.947	0.897		
n ₁₅₃₀	1529.58	1.57540	P _{g,F}	0.5400	D _W	1	2000	0.977	0.955		
n ₁₁₂₉	1128.64	1.58027	P' _{d,c'}	0.2551	D _A	4	1800	0.990	0.980		
n ₁₀₆₄	1064.00	1.58112	P' _{e,d}	0.2371	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.58182	P' _{g,F'}	0.4798	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.58444			CR	2	1200	0.999	0.998		
n _{A'}	768.19	1.58618					1060	0.999	0.998		
n _r	706.52	1.58775									
n _C	656.27	1.58931	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1000	0.999	0.998		
n _{C'}	643.85	1.58974									
n _{He-Ne}	632.80	1.59014	P _{F,e}	0.0019	°C	α	950	0.999	0.998		
n _D	589.29	1.59193	P _{g,F}	0.0077	-50/-40	79	900	0.999	0.998		
n _D	589.29	1.59193	P _{C,t}	-0.0168	-40/-30	81	850	0.999	0.998		
n _d	587.56	1.59201	P _{C,s}	-0.0099	-30/-20	85	750	0.999	0.998		
n _e	546.07	1.59412	Thermal Properties		-20/-10	87	700	0.999	0.998		
n _F	486.13	1.59814									
n _{F'}	479.99	1.59864	T _g (°C)		509	-10/0	89	650	0.999	0.998	
n _g	435.84	1.60291	T _s (°C)		538	0/10	90	600	0.999	0.998	
n _h	404.66	1.60684	T ₁₀ ^{14.5} (°C)		481	10/20	91	550	0.999	0.998	
n _i	365.01	1.61349	T ₁₀ ¹³ (°C)		502	20/30	93	500	0.999	0.998	
			α _{-50/80°C} (10 ⁻⁷ /K)		87	30/40	93	480	0.999	0.998	
			α _{100/300°C} (10 ⁻⁷ /K)		113	40/50	95	460	0.999	0.998	
			λ (W/(m·K))		0.78	50/60	96	440	0.998	0.995	
			β _d		120	60/70	96	420	0.996	0.992	
Constants of Dispersion Formula					70/80	98	400	0.994	0.988		
					80/90	100	390	0.992	0.984		
A ₀	2.50030926E+00		Mechanical Properties		90/100	102	380	0.990	0.980		
A ₁	-1.01689443E-02				HK (10 ⁷ Pa)	426	370	0.985	0.972		
A ₂	1.24607241E-02		F _A		299	100/110	102	360	0.978	0.952	
A ₃	1.85952458E-04		E (GPa)		80.4	110/120	103	350	0.967	0.930	
A ₄	2.05179854E-06		G (GPa)		31.0	120/130	104	340	0.945	0.889	
A ₅	-1.49222817E-07		μ		0.297	130/140	106	330	0.908	0.821	
Density		Solarization		σ _b (MPa)		57	140/150	106	320	0.848	0.716
				B (10 ⁻¹² /Pa)		1.30	150/160	108	310	0.762	0.579
Temperature Coefficients of Refractive Index dn/dt relative (×10 ⁻⁶ / °C)							300	0.657	0.433		
							290	0.542	0.297		
							280	0.422	0.182		

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-PK60A	592670	$n_d = 1.59201$	$v_d = 67.00$	$n_F - n_C = 0.008836$
		$n_e = 1.59412$	$v_e = 66.74$	$n_F - n_{C'} = 0.008902$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42		$P_{d,C}$	0.3066	RC (S)	2	2400	0.958	0.917
n_{1970}	1970.09		$P_{e,d}$	0.2383	RA (S)	2	2200	0.978	0.956
n_{1530}	1529.58		$P_{g,F}$	0.5394	D_W	1	2000	0.991	0.983
n_{1129}	1128.64	1.58026	$P'_{d,c'}$	0.2557	D_A	4	1800	0.996	0.991
n_{1064}	1064.00	1.58110	$P'_{e,d}$	0.2366	$R_{OH}(S)$	1	1600	0.999	0.997
n_t	1013.98	1.58179	$P'_{g,F'}$	0.4792	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.58441			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.58616	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.58775					1000	0.999	0.998
n_C	656.27	1.58930					950	0.999	0.998
$n_{C'}$	643.85	1.58974					900	0.999	0.998
n_{He-Ne}	632.80	1.59014	$P_{F,e}$	0.0017	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.59193	$P_{g,F}$	0.0071	-50/-40	82	800	0.999	0.998
n_d	587.56	1.59201	$P_{C,t}$	-0.0143	-40/-30	86	750	0.999	0.998
n_e	546.07	1.59412	$P_{C,s}$	-0.0071	-30/-20	88	700	0.999	0.998
n_F	486.13	1.59814	Thermal Properties		-20/-10	89	650	0.999	0.998
$n_{F'}$	479.99	1.59864			-10/0	90	600	0.999	0.998
n_g	435.84	1.60291	T_g ($^{\circ}C$)	511	0/10	91	550	0.999	0.998
n_h	404.66	1.60685	T_s ($^{\circ}C$)	541	10/20	93	500	0.999	0.998
n_i	365.01	1.61347	$T_{10}^{14.5}$ ($^{\circ}C$)	483	20/30	94	480	0.999	0.997
			T_{10}^{13} ($^{\circ}C$)	505	30/40	96	460	0.998	0.996
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	92	40/50	97	440	0.997	0.995
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	117	50/60	98	420	0.997	0.994
			λ (W/(m $\cdot$ K))	0.85	60/70	99	400	0.996	0.993
			β_d	105	70/80	100	390	0.995	0.990
Constants of Dispersion Formula			Mechanical Properties		80/90	102	380	0.993	0.986
					90/100	103	370	0.989	0.979
A_0	2.49773939E+00		HK (10^7Pa)	466	100/110	104	360	0.983	0.965
A_1	-9.08291831E-03		F_A	250	110/120	105	350	0.968	0.938
A_2	1.43828132E-02		E (GPa)	88.2	120/130	107	340	0.944	0.891
A_3	-4.31987762E-04		G (GPa)	34.5	130/140	109	330	0.902	0.814
A_4	9.07002654E-05		μ	0.278	140/150	112	320	0.838	0.703
A_5	-4.79737948E-06		σ_b (MPa)		150/160	115	310	0.750	0.563
Density		Solarization		B ($10^{-12}/Pa$)	1.38		300	0.649	0.421
ρ (g/cm 3)	3.16	$\triangle\lambda$ (%)	-1.9				290	0.538	0.289
							280	0.424	0.180

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	t	s	C	C'	He-Ne	d	e	F	F'	g
-60 ~ -40	-2.3	-2.2	-1.8	-1.8	-1.8	-1.6	-1.5	-1.2	-1.1	-0.8
-40 ~ -20	-2.3	-2.2	-1.9	-1.9	-1.8	-1.7	-1.5	-1.2	-1.2	-0.9
-20 ~ 0	-2.3	-2.2	-1.9	-1.9	-1.8	-1.7	-1.5	-1.2	-1.2	-0.9
0 ~ 20	-2.3	-2.1	-1.8	-1.8	-1.8	-1.6	-1.5	-1.2	-1.1	-0.8
20 ~ 40	-2.2	-2.1	-1.7	-1.7	-1.7	-1.6	-1.4	-1.1	-1.1	-0.8
40 ~ 60	-2.1	-2.0	-1.7	-1.6	-1.6	-1.5	-1.3	-1.0	-1.0	-0.7
60 ~ 80	-2.0	-1.9	-1.6	-1.5	-1.5	-1.4	-1.2	-0.9	-0.9	-0.6
80 ~ 100	-1.9	-1.8	-1.5	-1.4	-1.4	-1.3	-1.1	-0.8	-0.8	-0.5
100 ~ 120	-1.8	-1.7	-1.4	-1.3	-1.3	-1.2	-1.0	-0.7	-0.7	-0.4
120 ~ 140	-1.7	-1.6	-1.3	-1.3	-1.2	-1.1	-1.0	-0.7	-0.6	-0.3
140 ~ 160	-1.6	-1.5	-1.2	-1.2	-1.2	-1.0	-0.9	-0.6	-0.6	-0.3

Coloration Code	
$\lambda_{80}(\lambda_{70})/\lambda_5$	340/270
Coloration of Internal Transmittance	
$\lambda\tau_{80}/\lambda\tau_5$	328/267

Constants of dn/dt		
D ₀	D ₁	D ₂
-8.44E-06	1.49E-08	-2.04E-11
E ₀	E ₁	λ_{TK}
7.08E-07	-1.08E-10	6.42E-13

D-PK62	619639	$n_d = 1.61881$	$v_d = 63.85$	$n_F - n_C = 0.009691$
		$n_e = 1.62112$	$v_e = 63.55$	$n_{F'} - n_{C'} = 0.009773$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.59157	P _{d,C}	0.3044	RC (S)	1	2400	0.960	0.921		
n ₁₉₇₀	1970.09	1.59638	P _{e,d}	0.2384	RA (S)	2	2200	0.977	0.954		
n ₁₅₃₀	1529.58	1.60165	P _{g,F}	0.5459	D _W	1	2000	0.990	0.980		
n ₁₁₂₉	1128.64	1.60637	P' _{d,c'}	0.2538	D _A	4	1800	0.995	0.990		
n ₁₀₆₄	1064.00	1.60722	P' _{e,d}	0.2364	R _{OH} (S)	1	1600	0.999	0.998		
n _t	1013.98	1.60793	P' _{g,F'}	0.4850	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.61065			CR	1	1200	0.999	0.998		
n _{A'}	768.19	1.61249	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.61418					1000	0.999	0.998		
n _C	656.27	1.61586					950	0.999	0.998		
n _{C'}	643.85	1.61633					900	0.999	0.998		
n _{He-Ne}	632.80	1.61676					850	0.999	0.998		
n _D	589.29	1.61872	P _{F,e}	0.0022	°C	α	800	0.999	0.998		
n _D	589.29	1.61872	P _{g,F}	0.0083	-50/-40	90	750	0.999	0.998		
n _d	587.56	1.61881	P _{C,t}	-0.0312	-40/-30	91	700	0.999	0.998		
n _e	546.07	1.62112	P _{C,s}	-0.0160	-30/-20	92	650	0.999	0.998		
n _F	486.13	1.62555	Thermal Properties		-20/-10	92	600	0.999	0.998		
n _{F'}	479.99	1.62610			T _g (°C)	519	-10/0	96	550	0.999	0.998
n _g	435.84	1.63084			T _s (°C)	562	0/10	97	500	0.999	0.998
n _h	404.66	1.63522			T ₁₀ ^{14.5} (°C)	488	10/20	98	480	0.999	0.998
n _i	365.01	1.64265			T ₁₀ ¹³ (°C)	510	20/30	99	460	0.999	0.998
					α _{-50/80°C} (10 ⁻⁷ /K)	98	440	0.998	0.996		
					α _{100/300°C} (10 ⁻⁷ /K)	122					

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.52500$	$v_d = 70.32$	$n_F - n_C = 0.007470$
		$n_e = 1.52679$	$v_e = 70.11$	$n_F - n_{C'} = 0.007510$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance				
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm		
n ₂₃₂₅	2325.42	1.49842	P _{d,C}	0.3092	RC (S)	1	2400	0.655	0.429		
n ₁₉₇₀	1970.09	1.50393	P _{e,d}	0.2396	RA (S)	1	2200	0.743	0.552		
n ₁₅₃₀	1529.58	1.50979	P _{g,F}	0.5301	D _W	1	2000	0.852	0.727		
n ₁₁₂₉	1128.64	1.51461	P' _{d,c'}	0.2583	D _A	1	1800	0.918	0.843		
n ₁₀₆₄	1064.00	1.51542	P' _{e,d}	0.2383	R _{OH} (S)	3	1600	0.973	0.947		
n _t	1013.98	1.51607	P' _{g,F'}	0.4727	RP (S)	2	1400	0.999	0.998		
n _s	852.11	1.51845			CR		1200	0.999	0.998		
n _{A'}	768.19	1.51999	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998		
n _r	706.52	1.52136					1000	0.999	0.998		
n _C	656.27	1.52269					950	0.999	0.998		
n _{C'}	643.85	1.52306					900	0.999	0.998		
n _{He-Ne}	632.80	1.52341	P _{F,e}	0.0011	°C	α	850	0.999	0.998		
n _D	589.29	1.52493	P _{g,F}	0.0033	-50/-40	68	800	0.999	0.998		
n _d	587.56	1.52500	P _{C,t}	0.0053	-40/-30	70	750	0.999	0.998		
n _e	546.07	1.52679	P _{C,s}	-0.0016	-30/-20	71	700	0.999	0.998		
n _F	486.13	1.53017	Thermal Properties		-20/-10	73	650	0.999	0.998		
n _{F'}	479.99	1.53058			T _g (°C)	534	-10/0	74	600	0.999	0.998
n _g	435.84	1.53413			T _s (°C)	578	0/10	75	550	0.999	0.998
n _h	404.66	1.53738			T ₁₀ ^{14.5} (°C)	505	10/20	76	500	0.999	0.998
n _i	365.01	1.54287			T ₁₀ ¹³ (°C)	528	20/30	76	480	0.999	0.998
					α _{-50/80°C} (10 ⁻⁷ /K)	75	30/40	77	460	0.998	0.996
					α _{100/300°C} (10 ⁻⁷ /K)	96	40/50	78	440	0.997	0.993
					λ (W/(m·K))	0.97	50/60	79	420	0.996	0.990
					β _d	175	60/70	79	400	0.994	0.987
Constants of Dispersion Formula					70/80	80	390	0.992	0.984		
			Mechanical Properties		80/90	81	380	0.990	0.981		
A ₀	2.29965045E+00		HK (10 ⁷ Pa)		382	90/100	82	370	0.988	0.976	
A ₁	-1.03835061E-02		F _A		197	100/110	83	360	0.984	0.969	
A ₂	9.47420898E-03		E (GPa)		74.3	110/120	85	350	0.980	0.960	
A ₃	3.16683036E-04		G (GPa)		30.1	120/130	86	340	0.969	0.940	
A ₄	-2.62425226E-05		μ		0.233	130/140	87	330	0.949	0.900	
A ₅	1.36324904E-06		σ _b (MPa)		67	140/150	88	320	0.906	0.822	
Density				B (10 ⁻¹² /Pa)	2.13	150/160	90	310	0.833	0.693	
ρ (g/cm ³)	2.63	Solarization									
		△λ (%)	-2.0								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.58700$	$v_d = 59.59$	$n_F - n_C = 0.009850$
		$n_e = 1.58935$	$v_e = 59.35$	$n_{F'} - n_{C'} = 0.009930$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.55732	$P_{d,C}$	0.3056	RC (S)	1	2400	0.920	0.831
n_{1970}	1970.09	1.56289	$P_{e,d}$	0.2386	RA (S)	3	2200	0.962	0.909
n_{1530}	1529.58	1.56892	$P_{g,F}$	0.5421	D_W	1	2000	0.990	0.980
n_{1129}	1128.64	1.57412	$P'_{d,c'}$	0.2538	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.57504	$P'_{e,d}$	0.2367	$R_{OH}(S)$	2	1600	0.999	0.998
n_t	1013.98	1.57579	$P'_{g,F'}$	0.4804	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.57863			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.58054	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.58228					1000	0.999	0.998
n_C	656.27	1.58399					950	0.999	0.998
$n_{C'}$	643.85	1.58448					900	0.999	0.998
n_{He-Ne}	632.80	1.58492	$P_{F,e}$	-0.0015	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.58691	$P_{g,F}$	-0.0025	-50/-40	64	800	0.999	0.998
n_d	587.56	1.58700	$P_{C,t}$	0.0036	-40/-30	67	750	0.999	0.998
n_e	546.07	1.58935	$P_{C,s}$	0.0007	-30/-20	70	700	0.999	0.998
n_F	486.13	1.59384	Thermal Properties		-20/-10	71	650	0.999	0.998
$n_{F'}$	479.99	1.59441			-10/0	72	600	0.999	0.998
n_g	435.84	1.59918	T_g ($^{\circ}C$)	507	0/10	73	550	0.999	0.998
n_h	404.66	1.60364	T_s ($^{\circ}C$)	548	10/20	74	500	0.999	0.998
n_i	365.01	1.61145	$T_{10}^{14.5}$ ($^{\circ}C$)	448	20/30	75	480	0.999	0.998
			T_{10}^{13} ($^{\circ}C$)	485	30/40	76	460	0.999	0.998
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	72	40/50	76	440	0.999	0.998
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	92	50/60	77	420	0.999	0.998
			λ (W/(m·K))	1.09	60/70	77	400	0.999	0.998
			β_d	90	70/80	78	390	0.999	0.998
Constants of Dispersion Formula			Mechanical Properties		80/90	79	380	0.999	0.998
					90/100	79	370	0.994	0.990
A_0	2.48098765E+00		HK (10^7Pa)	570	100/110	80	360	0.988	0.979
A_1	-1.07611097E-02		F_A	107	110/120	82	350	0.974	0.949
A_2	1.30595297E-02		E (GPa)	91.6	120/130	83	340	0.955	0.913
A_3	5.70453194E-04		G (GPa)	36.9	130/140	84	330	0.919	0.851
A_4	-6.87445031E-05		μ	0.242	140/150	85	320	0.859	0.734
A_5	5.08145529E-06		σ_b (MPa)	82	150/160	86	310	0.753	0.567
Density			B ($10^{-12}/Pa$)	2.11			300	0.597	0.358
							290	0.411	0.173
ρ (g/cm ³)	2.98						280	0.231	0.059
Solarization									
$\triangle\lambda$ (%)	-6.5								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.58913$	$v_d = 61.25$	$n_F - n_C = 0.009619$
		$n_e = 1.59142$	$v_e = 61.03$	$n_F - n_{C'} = 0.009690$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.55682	$P_{d,C}$	0.3067	RC (S)	1	2400	0.805	0.648
n_{1970}	1970.09	1.56338	$P_{e,d}$	0.2381	RA (S)	3	2200	0.913	0.834
n_{1530}	1529.58	1.57035	$P_{g,F}$	0.5354	D_W	2	2000	0.988	0.976
n_{1129}	1128.64	1.57613	$P'_{d,c'}$	0.2559	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.57711	$P'_{e,d}$	0.2363	$R_{OH}(S)$	2	1600	0.999	0.998
n_t	1013.98	1.57790	$P'_{g,F'}$	0.4757	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.58083			CR	4c	1200	0.999	0.998
$n_{A'}$	768.19	1.58275	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.58448					1000	0.999	0.998
n_C	656.27	1.58618					950	0.999	0.998
$n_{C'}$	643.85	1.58665					900	0.999	0.998
n_{He-Ne}	632.80	1.58709	$P_{F,e}$	-0.0010	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.58904	$P_{g,F}$	-0.0065	-50/-40	58	800	0.999	0.998
n_d	587.56	1.58913	$P_{C,t}$	0.0239	-40/-30	59	750	0.999	0.998
n_e	546.07	1.59142	$P_{C,s}$	0.0088	-30/-20	59	700	0.999	0.998
n_F	486.13	1.59580	Thermal Properties		-20/-10	62	650	0.999	0.998
$n_{F'}$	479.99	1.59634			-10/0	63	600	0.999	0.998
n_g	435.84	1.60095			0/10	65	550	0.999	0.998
n_h	404.66	1.60520			10/20	67	500	0.999	0.998
n_i	365.01	1.61247	T_g ($^{\circ}C$)	508	20/30	67	480	0.999	0.998
			T_s ($^{\circ}C$)	544	30/40	70	460	0.999	0.998
			$T_{10}^{14.5}$ ($^{\circ}C$)	444	40/50	70	440	0.999	0.998
			T_{10}^{13} ($^{\circ}C$)	465	50/60	72	420	0.999	0.998
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	66	60/70	73	400	0.999	0.998
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	89	70/80	75	390	0.995	0.989
			λ (W/(m·K))	1.31	80/90	75	380	0.993	0.984
			β_d	100	90/100	76	370	0.989	0.977
Constants of Dispersion Formula			Mechanical Properties		100/110	77	360	0.980	0.962
					110/120	79	350	0.965	0.933
					120/130	80	340	0.937	0.880
					130/140	83	330	0.892	0.794
Density			μ	0.250	140/150	83	320	0.815	0.664
			σ_b (MPa)	70	150/160	84	310	0.705	0.498
			B ($10^{-12}/Pa$)	2.12			300	0.566	0.322
Solarization							290	0.417	0.176
							280	0.281	0.082
ρ (g/cm ³)	2.79		$\Delta\lambda$ (%)	-2.5					

Range of Temperature (°C)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.58831$	$v_d = 61.02$	$n_F - n_C = 0.009640$
		$n_e = 1.59061$	$v_e = 60.81$	$n_F - n_{C'} = 0.009710$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance			
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm	
n ₂₃₂₅	2325.42		P _{d,C}	0.3071	RC (S)	2	2400	0.884	0.781	
n ₁₉₇₀	1970.09		P _{e,d}	0.2386	RA (S)	2	2200	0.955	0.911	
n ₁₅₃₀	1529.58		P _{g,F}	0.5384	D _W	2	2000	0.987	0.974	
n ₁₁₂₉	1128.64	1.57541	P' _{d,c'}	0.2564	D _A	3	1800	0.993	0.986	
n ₁₀₆₄	1064.00	1.57635	P' _{e,d}	0.2369	R _{OH} (S)	2	1600	0.997	0.995	
n _t	1013.98	1.57712	P' _{g,F'}	0.4768	RP (S)	2	1400	0.999	0.998	
n _s	852.11	1.58001			CR	4b	1200	0.999	0.998	
n _{A'}	768.19	1.58193	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998	
n _r	706.52	1.58365					1000	0.999	0.998	
n _C	656.27	1.58535					950	0.999	0.998	
n _{C'}	643.85	1.58582					900	0.999	0.998	
n _{He-Ne}	632.80	1.58627	P _{F,e}	-0.0022	°C	α	850	0.999	0.998	
n _D	589.29	1.58823	P _{g,F}	-0.0039	-50/-40	60	800	0.999	0.998	
n _d	587.56	1.58831	P _{C,t}	0.0179	-40/-30	65	750	0.999	0.998	
n _e	546.07	1.59061	P _{C,s}	0.0071	-30/-20	67	700	0.999	0.998	
n _F	486.13	1.59499	Thermal Properties		-20/-10	68	650	0.999	0.998	
n _{F'}	479.99	1.59555			T _g (°C)	514	-10/0	72	600	0.999
n _g	435.84	1.60018	T _s (°C)		546	0/10	73	550	0.999	0.998
n _h	404.66	1.60446	T ₁₀ ^{14.5} (°C)		474	10/20	73	500	0.999	0.998
n _i	365.01	1.61171	T ₁₀ ¹³ (°C)		502	20/30	75	480	0.999	0.998
			α _{-50/80°C} (10 ⁻⁷ /K)		73	30/40	77	460	0.999	0.998
			α _{100/300°C} (10 ⁻⁷ /K)		96	40/50	79	440	0.999	0.998
			λ (W/(m·K))		1.19	50/60	79	420	0.999	0.998
			β _d		100	60/70	81	400	0.998	0.996
Constants of Dispersion Formula					70/80	82	390	0.997	0.994	
					80/90	84	380	0.995	0.991	
A ₀	2.48520640E+00		Mechanical Properties		90/100	84	370	0.994	0.988	
A ₁	-1.11940698E-02				HK (10 ⁷ Pa)	606	100/110	86	360	0.986
A ₂	1.38766236E-02		F _A		103	110/120	86	350	0.975	0.951
A ₃	1.12540137E-04		E (GPa)		99.1	120/130	89	340	0.953	0.908
A ₄	1.15205458E-05		G (GPa)		38.8	130/140	89	330	0.914	0.836
A ₅	-4.63440822E-07		μ		0.278	140/150	91	320	0.847	0.717
Density		Solarization		σ _b (MPa)	141	150/160	94	310	0.738	0.545
ρ (g/cm ³)	2.80			B (10 ⁻¹² /Pa)	2.14			300	0.597	0.356
Range of Temperature	Temperature Coefficients of Refractive Index									
	dn/dt relative (×10 ⁻⁶ / °C)									
								290	0.438	0.192
								280	0.293	0.086

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	$n_d = 1.60886$	$v_d = 57.90$	$n_F - n_C = 0.010516$
		$n_e = 1.61136$	$v_e = 57.70$	$n_F - n_{C'} = 0.010595$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.57477	$P_{d,C}$	0.3052	RC (S)	1	2400	0.780	0.608
n_{1970}	1970.09	1.58152	$P_{e,d}$	0.2377	RA (S)	3	2200	0.903	0.815
n_{1530}	1529.58	1.58874	$P_{g,F}$	0.5401	D_W	2	2000	0.987	0.974
n_{1129}	1128.64	1.59482	$P'_{d,c'}$	0.2548	D_A	3	1800	0.995	0.990
n_{1064}	1064.00	1.59586	$P'_{e,d}$	0.2360	$R_{OH}(S)$	2	1600	0.999	0.998
n_t	1013.98	1.59671	$P'_{g,F'}$	0.4795	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.59986			CR	4b	1200	0.999	0.998
$n_{A'}$	768.19	1.60194	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.60380					1000	0.999	0.998
n_C	656.27	1.60565					950	0.999	0.998
$n_{C'}$	643.85	1.60616					900	0.999	0.998
n_{He-Ne}	632.80	1.60664	$P_{F,e}$	-0.0018	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.60876	$P_{g,F}$	-0.0073	-50/-40	58	800	0.999	0.998
n_d	587.56	1.60886	$P_{C,t}$	0.0294	-40/-30	61	750	0.999	0.998
n_e	546.07	1.61136	$P_{C,s}$	0.0112	-30/-20	64	700	0.999	0.998
n_F	486.13	1.61616	Thermal Properties		-20/-10	65	650	0.999	0.998
$n_{F'}$	479.99	1.61676			-10/0	67	600	0.999	0.998
n_g	435.84	1.62184			0/10	69	550	0.999	0.998
n_h	404.66	1.62655			10/20	70	500	0.999	0.998
n_i	365.01	1.63460	T_g ($^{\circ}C$)	505	20/30	72	480	0.999	0.998
			T_s ($^{\circ}C$)	541	30/40	74	460	0.999	0.998
			$T_{10}^{14.5}$ ($^{\circ}C$)	458	40/50	75	440	0.999	0.998
			T_{10}^{13} ($^{\circ}C$)	476	50/60	76	420	0.998	0.996
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	70	60/70	77	400	0.997	0.994
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	87	70/80	77	390	0.996	0.992
			λ (W/(m·K))	1.18	80/90	78	380	0.994	0.988
			β_d	100	90/100	79	370	0.989	0.978
Constants of Dispersion Formula			Mechanical Properties		100/110	81	360	0.974	0.952
					110/120	82	350	0.955	0.915
A_0	2.54913552E+00				120/130	84	340	0.919	0.848
A_1	-1.32831855E-02				130/140	85	330	0.855	0.733
A_2	1.39362205E-02		HK (10^7Pa)	669	140/150	87	320	0.740	0.548
A_3	4.99307363E-04		F_A	106	150/160	88	310	0.535	0.287
A_4	-3.36145332E-05		E (GPa)	103.1			300	0.230	0.054
A_5	1.90094032E-06		G (GPa)	40.6			290		
			μ	0.269			280		
			σ_b (MPa)	90					
			B ($10^{-12}/Pa$)	2.34					
Density		Solarization							
ρ (g/cm ³)	2.83	$\triangle\lambda$ (%)	0.0						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.69350$	$v_d = 53.20$	$n_F - n_C = 0.013036$
		$n_e = 1.69661$	$v_e = 52.97$	$n_{F'} - n_{C'} = 0.013152$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.65586	P _{d,C}	0.3030	RC (S)	1	2400	0.834	0.696
n ₁₉₇₀	1970.09	1.66278	P _{e,d}	0.2386	RA (S)	3	2200	0.962	0.926
n ₁₅₃₀	1529.58	1.67028	P _{g,F}	0.5485	D _W	1	2000	0.990	0.980
n ₁₁₂₉	1128.64	1.67683	P' _{d,c'}	0.2532	D _A	3	1800	0.997	0.994
n ₁₀₆₄	1064.00	1.67799	P' _{e,d}	0.2365	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.67895	P' _{g,F'}	0.4866	RP (S)	2	1400	0.999	0.998
n _s	852.11	1.68259			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.68506	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.68731					1000	0.999	0.998
n _C	656.27	1.68955					950	0.999	0.998
n _{C'}	643.85	1.69017					900	0.999	0.998
n _{He-Ne}	632.80	1.69076					850	0.999	0.998
n _D	589.29	1.69338	P _{F,e}	-0.0029	°C	α	800	0.999	0.998
n _d	587.56	1.69350	P _{g,F}	-0.0068	-50/-40	60	750	0.999	0.998
n _e	546.07	1.69661	P _{C,t}	0.0152	-40/-30	61	700	0.999	0.998
			P _{C,s}	0.0058	-30/-20	63	650	0.999	0.998
n _F	486.13	1.70258	Thermal Properties		-20/-10	65	600	0.999	0.998
n _{F'}	479.99	1.70333			-10/0	66	550	0.999	0.998
n _g	435.84	1.70973			0/10	67	500	0.999	0.998
n _h	404.66	1.71570			10/20	67	480	0.999	0.998
n _i	365.01	1.72593			20/30	68	460	0.999	0.998
					30/40	69	440	0.998	0.996
					40/50	70			
								</	

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		Solarization	
ρ (g/cm ³)	3.50	$\Delta\lambda$ (%)	-0.5

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZF10A	689311	$n_d = 1.68893$	$v_d = 31.08$	$n_F - n_C = 0.022169$
		$n_e = 1.69417$	$v_e = 30.85$	$n_F - n_{C'} = 0.022498$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42		P _{d,C}	0.2905	RC (S)	1	2400	0.968	0.937					
n ₁₉₇₀	1970.09		P _{e,d}	0.2364	RA (S)	1	2200	0.976	0.952					
n ₁₅₃₀	1529.58		P _{g,F}	0.5995	D _W	1	2000	0.987	0.974					
n ₁₁₂₉	1128.64	1.66447	P' _{d,c'}	0.2414	D _A	1	1800	0.992	0.984					
n ₁₀₆₄	1064.00	1.66585	P' _{e,d}	0.2329	R _{OH} (S)	1	1600	0.998	0.995					
n _t	1013.98	1.66704	P' _{g,F'}	0.5312	RP (S)	1	1400	0.999	0.998					
n _s	852.11	1.67193			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.67553	Deviation of Relative Partial Dispersions				1060	0.999	0.998					
n _r	706.52	1.67895					Expansion Coefficient α (×10 ⁻⁷ /K)		1000	0.999	0.998			
n _C	656.27	1.68249							°C		950	0.999	0.998	
n _{C'}	643.85	1.68350									α		900	0.999
n _{He-Ne}	632.80	1.68444	-50/-40		850	0.999							0.998	
n _D	589.29	1.68874			-40/-30		800	0.999					0.998	
n _d	587.56	1.68893					-30/-20		750	0.999			0.998	
n _e	546.07	1.69417							-20/-10		700	0.998	0.997	
n _F	486.13	1.70466	-10/0								650	0.998	0.997	
n _{F'}	479.99	1.70600			0/10						600	0.998	0.997	
n _g	435.84	1.71795					10/20				550	0.998	0.996	
n _h	404.66	1.72975							20/30		500	0.996	0.992	
n _i	365.01	1.75193	30/40								480	0.995	0.990	
					40/50						460	0.993	0.986	
							50/60				440	0.990	0.980	
									60/70		420	0.984	0.968	
Constants of Dispersion Formula			Thermal Properties								60/70		400	0.964
					Tg (°C)								390	0.939
Ts (°C)		96		380			0.880	0.774						
				T ₁₀ ^{14.5} (°C)			98		370	0.724			0.524	
									T ₁₀ ¹³ (°C)		96		360	0.387
						α _{-50/80°C} (10 ⁻⁷ /K)							101	
98		104												
				96				109						
										93		111		
						96								110
98		113												
				101				119						
										104		125		
						109								128
111		128												
				113				123						
										119		128		
						125								128
128		123												
				123				128						
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						123								128
128		123												
				123				128						
										128		123		
						123								128

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-LaF050	768492	$n_d = 1.76802$	$v_d = 49.24$	$n_F - n_C = 0.015597$
		$n_e = 1.77173$	$v_e = 49.00$	$n_{F'} - n_{C'} = 0.015749$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance							
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm					
n ₂₃₂₅	2325.42	1.72707	P _{d,C}	0.3020	RC (S)	1	2400	0.820	0.672					
n ₁₉₇₀	1970.09	1.73403	P _{e,d}	0.2379	RA (S)	3	2200	0.952	0.906					
n ₁₅₃₀	1529.58	1.74170	P _{g,F}	0.5527	D _W	1	2000	0.978	0.956					
n ₁₁₂₉	1128.64	1.74866	P' _{d,c'}	0.2514	D _A	3	1800	0.989	0.978					
n ₁₀₆₄	1064.00	1.74994	P' _{e,d}	0.2356	R _{OH} (S)	1	1600	0.999	0.998					
n _t	1013.98	1.75101	P' _{g,F'}	0.4908	RP (S)	2	1400	0.999	0.998					
n _s	852.11	1.75515			CR	1	1200	0.999	0.998					
n _{A'}	768.19	1.75802	Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998				
n _r	706.52	1.76066								1000	0.999	0.998		
n _C	656.27	1.76331						P _{F,e}	-0.0027			950	0.999	0.998
n _{C'}	643.85	1.76406						P _{g,F}	-0.0091			900	0.999	0.998
n _{He-Ne}	632.80	1.76475	P _{C,t}	0.0099	°C	α	850	0.999	0.998					
n _D	589.29	1.76787	P _{C,s}	0.0046	-50/-40	58	800	0.999	0.998					
n _d	587.56	1.76802	Thermal Properties		-40/-30	59	750	0.999	0.998					
n _e	546.07	1.77173					-30/-20	60	700	0.999	0.998			
n _F	486.13	1.77891					-20/-10	61	650	0.999	0.998			
n _{F'}	479.99	1.77980					-10/0	62	600	0.999	0.998			
n _g	435.84	1.78753	T _g (°C)	615	0/10	62	550	0.999	0.998					
n _h	404.66	1.79475	T _s (°C)	640	10/20	62	500	0.999	0.998					
n _i	365.01	1.80718	T ₁₀ ^{14.5} (°C)	512	20/30	63	480	0.998	0.996					
			T ₁₀ ¹³ (°C)	549	30/40	63	460	0.997	0.994					
			α _{-50/80°C} (10 ⁻⁷ /K)	62	40/50	63	440	0.996	0.992					
			α _{100/300°C} (10 ⁻⁷ /K)	75	50/60	64	420	0.994	0.989					
			λ (W/(m·K))	0.79	60/70	64	400	0.992	0.984					
			β _d	147	70/80	65	390	0.989	0.978					
Constants of Dispersion Formula			Mechanical Properties		80/90	66	380	0.984	0.968					
					90/100	66	370	0.975	0.951					
A ₀	3.05764396E+00		HK (10 ⁷ Pa)	578	100/110	67	360	0.960	0.922					
A ₁	-1.46517743E-02		F _A	72	110/120	68	350	0.938	0.879					
A ₂	2.34463123E-02		E (GPa)	112.7	120/130	69	340	0.904	0.818					
A ₃	7.01742420E-04		G (GPa)	43.1	130/140	71	330	0.858	0.736					
A ₄	-2.73402326E-05		μ	0.306	140/150	72	320	0.796	0.634					
A ₅	1.97166425E-06		σ _b (MPa)	92	150/160	73	310	0.629	0.396					
Density		Solarization		B (10 ⁻¹² /Pa)	1.81			300	0.632	0.400				
ρ (g/cm ³)	4.56							290	0.552	0.305				
Range of Temperature	Temperature Coefficients of Refractive Index						280	0.381	0.145					
	dn/dt relative (×10 ⁻⁶ / °C)													

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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		
$\lambda_{80}(\lambda_{70})/\lambda_5$		360/280
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	$n_d = 1.77250$	$v_d = 49.50$	$n_F - n_C = 0.015605$
		$n_e = 1.77622$	$v_e = 49.26$	$n_{F'} - n_{C'} = 0.015757$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance					
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm			
n ₂₃₂₅	2325.42	1.73130	P _{d,C}	0.3018	RC (S)	1	2400	0.820	0.674			
n ₁₉₇₀	1970.09	1.73834	P _{e,d}	0.2384	RA (S)	3	2200	0.955	0.914			
n ₁₅₃₀	1529.58	1.74608	P _{g,F}	0.5537	D _W	1	2000	0.989	0.978			
n ₁₁₂₉	1128.64	1.75309	P' _{d,c'}	0.2513	D _A	3	1800	0.997	0.994			
n ₁₀₆₄	1064.00	1.75438	P' _{e,d}	0.2361	R _{OH} (S)	1	1600	0.999	0.998			
n _t	1013.98	1.75545	P' _{g,F'}	0.4912	RP (S)	2	1400	0.999	0.998			
n _s	852.11	1.75961			CR	1	1200	0.999	0.998			
n _{A'}	768.19	1.76248	Deviation of Relative Partial Dispersions				1060	0.999	0.998			
n _r	706.52	1.76513					1000	0.999	0.998			
n _C	656.27	1.76779	P _{F,e}	-0.0028	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.999	0.998			
n _{C'}	643.85	1.76854	P _{g,F}	-0.0077			°C	α	900	0.999	0.998	
n _{He-Ne}	632.80	1.76923	P _{C,t}	0.0108	-50/-40	58	850	0.999	0.998			
n _D	589.29	1.77236	P _{C,s}	0.0050	-40/-30	60	800	0.999	0.998			
n _d	587.56	1.77250	Thermal Properties		-30/-20	61	750	0.999	0.998			
n _e	546.07	1.77622			-20/-10	62	700	0.999	0.998			
n _F	486.13	1.78340	T _g (°C)	633	-10/0	63	650	0.999	0.998			
n _{F'}	479.99	1.78430	T _s (°C)	659	0/10	63	600	0.999	0.998			
n _g	435.84	1.79204	T ₁₀ ^{14.5} (°C)	583	10/20	64	550	0.999	0.998			
n _h	404.66	1.79927	T ₁₀ ¹³ (°C)	617	20/30	64	500	0.999	0.998			
n _i	365.01	1.81174	α _{-50/80°C} (10 ⁻⁷ /K)	65	30/40	64	480	0.998	0.996			
			α _{100/300°C} (10 ⁻⁷ /K)	75	40/50	65	460	0.997	0.994			
			λ (W/(m·K))	0.75	50/60	65	440	0.996	0.992			
			β _d	138	60/70	66	420	0.995	0.990			
Constants of Dispersion Formula			Mechanical Properties		70/80	66	400	0.991	0.982			
					80/90	67	390	0.987	0.976			
A ₀	3.07337625E+00		HK (10 ⁷ Pa)	643	90/100	67	380	0.982	0.966			
A ₁	-1.48574785E-02		F _A	81	100/110	68	370	0.973	0.950			
A ₂	2.34948451E-02		E (GPa)	114.8	110/120	69	360	0.952	0.920			
A ₃	7.16989975E-04		G (GPa)	43.4	120/130	70	350	0.931	0.870			
A ₄	-3.03961557E-05		μ	0.323	130/140	71	340	0.898	0.809			
A ₅	2.24464169E-06		σ _b (MPa)	88	140/150	72	330	0.853	0.731			
Density		Solarization		B (10 ⁻¹² /Pa)	1.70		320	0.797	0.639			
ρ (g/cm ³)	4.62						310	0.679	0.465			
		300	0.649				0.423					
Range of Temperature	Temperature Coefficients of Refractive Index						290	0.572	0.329			
							dn/dt relative (×10 ⁻⁶ / °C)					

D-LaF50-170	774494	$n_d = 1.77420$	$v_d = 49.41$	$n_F - n_C = 0.015670$
		$n_e = 1.77793$	$v_e = 49.17$	$n_{F'} - n_{C'} = 0.015820$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.73298	$P_{d,C}$	0.3019	RC (S)	1	2400	0.814	0.663
n_{1970}	1970.09	1.74004	$P_{e,d}$	0.2380	RA (S)	2	2200	0.949	0.900
n_{1530}	1529.58	1.74780	$P_{g,F}$	0.5507	D_W	1	2000	0.980	0.960
n_{1129}	1128.64	1.75479	$P'_{d,c'}$	0.2516	D_A	3	1800	0.993	0.985
n_{1064}	1064.00	1.75608	$P'_{e,d}$	0.2358	R_{OH} (S)	1	1600	0.996	0.992
n_t	1013.98	1.75714	$P'_{g,F'}$	0.4886	RP (S)	2	1400	0.998	0.996
n_s	852.11	1.76129			CR	1	1200	0.998	0.996
$n_{A'}$	768.19	1.76416	Deviation of Relative Partial Dispersions				1060	0.998	0.996
n_r	706.52	1.76681					1000	0.998	0.996
n_C	656.27	1.76947	$P_{F,e}$	-0.0028	Expansion Coefficient α ($\times 10^{-7}/K$)		950	0.998	0.996
$n_{C'}$	643.85	1.77022	$P_{g,F}$	-0.0108			900	0.998	0.996
n_{He-Ne}	632.80	1.77092	$P_{C,t}$	0.0073	$^{\circ}C$	α	850	0.998	0.996
n_D	589.29	1.77406	$P_{C,s}$	0.0030	-50/-40	53	800	0.998	0.996
n_d	587.56	1.77420	Thermal Properties		-40/-30	54	750	0.998	0.996
n_e	546.07	1.77793			-30/-20	56	700	0.998	0.996
n_F	486.13	1.78514	T_g ($^{\circ}C$)	628	-20/-10	57	650	0.998	0.996
$n_{F'}$	479.99	1.78604	T_s ($^{\circ}C$)	662	-10/0	58	600	0.997	0.994
n_g	435.84	1.79377	$T_{10}^{14.5}$ ($^{\circ}C$)	578	0/10	58	550	0.996	0.993
n_h	404.66	1.80098	T_{10}^{13} ($^{\circ}C$)	612	10/20	59	500	0.995	0.990
n_i	365.01	1.81346	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	60	20/30	60	480	0.994	0.989
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	76	30/40	61	460	0.993	0.986
			λ (W/(m $\cdot$ K))	0.80	40/50	62	440	0.992	0.983
			β_d	138	50/60	63	420	0.990	0.980

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		Solarization	
ρ (g/cm 3)	4.62	$\triangle\lambda$ (%)	-2.4

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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

70/80	65	390	0.984	0.969
80/90	66	380	0.979	0.959
90/100	66	370	0.966	0.933
100/110	67	360	0.942	0.887
110/120	67	350	0.920	0.847
120/130	68	340	0.890	0.792
130/140	68	330	0.849	0.720
140/150	70	320	0.791	0.626
150/160	72	310	0.632	0.400
		300	0.539	0.290
		290	0.469	0.220
		280	0.362	0.131

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-LaF50A	776495	$n_d = 1.77672$	$v_d = 49.50$	$n_F - n_C = 0.015693$
		$n_e = 1.78045$	$v_e = 49.21$	$n_{F'} - n_{C'} = 0.015858$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.73953	P _{d,C}	0.3001	RC (S)	1	2400	0.888	0.788
n ₁₉₇₀	1970.09	1.74510	P _{e,d}	0.2378	RA (S)	2	2200	0.973	0.947
n ₁₅₃₀	1529.58	1.75144	P _{g,F}	0.5580	D _W	1	2000	0.987	0.975
n ₁₁₂₉	1128.64	1.75763	P' _{d,c'}	0.2501	D _A	3	1800	0.997	0.995
n ₁₀₆₄	1064.00	1.75883	P' _{e,d}	0.2354	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.75984	P' _{g,F'}	0.4949	RP (S)	1	1400	0.999	0.998
n _s	852.11	1.76388			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.76672	Deviation of Relative Partial Dispersions				1060	0.999	0.998
n _r	706.52	1.76936					1000	0.999	0.998
n _C	656.27	1.77201	P _{F,e}	-0.0009	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.999	0.998
n _{C'}	643.85	1.77275	P _{g,F}	-0.0034			α	900	0.999
n _{He-Ne}	632.80	1.77345	P _{C,t}	-0.0048	°C		850	0.999	0.998
n _D	589.29	1.77658	P _{C,s}	-0.0012	-50/-40	65	800	0.999	0.998
n _d	587.56	1.77672	Thermal Properties		-40/-30	65	750	0.999	0.998
n _e	546.07	1.78045			-30/-20	66	700	0.998	0.997
n _F	486.13	1.78770	T _g (°C)	575	-20/-10	67	650	0.998	0.997
n _{F'}	479.99	1.78861	T _s (°C)	624	-10/0	67	600	0.998	0.997
n _g	435.84	1.79646	T ₁₀ ^{14.5} (°C)	525	0/10	69	550	0.998	0.997
n _h	404.66	1.80381	T ₁₀ ¹³ (°C)	559	10/20	70	500	0.998	0.996
n _i	365.01	1.81637	α _{-50/80°C} (10 ⁻⁷ /K)	70	20/30	71	480	0.997	0.995
			α _{100/300°C} (10 ⁻⁷ /K)	87	30/40	73	460	0.997	0.994
			λ (W/(m·K))	0.91	40/50	73	440	0.995	0.991
Constants of Dispersion Formula			β _d	142	50/60	74	420	0.994	0.988
			Mechanical Properties		60/70	74	400	0.990	0.980
A ₀	3.08280752E+00	70/80			75	390	0.985	0.971	
A ₁	-1.14328917E-02	80/90	77	380	0.978	0.956			
A ₂	2.69890896E-02	HK (10 ⁷ Pa)	633	90/100	78	370	0.963	0.927	
A ₃	-4.02628550E-04	F _A	170	100/110	78	360	0.933	0.871	
A ₄	1.49403074E-04	E (GPa)	121.7	110/120	79	350	0.885	0.784	
A ₅	-7.92664529E-06	G (GPa)	46.4	120/130	80	340	0.811	0.657	
Density			μ	0.312	130/140	81	330	0.708	0.501
			σ _b (MPa)	125	140/150	83	320	0.579	0.335
ρ (g/cm ³)	4.84	Solarization	B (10 ⁻¹² /Pa)	1.36	150/160	87	310	0.373	0.139
		△λ (%)	-1.6				300	0.285	0.081
Range of Temperature	Temperature Coefficients of Refractive Index						290		
	dn/dt relative (×10 ⁻⁶ / °C)						280		

D-LaF731	731405	$n_d = 1.73077$	$v_d = 40.50$	$n_F - n_C = 0.018043$
		$n_e = 1.73505$	$v_e = 40.25$	$n_{F'} - n_{C'} = 0.018263$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.68874	$P_{d,C}$	0.2971	RC (S)	1	2400	0.900	0.810
n_{1970}	1970.09	1.69525	$P_{e,d}$	0.2372	RA (S)	3	2200	0.982	0.964
n_{1530}	1529.58	1.70254	$P_{g,F}$	0.5714	D_W	1	2000	0.995	0.990
n_{1129}	1128.64	1.70947	$P'_{d,c'}$	0.2475	D_A	2	1800	0.999	0.998
n_{1064}	1064.00	1.71080	$P'_{e,d}$	0.2344	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.71191	$P'_{g,F'}$	0.5059	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.71635			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.71949	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.72243					1000	0.999	0.998
n_C	656.27	1.72541					950	0.999	0.998
$n_{C'}$	643.85	1.72625					900	0.999	0.998
n_{He-Ne}	632.80	1.72705	$P_{F,e}$	-0.0023	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.73061	$P_{g,F}$	-0.0049	-50/-40	87	800	0.999	0.998
n_d	587.56	1.73077	$P_{C,t}$	0.0118	-40/-30	90	750	0.999	0.998
n_e	546.07	1.73505	$P_{C,s}$	0.0045	-30/-20	91	700	0.999	0.998
n_F	486.13	1.74345	Thermal Properties		-20/-10	93	650	0.999	0.998
$n_{F'}$	479.99	1.74452			-10/0	94	600	0.999	0.998
n_g	435.84	1.75376			0/10	95	550	0.997	0.995
n_h	404.66	1.76260			10/20	96	500	0.995	0.992
n_i	365.01	1.77835	T_g ($^{\circ}C$)	498	20/30	97	480	0.992	0.988
			T_s ($^{\circ}C$)	533	30/40	97	460	0.989	0.982
			$T_{10}^{14.5}$ ($^{\circ}C$)	460	40/50	98	440	0.985	0.974
			T_{10}^{13} ($^{\circ}C$)	492	50/60	98	420	0.975	0.953
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	95	60/70	99	400	0.967	0.937
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	112	70/80	100	390	0.951	0.908
			λ (W/(m·K))	1.29	80/90	101	380	0.923	0.856
			β_d	105	90/100	102	370	0.863	0.752
Constants of Dispersion Formula			Mechanical Properties		100/110	103	360	0.728	0.535
					110/120	104	350	0.410	0.171
A_0	2.91839395E+00				120/130	105	340	0.057	0.008
A_1	-1.31881796E-02				130/140	106	330		
A_2	2.56126448E-02		HK (10^7Pa)	611	140/150	108	320		
A_3	9.59611523E-04		F_A	127	150/160	109	310		
A_4	-3.53323234E-05		E (GPa)	111.9			300		
A_5	4.57862484E-06		G (GPa)	43.2			290		
			μ	0.296			280		
			σ_b (MPa)	64					
			B ($10^{-12}/Pa$)	1.96					
Density		Solarization							
ρ (g/cm ³)	3.21	$\triangle\lambda$ (%)	0.0						

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	$n_d = 1.74330$	$v_d = 49.33$	$n_F - n_C = 0.015069$
		$n_e = 1.74689$	$v_e = 49.07$	$n_{F'} - n_{C'} = 0.015221$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.70399	P _{d,C}	0.3013	RC (S)	1	2400	0.830	0.689
n ₁₉₇₀	1970.09	1.71066	P _{e,d}	0.2382	RA (S)	3	2200	0.955	0.912
n ₁₅₃₀	1529.58	1.71800	P _{g,F}	0.5521	D _W	1	2000	0.982	0.965
n ₁₁₂₉	1128.64	1.72467	P' _{d,c'}	0.2510	D _A	3	1800	0.994	0.989
n ₁₀₆₄	1064.00	1.72590	P' _{e,d}	0.2359	R _{OH} (S)	1	1600	0.998	0.996
n _t	1013.98	1.72692	P' _{g,F'}	0.4895	RP (S)	1	1400	0.998	0.996
n _s	852.11	1.73091			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.73366	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.73621					1000	0.999	0.998
n _C	656.27	1.73876					P _{F,e}	-0.0024	950
n _{C'}	643.85	1.73948	P _{g,F}	-0.0095			900	0.999	0.998
n _{He-Ne}	632.80	1.74016	P _{C,t}	0.0066			°C	α	850
n _D	589.29	1.74317	P _{C,s}	0.0021	-50/-40	50	800	0.999	0.998
n _d	587.56	1.74330	Thermal Properties		-40/-30	53	750	0.999	0.998
n _e	546.07	1.74689			-30/-20	54	700	0.999	0.998
n _F	486.13	1.75383			-20/-10	55	650	0.999	0.998
n _{F'}	479.99	1.75470	T _g (°C)	571	-10/0	56	600	0.999	0.998
n _g	435.84	1.76215	T _s (°C)	603	0/10	57	550	0.999	0.998
n _h	404.66	1.76911	T ₁₀ ^{14.5} (°C)	531	10/20	58	500	0.999	0.998
n _i	365.01	1.78110	T ₁₀ ¹³ (°C)	555	20/30	58	480	0.998	0.997
			α _{-50/80°C} (10 ⁻⁷ /K)	57	30/40	59	460	0.997	0.995
			α _{100/300°C} (10 ⁻⁷ /K)	74	40/50	59	440	0.997	0.994

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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-ZLaF52L	806407	$n_d = 1.80610$	$v_d = 40.73$	$n_F - n_C = 0.019791$
		$n_e = 1.81080$	$v_e = 40.48$	$n_{F'} - n_{C'} = 0.020031$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.76065	P _{d,C}	0.2971	RC (S)	1	2400	0.848	0.719
n ₁₉₇₀	1970.09	1.76756	P _{e,d}	0.2375	RA (S)	3	2200	0.962	0.925
n ₁₅₃₀	1529.58	1.77534	P _{g,F}	0.5679	D _W	1	2000	0.995	0.990
n ₁₁₂₉	1128.64	1.78278	P' _{d,c'}	0.2476	D _A	3	1800	0.999	0.998
n ₁₀₆₄	1064.00	1.78422	P' _{e,d}	0.2346	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.78543	P' _{g,F'}	0.5037	RP (S)	3	1400	0.999	0.998
n _s	852.11	1.79027			CR	1	1200	0.999	0.998
n _{A'}	768.19	1.79371	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.79694					1000	0.999	0.998
n _C	656.27	1.80022					950	0.999	0.998
n _{C'}	643.85	1.80114					900	0.999	0.998
n _{He-Ne}	632.80	1.80201					850	0.999	0.998
n _D	589.29	1.80592	P _{F,e}	-0.0018	°C	α	800	0.999	0.998
n _D	589.29	1.80592	P _{g,F}	-0.0080	-50/-40	52	750	0.999	0.998
n _d	587.56	1.80610	P _{C,t}	0.0098	-40/-30	55	700	0.999	0.998
n _e	546.07	1.81080	P _{C,s}	0.0046	-30/-20	56	650	0.999	0.998
n _F	486.13	1.82002	Thermal Properties		-20/-10	57	600	0.999	0.998
n _{F'}	479.99	1.82117			-10/0	58	550	0.999	0.998
n _g	435.84	1.83126			0/10	59	500	0.998	0.995
n _h	404.66	1.84085			10/20	59	480	0.996	0.992
n _i	365.01	1.85784			20/30	60	460	0.994	0.988
					30/40	61	440	0.992	0.983
					40/50	61			

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	$\triangle\lambda$ (%)	0.0

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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

Internal Transmittance		
λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
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		

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	$n_d = 1.81000$	$v_d = 41.00$	$n_F - n_C = 0.019758$
		$n_e = 1.81469$	$v_e = 40.80$	$n_{F'} - n_{C'} = 0.019970$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.76475	$P_{d,C}$	0.2981	RC (S)	1	2400	0.850	0.723
n_{1970}	1970.09	1.77159	$P_{e,d}$	0.2374	RA (S)	3	2200	0.956	0.914
n_{1530}	1529.58	1.77930	$P_{g,F}$	0.5674	D_W	1	2000	0.975	0.951
n_{1129}	1128.64	1.78671	$P'_{d,c'}$	0.2479	D_A	3	1800	0.988	0.976
n_{1064}	1064.00	1.78814	$P'_{e,d}$	0.2349	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.78935	$P'_{g,F'}$	0.5038	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.79418			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.79762	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.80084					1000	0.999	0.998
n_C	656.27	1.80411					950	0.999	0.998
$n_{C'}$	643.85	1.80505					900	0.999	0.998
n_{He-Ne}	632.80	1.80591	$P_{F,e}$	-0.0029	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.80982	$P_{g,F}$	-0.0081	-50/-40	51	800	0.999	0.998
n_d	587.56	1.81000	$P_{C,t}$	0.0083	-40/-30	54	750	0.999	0.998
n_e	546.07	1.81469	$P_{C,s}$	0.0038	-30/-20	56	700	0.999	0.998
n_F	486.13	1.82387	Thermal Properties		-20/-10	58	650	0.999	0.998
$n_{F'}$	479.99	1.82502			-10/0	59	600	0.999	0.997
n_g	435.84	1.83508	T_g ($^{\circ}C$)	548	0/10	60	550	0.999	0.997
n_h	404.66	1.84465	T_s ($^{\circ}C$)	578	10/20	61	500	0.998	0.996
n_i	365.01	1.86160	$T_{10}^{14.5}$ ($^{\circ}C$)	510	20/30	62	480	0.996	0.996
			T_{10}^{13} ($^{\circ}C$)	529	30/40	63	460	0.994	0.993
			$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	60	40/50	64	440	0.992	0.988
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	79	50/60	64	420	0.990	0.974
			λ (W/(m·K))	0.98	60/70	64	400	0.982	0.959
			β_d	140	70/80	65	390	0.975	0.944
Constants of Dispersion Formula			Mechanical Properties		80/90	66	380	0.963	0.919
					90/100	67	370	0.940	0.876
A_0	3.18681101E+00		HK (10^7Pa)	625	100/110	68	360	0.894	0.795
A_1	-1.44191920E-02		F_A	91	110/120	69	350	0.816	0.662
A_2	2.95460135E-02		E (GPa)	114.4	120/130	70	340	0.646	0.415
A_3	1.15252022E-03		G (GPa)	42.6	130/140	71	330	0.320	0.103
A_4	-5.90862778E-05		μ	0.343	140/150	72	320		
A_5	5.97442323E-06		σ_b (MPa)	81	150/160	73	310		

Density		Solarization	
ρ (g/cm ³)	4.47	$\triangle\lambda$ (%)	-0.6

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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

Internal Transmittance		
λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
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		

D-ZLaF52N-M170	808409	$n_d = 1.80834$	$v_d = 40.92$	$n_F - n_C = 0.019753$
		$n_e = 1.81303$	$v_e = 40.67$	$n_{F'} - n_{C'} = 0.019992$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.76315	$P_{d,C}$	0.2972	RC (S)	1	2400	0.855	0.731
n_{1970}	1970.09	1.77000	$P_{e,d}$	0.2374	RA (S)	3	2200	0.968	0.937
n_{1530}	1529.58	1.77771	$P_{g,F}$	0.5670	D_W	1	2000	0.990	0.980
n_{1129}	1128.64	1.78511	$P'_{d,c'}$	0.2471	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.78654	$P'_{e,d}$	0.2346	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.78774	$P'_{g,F'}$	0.5022	RP (S)	2	1400	0.999	0.998
n_s	852.11	1.79256			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.79599	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.79921					1000	0.999	0.998
n_C	656.27	1.80247					950	0.999	0.998
$n_{C'}$	643.85	1.80340					900	0.999	0.998
n_{He-Ne}	632.80	1.80427	$\Delta P_{F,e}$	-0.0019	$^{\circ}C$	α	850	0.999	0.998
n_D	589.29	1.80817	$\Delta P_{g,F}$	-0.0086	-50/-40	51	800	0.999	0.998
n_d	587.56	1.80834	$\Delta P_{C,t}$	0.0073	-40/-30	54	750	0.999	0.998
n_e	546.07	1.81303	$\Delta P_{C,s}$	0.0031	-30/-20	56	700	0.999	0.998
n_F	486.13	1.82223	Thermal Properties		-20/-10	58	650	0.999	0.998
$n_{F'}$	479.99	1.82339			-10/0	59	600	0.999	0.998
n_g	435.84	1.83343			0/10	60	550	0.999	0.998
n_h	404.66	1.84298			10/20	61	500	0.998	0.996
n_i	365.01	1.85982			20/30	62	480	0.996	0.993
					30/40	63	460	0.994	0.990
			Mechanical Properties		40/50	64	440	0.992	0.986
					50/60	64	420	0.990	0.980
					60/70	64	400	0.982	0.967
					70/80	65	390	0.976	0.955
			Constants of Dispersion Formula		80/90	66	380	0.963	0.934
					90/100	67	370	0.942	0.898
					100/110	68	360	0.911	0.831
					110/120	69	350	0.834	0.701
					120/130	70	340	0.671	0.454
					130/140	71	330	0.372	0.136
			Density		140/150	72	320		
					150/160	73	310		
							300		
							290		
			Solarization				280		
			Range of Temperature ($^{\circ}C$)						
			Temperature Coefficients of Refractive Index						
			dn/dt relative ($\times 10^{-6} / ^{\circ}C$)						
			t						
			s						
			C						
			C'						
			He-Ne						
			d						
			e						
			F						
			F'						
			g						
			Coloration Code						
			Coloration of Internal Transmittance						
			Constants of dn/dt						
			D ₀						
			D ₁						
			D ₂						
			E ₀						
			E ₁						
			λ_{TK}						
			1.67E-06						
			1.27E-09						
			4.39E-07						

D-ZLaF52NC			810410			n _d = 1.81000			v _d = 41.01			n _F − n _C = 0.019751							
						n _e = 1.81469			v _e = 40.76			n _F − n _C ′ = 0.019985							
Refractive Indices						Relative Partial Dispersion			Chemical Properties (grade)			Internal Transmittance							
	λ (nm)	n _λ																	
n ₂₃₂₅		2325.42				P _{d,C}		0.2977		RC (S)		1		2400		0.835		0.698	
n ₁₉₇₀		1970.09				P _{e,d}		0.2375		RA (S)		2		2200		0.960		0.922	
n ₁₅₃₀		1529.58				P _{g,F}		0.5681		D _W		1		2000		0.984		0.968	
n ₁₁₂₉		1128.64		1.78670		P _{d,c} ′		0.2477		D _A		3		1800		0.995		0.990	
n ₁₀₆₄		1064.00		1.78813		P _{e,d} ′		0.2347		R _{OH} (S)		1		1600		0.998		0.996	
n _t		1013.98		1.78933		P _{g,F} ′		0.5034		RP (S)		2		1400		0.999		0.997	
n _s		852.11		1.79417						CR		1		1200		0.999		0.998	
n _A ′		768.19		1.79761		Deviation of Relative Partial Dispersions			Expansion Coefficient α (×10 ^{−7} /K)			1060		0.999		0.998			
n _r		706.52		1.80085								1000		0.999		0.998			
n _C		656.27		1.80412		P _{F,e}		−0.0028		°C		α		950		0.999		0.998	
n _C ′		643.85		1.80505		P _{g,F}		−0.0074		−50/−40		52		900		0.999		0.998	
n _{He-Ne}		632.80		1.80592		P _{C,t}		0.0100		−40/−30		53		850		0.999		0.998	
n _D		589.29		1.80982		P _{C,s}		0.0049		−30/−20		53		700		0.999		0.998	
n _d		587.56		1.81000		Thermal Properties			−20/−10			55		650		0.999		0.998	
n _e		546.07		1.81469					T _g (°C)		550		−10/0		57		600		0.999
n _F		486.13		1.82387		T _s (°C)		590		0/10		57		550		0.999		0.997	
n _F ′		479.99		1.82503		T ₁₀ ^{14.5} (°C)		513		10/20		58		500		0.997		0.994	
n _g		435.84		1.83509		T ₁₀ ¹³ (°C)		532		20/30		59		480		0.994		0.989	
n _h		404.66		1.84464		α _{−50/80°C} (10 ^{−7} /K)		58		30/40		62		460		0.993		0.985	
n _i		365.01		1.86150		α _{100/300°C} (10 ^{−7} /K)		76		40/50		62		440		0.989		0.979	
						λ (W/(m·K))		0.91		50/60		62		420		0.985		0.971	
						β _d		137		60/70		63		400		0.977		0.955	
Constants of Dispersion Formula						Mechanical Properties			70/80		65		390		0.967		0.936		
A ₀		3.18520807E+00		HK (10 ⁷ Pa)					637		80/90		66		380		0.956		0.913
A ₁		−1.37608761E-02		F _A		131		90/100		66		370		0.929		0.863			
A ₂		3.07955827E-02		E (GPa)		113.3		100/110		67		360		0.895		0.801			
A ₃		7.27147102E-04		G (GPa)		43.5		110/120		69		350		0.833		0.694			
A ₄		7.51921841E-06		μ		0.301		120/130		69		340		0.721		0.519			
A ₅		2.05148638E-06		σ _b (MPa)				130/140		71		330		0.517		0.267			
Density			Solarization			B (10 ^{−12} /Pa)		2.15		140/150		71		320		0.223		0.050	
ρ (g/cm ³)		4.41		△λ (%)		−0.5				150/160		73		310					
														300					
														290					
														280					
Range of Temperature (°C)		Temperature Coefficients of Refractive Index										Coloration Code							
		dn/dt relative (×10 ^{−6} / °C)										λ ₈₀ (λ ₇₀)/λ ₅		395/320					
		t	s	C	C′	He-Ne	d	e	F	F′	g	Coloration of Internal Transmittance							
−60 ~ −40		5.1	5.3	6.0	6.1	6.2	6.5	6.9	7.7	7.8	8.8	λτ ₈₀ /λτ ₅		360/320					
−40 ~ −20		5.2	5.5	6.1	6.2	6.3	6.6	7.0	7.8	7.9	8.9								
−20 ~ 0		5.4	5.6	6.3	6.4	6.5	6.8	7.2	8.0	8.1	9.1								
0 ~ 20		5.6	5.8	6.5	6.6	6.7	7.0	7.4	8.2	8.4	9.4								
20 ~ 40		5.8	6.1	6.8	6.9	6.9	7.3	7.6	8.5	8.6	9.6								
40 ~ 60		6.0	6.3	7.0	7.1	7.2	7.5	7.9	8.8	8.9	9.9								
60 ~ 80		6.3	6.6	7.3	7.4	7.4	7.8	8.2	9.0	9.1	10.2								
80 ~ 100		6.5	6.8	7.5	7.6	7.7	8.0	8.4	9.3	9.4	10.4								
100 ~ 120		6.8	7.0	7.8	7.8	7.9	8.3	8.7	9.5	9.6	10.7								
120 ~ 140		7.0	7.3	8.0	8.1	8.1	8.5	8.9	9.7	9.9	10.9								
140 ~ 160		7.2	7.4	8.2	8.3	8.3	8.7	9.1	9.9	10.1	11.1								
						Constants of dn/dt													
						D ₀			D ₁			D ₂							
						5.63E-06			1.88E-08			−2.17E-11							
						E ₀			E ₁			λ _{TK}							
						8.94E-07			5.47E-11			2.24E-01							

D-ZLaF814	815370	$n_d = 1.81474$	$v_d = 37.03$	$n_F - n_C = 0.022004$
		$n_e = 1.81995$	$v_e = 36.78$	$n_F - n_{C'} = 0.022294$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm
n ₂₃₂₅	2325.42	1.76516	P _{d,C}	0.2949	RC (S)	1	2400	0.846	0.715
n ₁₉₇₀	1970.09	1.77267	P _{e,d}	0.2368	RA (S)	3	2200	0.962	0.925
n ₁₅₃₀	1529.58	1.78111	P _{g,F}	0.5763	D _W	1	2000	0.986	0.972
n ₁₁₂₉	1128.64	1.78919	P' _{d,c'}	0.2454	D _A	4	1800	0.995	0.990
n ₁₀₆₄	1064.00	1.79076	P' _{e,d}	0.2337	R _{OH} (S)	1	1600	0.999	0.998
n _t	1013.98	1.79207	P' _{g,F'}	0.5100	RP (S)	2	1400	0.999	0.998
n _s	852.11	1.79734			CR		1200	0.999	0.998
n _{A'}	768.19	1.80110	Deviation of Relative Partial Dispersions		Expansion Coefficient α (×10 ⁻⁷ /K)		1060	0.999	0.998
n _r	706.52	1.80465					1000	0.999	0.998
n _C	656.27	1.80825	P _{F,e}	-0.0017	°C	α	950	0.999	0.998
n _{C'}	643.85	1.80927	P _{g,F}	-0.0058	-50/-40	52	900	0.999	0.998
n _{He-Ne}	632.80	1.81023	P _{C,t}	0.0158	-40/-30	55	850	0.999	0.998
n _D	589.29	1.81455	P _{C,s}	0.0065	-30/-20	56	800	0.999	0.998
n _d	587.56	1.81474	Thermal Properties		-20/-10	58	750	0.999	0.998
n _e	546.07	1.81995			-10/0	59	700	0.999	0.998
n _F	486.13	1.83025	T _g (°C)	544	0/10	60	650	0.998	0.997
n _{F'}	479.99	1.83156	T _s (°C)	580	10/20	61	600	0.997	0.995
n _g	435.84	1.84293	T ₁₀ ^{14.5} (°C)	502	20/30	62	550	0.993	0.986
n _h	404.66	1.85388	T ₁₀ ¹³ (°C)	525	30/40	63	500	0.989	0.979
n _i	365.01	1.87363	α _{-50/80°C} (10 ⁻⁷ /K)	60	40/50	64	480	0.985	0.970
			α _{100/300°C} (10 ⁻⁷ /K)	74	50/60	64	460	0.979	0.957
			λ (W/(m·K))	0.93	60/70	64	440	0.968	0.938
			β _d	183	70/80	65	420	0.946	0.895
Constants of Dispersion Formula			Mechanical Properties		80/90	65	400	0.925	0.856
					90/100	66	390	0.892	0.796
A ₀	3.19574140E+00		HK (10 ⁷ Pa)	620	100/110	67	380	0.834	0.695
A ₁	-1.58738035E-02		F _A	108	110/120	68	370	0.719	0.516
A ₂	3.15329222E-02		E (GPa)	115.3	120/130	70	360	0.498	0.248
A ₃	1.57767624E-03		G (GPa)	44.7	130/140	71	350	0.193	0.037
A ₄	-9.05739467E-05		μ	0.290	140/150	73	340		
A ₅	9.32711709E-06		σ _b (MPa)		150/160	74	330		
Density		Solarization		B (10 ⁻¹² /Pa)	2.17		320		
ρ (g/cm ³)	4.20	Δλ (%)	-2.1				310		
Range of Temperature							300		
							290		
							280		

D-ZLaF851	851401	$n_d = 1.85135$	$v_d = 40.10$	$n_F - n_C = 0.021229$
		$n_e = 1.85639$	$v_e = 39.85$	$n_{F'} - n_{C'} = 0.021488$

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance		
	λ (nm)	n_λ					λ (nm)	$\tau_{5\text{mm}}$	$\tau_{10\text{mm}}$
n_{2325}	2325.42	1.80390	$P_{d,C}$	0.2968	RC (S)	1	2400	0.885	0.783
n_{1970}	1970.09	1.81087	$P_{e,d}$	0.2374	RA (S)	1	2200	0.984	0.968
n_{1530}	1529.58	1.81878	$P_{g,F}$	0.5700	D_W	1	2000	0.995	0.990
n_{1129}	1128.64	1.82650	$P'_{d,c'}$	0.2471	D_A	3	1800	0.999	0.998
n_{1064}	1064.00	1.82801	$P'_{e,d}$	0.2345	R_{OH} (S)	1	1600	0.999	0.998
n_t	1013.98	1.82929	$P'_{g,F'}$	0.5049	RP (S)	1	1400	0.999	0.998
n_s	852.11	1.83442			CR	1	1200	0.999	0.998
$n_{A'}$	768.19	1.83808	Deviation of Relative Partial Dispersions		Expansion Coefficient α ($\times 10^{-7}/K$)		1060	0.999	0.998
n_r	706.52	1.84154					1000	0.999	0.998
n_C	656.27	1.84505	$P_{F,e}$	-0.0022	$^{\circ}C$	α	950	0.999	0.998
$n_{C'}$	643.85	1.84604	$P_{g,F}$	-0.0070	-50/-40	54	900	0.999	0.998
n_{He-Ne}	632.80	1.84697	$P_{C,t}$	0.0080	-40/-30	57	850	0.999	0.998
n_D	589.29	1.85116	$P_{C,s}$	0.0041	-30/-20	58	800	0.999	0.998
n_d	587.56	1.85135	Thermal Properties		-20/-10	60	750	0.999	0.998
n_e	546.07	1.85639			-10/0	61	700	0.999	0.998
n_F	486.13	1.86628	T_g ($^{\circ}C$)	619	0/10	62	650	0.999	0.998
$n_{F'}$	479.99	1.86753	T_s ($^{\circ}C$)	655	10/20	63	600	0.999	0.998
n_g	435.84	1.87838	$T_{10}^{14.5}$ ($^{\circ}C$)	568	20/30	64	550	0.999	0.998
n_h	404.66	1.88871	T_{10}^{13} ($^{\circ}C$)	585	30/40	64	500	0.997	0.995
n_i	365.01	1.90699	$\alpha_{-50/80^{\circ}C}$ ($10^{-7}/K$)	62	40/50	65	480	0.995	0.992
			$\alpha_{100/300^{\circ}C}$ ($10^{-7}/K$)	77	50/60	66	460	0.992	0.989
			λ (W/(m $\cdot$ K))	0.96	60/70	66	440	0.988	0.983
			β_d	148	70/80	67	420	0.984	0.972
Constants of Dispersion Formula			Mechanical Properties		80/90	68	400	0.971	0.949
					90/100	69	390	0.958	0.923
A_0	3.32860198E+00		HK (10^7 Pa)	634	100/110	70	380	0.935	0.878
A_1	-1.49218815E-02		F_A	75	110/120	71	370	0.893	0.792
A_2	3.29458426E-02		E (GPa)	127.0	120/130	72	360	0.794	0.619
A_3	1.05526131E-03		G (GPa)	47.2	130/140	73	350	0.585	0.324
A_4	-2.14847086E-05		μ	0.345	140/150	74	340	0.228	0.049
A_5	3.89175295E-06		σ_b (MPa)	98	150/160	75	330		
Density			B (10^{-12} /Pa)	1.61			320		
							310		
ρ (g/cm 3)	4.81						300		
Solarization							290		
							280		
$\Delta\lambda$ (%)	-0.8								

Range of Temperature ($^{\circ}C$)	Temperature Coefficients of Refractive Index									
	dn/dt relative ($\times 10^{-6} / ^{\circ}C$)									
	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	v _d = 36.35	n _F − n _C =
		n _e = 1.62408	v _e = 36.09	n _F − n _C ′ = 0.017291

Refractive Indices			Relative Partial Dispersion		Chemical Properties (grade)		Internal Transmittance						
	λ (nm)	n _λ					λ (nm)	τ5mm	τ10mm				
n ₂₃₂₅	2325.42	1.58511	P _{d,C}	0.2937	RC (S)	1	2400	0.889	0.790				
n ₁₉₇₀	1970.09	1.58980	P _{e,d}	0.2362	RA (S)	3	2200	0.918	0.843				
n ₁₅₃₀	1529.58	1.59522	P _{g,F}	0.5832	D _W	1	2000	0.964	0.930				
n ₁₁₂₉	1128.64	1.60075	P' _{d,c'}	0.2445	D _A	1	1800	0.986	0.972				
n ₁₀₆₄	1064.00	1.60186	P' _{e,d}	0.2329	R _{OH} (S)	1	1600	0.999	0.998				
n _t	1013.98	1.60282	P' _{g,F'}	0.5162	RP (S)	1	1400	0.999	0.998				
n _s	852.11	1.60672			CR	3	1200	0.999	0.998				
n _{A'}	768.19	1.60957	Deviation of Relative Partial Dispersions				1060	0.999	0.998				
n _r	706.52	1.61228					1000	0.999	0.998				
n _C	656.27	1.61504	P _{F,e}	0.0000	Expansion Coefficient α (×10 ⁻⁷ /K)		950	0.999	0.998				
n _{C'}	643.85	1.61582	P _{g,F}	0.0000			900	0.999	0.998				
n _{He-Ne}	632.80	1.61656	P _{C,t}	0.0000	°C	α	850	0.999	0.998				
n _D	589.29	1.61990	P _{C,s}	0.0001	-50/-40	78	800	0.999	0.998				
n _d	587.56	1.62005	Thermal Properties		-40/-30	81	750	0.999	0.998				
n _e	546.07	1.62408			-30/-20	83	700	0.999	0.998				
n _F	486.13	1.63210	T _g (°C)	414	-20/-10	85	650	0.999	0.998				
n _{F'}	479.99	1.63312	T _s (°C)	471	-10/0	86	600	0.999	0.998				
n _g	435.84	1.64205	T ₁₀ ^{14.5} (°C)	355	0/10	88	550	0.999	0.998				
n _h	404.66	1.65066	T ₁₀ ¹³ (°C)	398	10/20	89	500	0.999	0.998				
n _i	365.01	1.66625	α _{-50/80°C} (10 ⁻⁷ /K)	88	20/30	90	480	0.999	0.998				
			α _{100/300°C} (10 ⁻⁷ /K)	110	30/40	91	460	0.999	0.998				
			λ (W/(m·K))	0.73	40/50	92	440	0.997	0.994				
Constants of Dispersion Formula					50/60	93	420	0.995	0.990				
					60/70	94	400	0.993	0.986				
A ₀	2.55510802E+00		Mechanical Properties		70/80	95	390	0.991	0.978				
A ₁	-8.64431010E-03				80/90	96	380	0.987	0.968				
A ₂	2.26592448E-02		HK (10 ⁷ Pa)	418	90/100	98	370	0.982	0.957				
A ₃	8.22256872E-04		F _A	172	100/110	99	360	0.971	0.932				
A ₄	-1.60646686E-05		E (GPa)	58.4	110/120	100	350	0.940	0.874				
A ₅	4.04183096E-06		G (GPa)	23.3	120/130	101	340	0.855	0.725				
Density			μ	0.251	130/140	103	330	0.620	0.383				
			σ _b (MPa)	60	140/150	104	320	0.178	0.036				
			B (10 ⁻¹² /Pa)	2.48	150/160	105	310						
ρ (g/cm ³)	3.57	△λ (%)	0.5	Temperature Coefficients of Refractive Index				300					
								290					
								280					
Range of Temperature	dn/dt relative (×10 ⁻⁶ / °C)												

红外材料数据表

IR materials Data Sheets

赤外材料のデータ表

IRG105

$$n_4 = 1.8541$$

$$v_4 = 18.92$$

$$n_3 - n_5 = 0.0452$$

Refractive Indices

$\lambda(\mu\text{m})$	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

T _g (°C)	534
T _s (°C)	565
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	65
$\alpha_{100/300^\circ\text{C}}$ (10 ⁻⁷ /K)	78

Mechanical Properties

HK (10 ⁷ Pa)	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)

°C	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

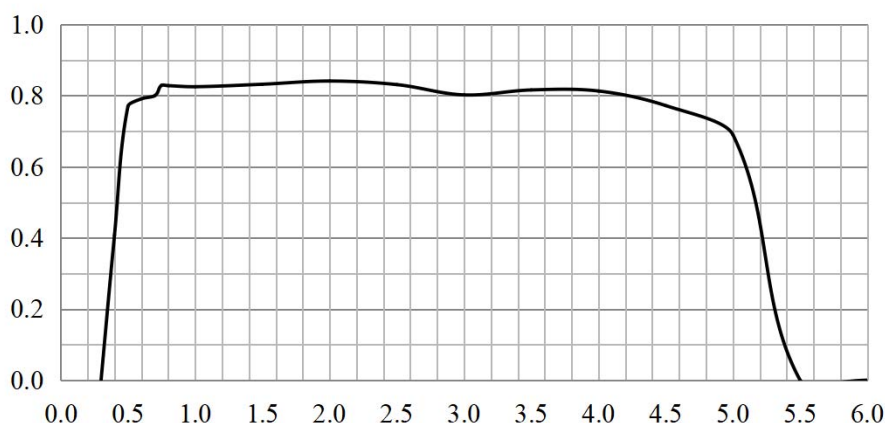
External Transmittance

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	

Temperature Coefficients of Refractive Index dn/dt relative (×10⁻⁶ / °C)

°C	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

Transmittance τ (2mm)



$$n_{10.6} = 2.4940$$

$$v_{10.6} = 95.77$$

$$n_8 - n_{12.5} = 0.0156$$

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
ϵ_r	

Chemical Properties (grade)

RC(S)	1
RA(S)	1
D _w	1
D _A	1
R _{OH} (S)	1
RP(S)	1

Thermal Properties

T _g (°C)	369
T _s (°C)	409
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	123
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	123
C _p (J/g·K)	

Mechanical Properties

HK (10 ⁷ Pa)	150
E (GPa)	22.0
G (GPa)	8.3
μ	0.331

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶ /°C)

λ (μm)	dn _{rel} /dt
3	67
5	65
8	64
10	62
12	62

Expansion Coefficient α (×10⁻⁷/K)

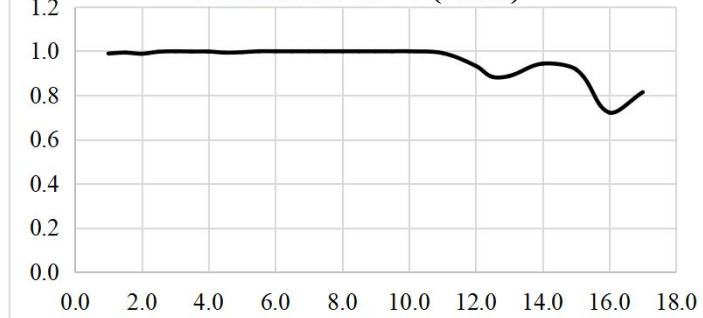
°C	α
-50/-40	118
-40/-30	120
-30/-20	121
-20/-10	122
-10/0	122
0/10	122
10/20	123
20/30	123
30/40	123
40/50	123
50/60	123
60/70	123
70/80	123
80/90	124
90/100	124
100/110	124
110/120	124
120/130	123
130/140	123
140/150	123
150/160	124

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

Transmittance τ (2mm)


$$n_{10.6} = 2.4925$$

$$v_{10.6} = 102.93$$

$$n_8 - n_{12.5} = 0.0145$$

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
ϵ_r	

Chemical Properties (grade)

RC(S)	1
RA(S)	1
D _w	2
D _A	1
R _{OH} (S)	1
RP(S)	1

Thermal Properties

T _g (°C)	292
T _s (°C)	347
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	164
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	165
C _p (J/g·K)	

Mechanical Properties

HK (10 ⁷ Pa)	152
E (GPa)	18.6
G (GPa)	6.8
μ	0.367

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶ /°C)

λ (μm)	dn _{rel} /dt
3	41
5	40
8	39
10	39
12	37

Expansion Coefficient α (×10⁻⁷/K)

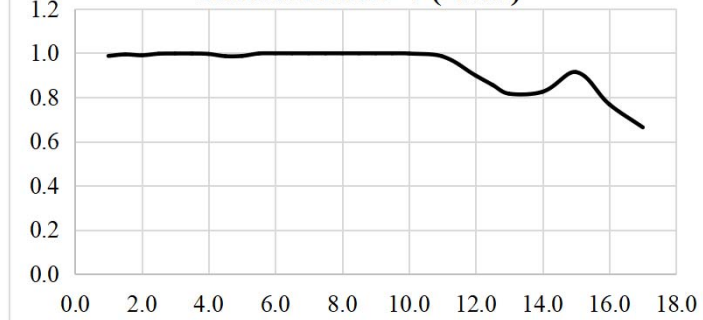
°C	α
-50/-40	161
-40/-30	162
-30/-20	163
-20/-10	164
-10/0	164
0/10	165
10/20	165
20/30	165
30/40	165
40/50	165
50/60	165
60/70	165
70/80	165
80/90	166
90/100	166
100/110	166
110/120	166
120/130	166
130/140	166
140/150	166
150/160	167

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

Transmittance τ (2mm)


$$n_{10.6} = 2.5837$$

$$v_{10.6} = 86.07$$

$$n_8 - n_{12.5} = 0.0184$$

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
ϵ_r	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

T _g (°C)	266
T _s (°C)	301
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	162
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	164
C _p (J/g·K)	

Mechanical Properties

HK (10 ⁷ Pa)	137
E (GPa)	19.8
G (GPa)	7.7
μ	0.291

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶ /°C)

λ (μm)	dn _{rel} /dt
3	42
5	40
8	39
10	39
12	39

Expansion Coefficient α (×10⁻⁷/K)

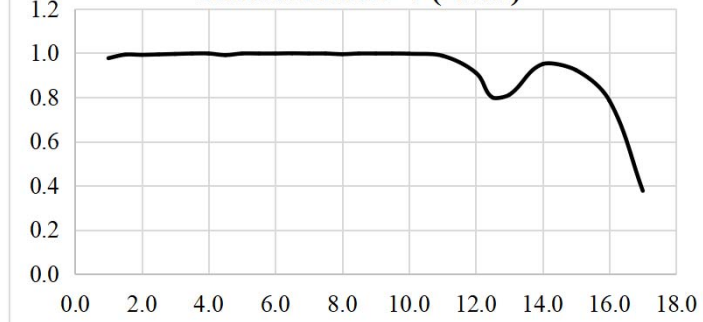
°C	α
-50/-40	159
-40/-30	160
-30/-20	161
-20/-10	162
-10/0	162
0/10	162
10/20	163
20/30	163
30/40	163
40/50	163
50/60	163
60/70	163
70/80	163
80/90	164
90/100	164
100/110	164
110/120	164
120/130	164
130/140	164
140/150	164
150/160	165

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

Transmittance τ (2mm)


$$n_{10.6} = 2.7659$$

$$v_{10.6} = 132.77$$

$$n_8 - n_{12.5} = 0.0133$$

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

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

Other Properties

ρ (g/cm ³)	4.72
ϵ_r	

Chemical Properties (grade)

RC(S)	1
RA(S)	1
D _W	2
D _A	1
R _{OH} (S)	2
RP(S)	1

Thermal Properties

T _g (°C)	174
T _s (°C)	199
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	209
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	212
C _p (J/g·K)	

Mechanical Properties

HK (10 ⁷ Pa)	115
E (GPa)	19.8
G (GPa)	7.3
μ	0.366

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶ /°C)

λ (μm)	dn _{rel} /dt
3	21
5	19
8	18
10	18
12	17

Expansion Coefficient α (×10⁻⁷/K)

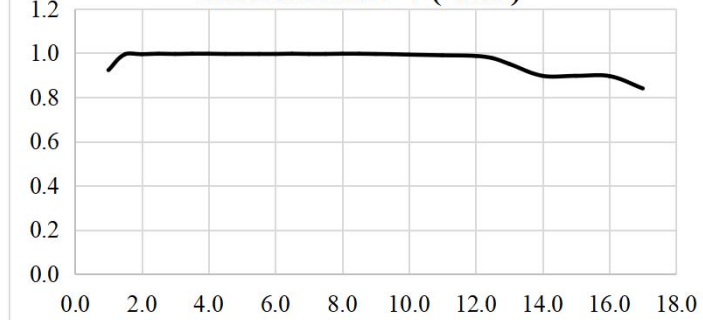
°C	α
-50/-40	202
-40/-30	205
-30/-20	206
-20/-10	207
-10/0	208
0/10	208
10/20	209
20/30	209
30/40	210
40/50	210
50/60	211
60/70	211
70/80	212
80/90	212
90/100	213
100/110	213
110/120	214
120/130	215
130/140	216
140/150	217
150/160	217

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 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

Transmittance τ (2mm)


$$n_{10.6} = 2.6011$$

$$v_{10.6} = 93.63$$

$$n_8 - n_{12.5} = 0.0171$$

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
ϵ_r	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

T _g (°C)	282
T _s (°C)	314
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	140
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	141
C _p (J/g·K)	0.33

Mechanical Properties

HK (10 ⁷ Pa)	132
E (GPa)	21.3
G (GPa)	8.5
μ	0.250

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶ /°C)

λ (μm)	dn _{rel} /dt
3	72
5	70
8	70
10	70
12	70

Expansion Coefficient α (×10⁻⁷/K)

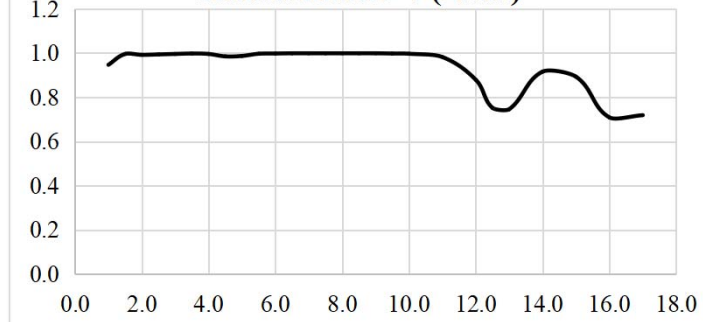
°C	α
-50/-40	137
-40/-30	139
-30/-20	139
-20/-10	140
-10/0	141
0/10	141
10/20	141
20/30	141
30/40	142
40/50	142
50/60	142
60/70	142
70/80	142
80/90	142
90/100	142
100/110	142
110/120	142
120/130	142
130/140	142
140/150	142
150/160	142

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

Transmittance τ (2mm)


$$n_{10.6} = 2.7764$$

$$v_{10.6} = 137.71$$

$$n_8 - n_{12.5} = 0.0129$$

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
ϵ_r	

Chemical Properties (grade)

RC(S)	1
RA(S)	1
D _w	1
D _A	1
R _{OH} (S)	2
RP(S)	1

Thermal Properties

T _g (°C)	184
T _s (°C)	216
$\alpha_{-60/120^\circ\text{C}}$ ($10^{-7}/\text{K}$)	206
$\alpha_{20/120^\circ\text{C}}$ ($10^{-7}/\text{K}$)	208
C _p (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°C) ($\times 10^{-6}/^\circ\text{C}$)

λ (μm)	dn_{rel}/dt
3	37
5	34
8	32
10	32
12	32

Expansion Coefficient α ($\times 10^{-7}/\text{K}$)

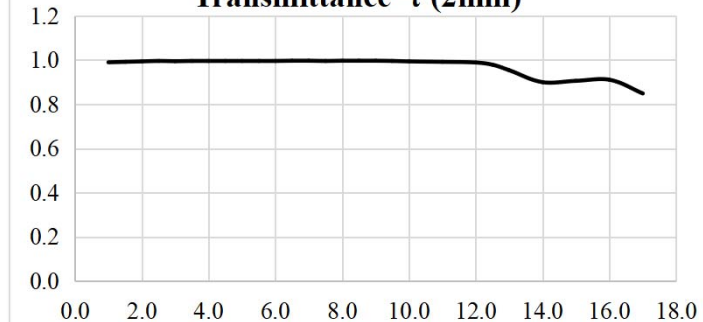
°C	α
-50/-40	203
-40/-30	205
-30/-20	205
-20/-10	206
-10/0	207
0/10	207
10/20	207
20/30	207
30/40	207
40/50	207
50/60	208
60/70	208
70/80	208
80/90	208
90/100	208
100/110	208
110/120	209
120/130	209
130/140	209
140/150	210
150/160	210

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

Transmittance τ (2mm)

$$n_{10.6} = 2.6075$$

$$v_{10.6} = 154.57$$

$$n_8 - n_{12.5} = 0.0104$$

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

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

Other Properties

ρ (g/cm ³)	4.49
ϵ_r	

Chemical Properties (grade)

RC(S)	1
RA(S)	1
D _w	1
D _A	1
R _{OH} (S)	1
RP(S)	1

Thermal Properties

T _g (°C)	228
T _s (°C)	281
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	206
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	209
C _p (J/g·K)	0.37

Mechanical Properties

HK (10 ⁷ Pa)	126
E (GPa)	15.6
G (GPa)	6.1
μ	0.287

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶ /°C)

λ (μm)	dn _{rel} /dt
3	18
5	17
8	17
10	17
12	

Expansion Coefficient α (×10⁻⁷/K)

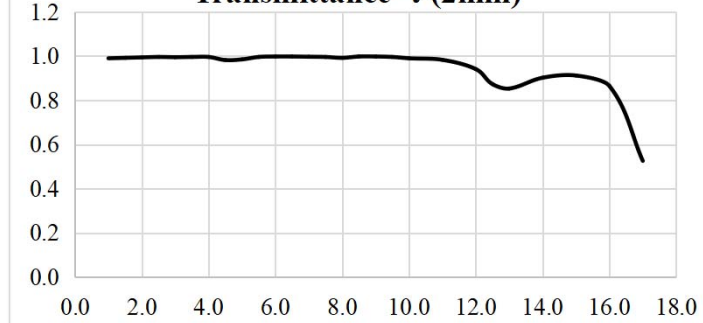
°C	α
-50/-40	199
-40/-30	201
-30/-20	203
-20/-10	204
-10/0	205
0/10	205
10/20	206
20/30	206
30/40	207
40/50	208
50/60	208
60/70	209
70/80	209
80/90	209
90/100	210
100/110	211
110/120	211
120/130	213
130/140	214
140/150	214
150/160	215

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 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

Transmittance τ (2mm)


$$n_{4.0} = 2.4168$$

$$v_{4.0} = 159.19$$

$$n_{3.0} - n_{5.0} = 0.0089$$

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
ϵ_r	

Chemical Properties (grade)

RC(S)	1
RA(S)	1
D _W	1
D _A	1
R _{OH} (S)	4
RP (S)	2

Thermal Properties

T _g (°C)	205
T _s (°C)	227
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	218
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	221
C _p (J/g·K)	

Mechanical Properties

HK (10 ⁷ Pa)	112
E (GPa)	17.1
G (GPa)	6.5
μ	0.300

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶/°C)

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)

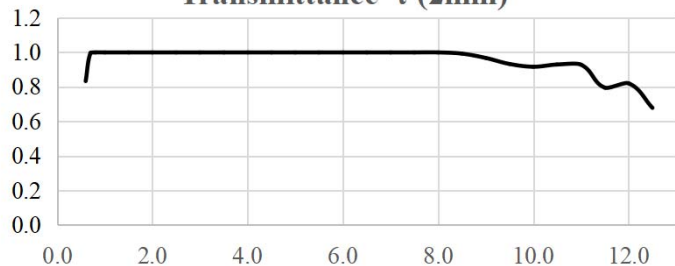
°C	α
-50/-40	209
-40/-30	210
-30/-20	212
-20/-10	213
-10/0	214
0/10	215
10/20	216
20/30	217
30/40	218
40/50	218
50/60	219
60/70	220
70/80	221
80/90	222
90/100	223
100/110	224
110/120	231
120/130	236
130/140	241
140/150	246
150/160	254

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

Transmittance τ (2mm)

IRG209

$$n_{10.6} = 3.1393$$

$$v_{10.6} = 207.70$$

$$n_8 - n_{12.5} = 0.0103$$

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
ϵ_r	

Chemical Properties (grade)

RC(S)	1
RA(S)	1
D _w	1
D _A	1
R _{OH} (S)	1
RP(S)	1

Thermal Properties

T _g (°C)	190
T _s (°C)	210
$\alpha_{-60/120^\circ\text{C}}$ (10 ⁻⁷ /K)	163
$\alpha_{20/120^\circ\text{C}}$ (10 ⁻⁷ /K)	167
C _p (J/g·K)	

Mechanical Properties

HK (10 ⁷ Pa)	112
E (GPa)	21.8
G (GPa)	8.1
μ	0.344

Temperature Coefficients of Refractive Index (-40 ~ 80°C) (×10⁻⁶/°C)

λ (μm)	dn _{rel} /dt
3	181
5	168
8	161
10	160
12	159

Expansion Coefficient α (×10⁻⁷/K)

°C	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

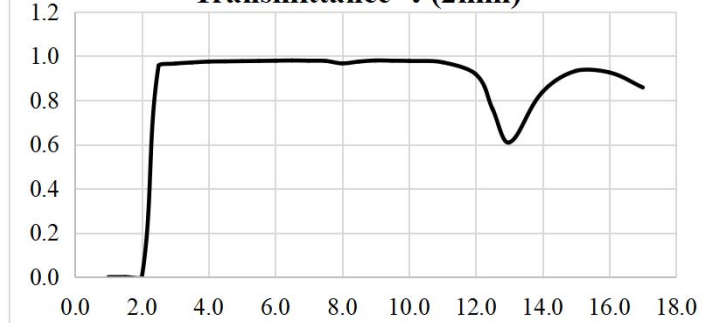
Internal Transmittance

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

Transmittance τ (2mm)





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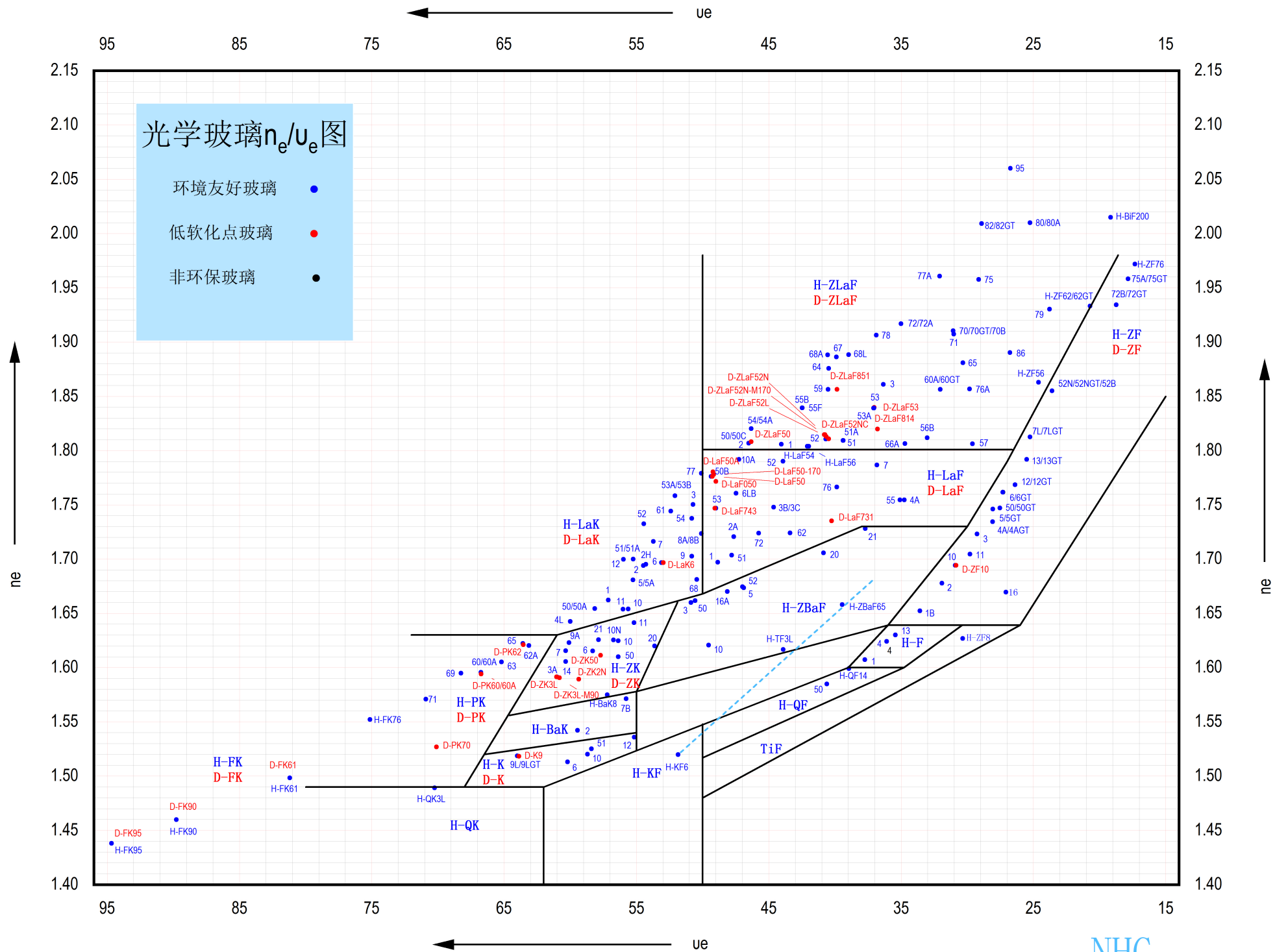
<http://www.hbnhg.com/>

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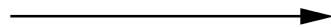
附表1

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	v _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	1.49010	1.49183	1.49301	1.49407	1.49514	1.49543	1.49571	1.49694	1.49700	1.49845	1.50123	1.50157	1.50451	1.50721	1.51173	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	1.49062	1.49235	1.49353	1.49460	1.49566	1.49596	1.49623	1.49747	1.49752	1.49897	1.50175	1.50210	1.50504	1.50774	1.51226	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	1.48888	1.49066	1.49184	1.49291	1.49396	1.49426	1.49454	1.49576	1.49582	1.49727	1.50004	1.50039	1.50332	1.50601	1.51053	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	1.45277	1.45425	1.45524	1.45615	1.45704	1.45729	1.45752	1.45855	1.45860	1.45981	1.46212	1.46241	1.46486	1.46710	1.47085	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	1.45173	1.45328	1.45429	1.45520	1.45609	1.45633	1.45656	1.45759	1.45764	1.45885	1.46116	1.46145	1.46388	1.46612	1.46987	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	1.43170	1.43306	1.43396	1.43478	1.43559	1.43582	1.43603	1.43696	1.43700	1.43810	1.44019	1.44044	1.44264	1.44466	1.44803	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	1.43075	1.43223	1.43317	1.43399	1.43480	1.43503	1.43524	1.43617	1.43621	1.43730	1.43940	1.43966	1.44185	1.44386	1.44723	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	1.50673	1.50929	1.51094	1.51241	1.51384	1.51424	1.51461	1.51625	1.51633	1.51825	1.52190	1.52236	1.52621	1.52976	1.53574	64.06	2.27095299E+00	-1.08648469E-02	1.05786491E-02	1.54454636E-04	5.64088446E-06	-4.70999004E-07
	D-K9@4	1.50653	1.50723	1.50979	1.51144	1.51291	1.51434	1.51474	1.51511	1.51675	1.51682	1.51874	1.52240	1.52285	1.52670	1.53025	1.53624	64.12	2.27328277E+00	-1.12400565E-02	9.97599803E-03	3.45416287E-04	-2.14522809E-05	9.35402686E-07
	D-K9@MY	1.50444	1.50524	1.50804	1.50975	1.51123	1.51265	1.51305	1.51342	1.51504	1.51512	1.51703	1.52069	1.52115	1.52502	1.52858	1.53456	64.07	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	1.58182	1.58444	1.58618	1.58775	1.58931	1.58974	1.59014	1.59193	1.59201	1.59412	1.59814	1.59864	1.60291	1.60684	1.61349	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	1.57943	1.58223	1.58401	1.58559	1.58714	1.58757	1.58797	1.58975	1.58983	1.59193	1.59596	1.59646	1.60073	1.60466	1.61131	66.87	2.49938722E+00	-1.42892453E-02	9.34545116E-03	9.22415376E-04	-7.96926698E-05	3.28459896E-06
	D-PK62@30	1.60722	1.60793	1.61065	1.61249	1.61418	1.61586	1.61633	1.61676	1.61872	1.61881	1.62112	1.62555	1.62610	1.63084	1.63522	1.64265	63.85	2.58101085E+00	-9.35112569E-03	1.43302338E-02	8.87867497E-05	2.39962149E-05	-1.31422303E-06
D-PK62	D-PK62@4	1.60801	1.60872	1.61144	1.61329	1.61498	1.61666	1.61712	1.61756	1.61951	1.61960	1.62191	1.62635	1.62690	1.63163	1.63602	1.64345	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	1.60610	1.60866	1.61047	1.61215	1.61384	1.61431	1.61475	1.61671	1.61680	1.61912	1.62355	1.62410	1.62882	1.63320	1.64063	63.52	2.56860724E+00	-5.38707629E-03	1.75069855E-02	-6.87624754E-04	1.10995728E-04	-4.98467098E-06
	D-PK70@30	1.51542	1.51607	1.51845	1.51999	1.52136	1.52269	1.52306	1.52341	1.52493	1.52493	1.52679	1.53017	1.53058	1.53413	1.53738	1.54287	70.32	2.29965045E+00	-1.03835061E-02	9.47420898E-03	3.16683036E-04	-2.62425226E-05	1.36324904E-06
D-PK70	D-PK70@4	1.51690	1.51755	1.51993	1.52148	1.52285	1.52419	1.52456	1.52491	1.52644	1.52651	1.52829	1.53168	1.53210	1.53564	1.53890	1.54441	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	1.51234	1.51473	1.51627	1.51764	1.51897	1.51933	1.51968	1.52119	1.52126	1.52303	1.52638	1.52680	1.53033	1.53359	1.53908	70.35	2.28762859E+00	-1.01674763E-02	1.02576513E-02	-1.66576093E-05	2.58810983E-05	-1.41889408E-06
	D-ZK2N@30	1.57504	1.57579	1.57863	1.58054	1.58228	1.58399	1.58448	1.58492	1.58691	1.58700	1.58935	1.59384	1.59441	1.59918	1.60364	1.61145	59.59	2.48098765E+00	-1.07611097E-02	1.30595297E-02	5.70453194E-04	-6.87445031E-05	5.08145529E-06
D-ZK2N	D-ZK2N@4	1.57581	1.57656	1.57941	1.58132	1.58305	1.58477	1.58525	1.58570	1.58769	1.58778	1.59013	1.59462	1.59518	1.59996	1.60442	1.61222	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	1.57395	1.57677	1.57867	1.58040	1.58212	1.58260	1.58304	1.58503	1.58512	1.58747	1.59196	1.59252	1.59730	1.60177	1.60959	59.46	2.47402496E+00					



dn/dt relative(d line, 20-40°C) [$10^{-6}/^{\circ}\text{C}$]



-10

-8

-6

-4

-2

0

2

4

6

8

10

12

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

光学玻璃 n_d -dn/dt图

环境友好玻璃



低软化点玻璃



非环保玻璃

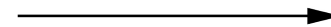


n_d



n_d

dn/dt relative(d line, 20-40°C) [$10^{-6}/^{\circ}\text{C}$]



NHG

