TECHNICAL INFORMATION

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1. DESIGNATION OF OPTICAL GLASS TYPES

In the course of Ohara's long history, many types of optical glasses have been developed. In this catalog, you will find 112 glasses which we have selected as our " recommended glass types". Each optical glass has its own properties which are closely connected with the key chemical element contained.
With this in mind, we have developed a new glass type designation system and the new names are used in this catalog.
On the $n_d - \nu_d$ diagram located in the rear of this catalog, you will see we have divided our glasses into groups. For each glass type, we have selected one or two chemical elements contained which are considered the most important and have used the atomic symbols of these for the first two letters of the glass type designation. The third letter of the glass type designation refers to the refractive index of each glass type within its glass group: H, M or L for high, middle, or low. Lastly we assign a one or two digit number to each glass type within a given glass family. Thus each glass type is represented by the above-mentioned three letters plus a one or two digit number.

We are also adding the prefix "S-" to indicate which of the glass types are ECO optical glasses and are environmentally "Safe". These glass types do not contain any lead or arsenic. All of 112 recommended glasses are ECO optical glasses and contain the pre-fix "S-".

For example, the glass type designation for S-BSL 7 is composed as follows:

S-stands for environmentally Safe
B represents Boron, one of the key compositional elements
S represents Silicon, one of the key compositional elements
L indicates a Low index within the BS glass group
7 indicates this is the 7th glass within this glass family

Along with Ohara's glass type designation, the technical data sheets will show the six-digit code for each glass type. In the six-digit code the first three digits represent the refractive index at the helium line (n_d) and the last three digits represent the Abbe number (ν_d). These six-digit codes are internationally recognized within the optical community.

2. OPTICAL PROPERTIES

2.1 Refractive Index

The refractive indices listed in this catalog were determined to the fifth decimal place for the following 20 lines of the spectrum. The refractive indices for d-line (587.56 nm) and e-line (546.07 nm) were determined to the sixth decimal place.

(Table 1)

Spectral Line Symbol					t	s	A´	r	C	C'
Light Source	Hg	Hg	Hg	Hg	Hg	Cs	K	He	H	Cd
Wavelength (nm)	2325.42	1970.09	1529.58	1128.64	1013.98	852.11	768.19	706.52	656.27	643.85

Spectral Line Symbol	He-Ne	D	d	e	F	F´	He-Cd	g	h	i
Light Source	Laser	Na	He	Hg	H	Cd	Laser	Hg	Hg	Hg
Wavelength (nm)	632.8	589.29	587.56	546.07	486.13	479.99	441.57	435.835	404.656	365.015

On the catalog pages, the wavelengths of each line are given in μm units in parentheses under each spectrum line symbol.

2.2 Dispersion

We have indicated $n_F - n_C$ and $n_{F'} - n_{C'}$ as the main dispersion. Abbe numbers were determined from the following ν_d and ν_e formula and calculated to the second decimal place:

$$\nu_d = \frac{n_d - 1}{n_F - n_C} \qquad \nu_e = \frac{n_e - 1}{n_{F'} - n_{C'}}$$

We have also listed 12 partial dispersions ($n_x - n_y$), 8 relative partial dispersions for the main dispersion $n_F - n_C$ and 4 for $n_{F'} - n_{C'}$.
To make achromatization effective for more than two wavelengths, glasses which have favorable relationships between ν_d and the relative partial dispersion $\theta_{x,y}$ for the wavelengths x and y are required. These may be defined as follows:

$$\theta_{x,y} = \frac{n_x - n_y}{n_F - n_C}$$

For lens design purposes, we have listed figures of main dispersion to the 6th decimal and Abbe number to the 2nd decimal place. As in the past, the main dispersion value to the 5th decimal place and Abbe number value to the 1st decimal place are also presented.

Glass types can be plotted in a graph of $\theta_{x,y}$ .vs. ν_d . Normal glass types tend to lie along a straight line between the two points which would be plotted for the two glass types 511605 — NSL7 and 620363 — PBM2. The distance that each glass type lies away from this normal line is called $\Delta\theta_{x,y}$. We give, in our catalog for each glass type, the values for the following five relationships.

$\Delta\theta_{C,t}$ $\Delta\theta_{g,F}$
$\Delta\theta_{C,A'}$ $\Delta\theta_{i,g}$
$\Delta\theta_{g,d}$

To show this $\Delta\theta$ relationship, we have included the graph for $\theta_{x,y}$ and ν_d.
As a typical way to visualize the relationship between $\theta_{x,y}$ and ν_d for each glass type,the graph for $\theta_{g,F}$ - ν_d is displayed in this catalog.

NSL7 and PBM2 are not among the 112 recommended glass types shown in this catalog. Considering that standard practice for showing anomalous dispersion has used these two glass types, we have decided to keep using these 2 glass types as our normal glass points.

(Table 2)

	$\theta_{C,t}$	$\theta_{C,A'}$	$\theta_{g,d}$	$\theta_{g,F}$	$\theta_{i,g}$	ν_d
NSL 7	**0.8305**	**0.3492**	**1.2391**	**0.5436**	**1.2185**	**60.49**
PBM 2	**0.7168**	**0.3198**	**1.2894**	**0.5828**	**1.4214**	**36.26**

2.3 Dispersion Formula

The refractive indices for wavelengths other than those listed in this catalog can be computed from a dispersion formula. As a practical dispersion formula, we have adopted the use of the Sellmeier formula shown below.

$$n^2 - 1 = \frac{A_1\lambda^2}{\lambda^2 - B_1} + \frac{A_2\lambda^2}{\lambda^2 - B_2} + \frac{A_3\lambda^2}{\lambda^2 - B_3}$$

The constants A_1, A_2, A_3, B_1, B_2, B_3 were computed by the method of least squares on the basis of refractive indices at standard wavelengths which were measured accurately from several melt samples.
By using this formula, refractive indices for any wavelength between 365 and 2325nm can be calculated to have an accuracy of around $\pm$ 5 x 10^{-6}. These constants A_1, A_2, A_3, B_1, B_2, B_3 are

listed on the left side of the individual catalog pages. However in some glass types, not all refractive indices in the standard spectral range are listed on the data sheet.
In such cases, the applicable scope of this dispersion formula is limited to the scope where refractive indices are given.
When calculating a respective refractive index, please bear in mind that each wavelength is expressed in μm units.

2.4 Effect of Temperature on Refractive Index (dn/dt)

Refractive index is affected by changes in glass temperature (see Fig. 1). This can be ascertained through the temperature coefficient of refractive index. The temperature coefficient of refractive index is defined as dn/dt from the curve showing the relationship between glass temperature and refractive index. The temperature coefficient of refractive index (for light of a given wavelength) changes with wavelength and temperature (see Fig. 2, 3). Therefore, the Abbe number also changes with temperature (see Fig. 4).

There are two ways of showing the temperature coefficient of refractive index. One is the absolute coefficient ($dn/dt_{absolute}$) measured under vacuum and the other is the relative coefficient ($dn/dt_{relative}$) measured at ambient air (101.3 kPa {760 torr} dry air).
In this catalog figures of the relative coefficients are listed.
The temperature coefficients of refractive index dn/dt were determined by measuring the refractive index from – 40°C to + 80°C at wavelengths of 1,013.98nm (t), 643.85nm (C'), 632.8nm (He-Ne laser), 589.29nm (D), 546.07nm (e), 479.99nm (F') and 435.835nm (g). These measurements are shown in the temperature range from – 40°C to + 80°C in 20°C intervals, and are listed in the lower part of each catalog page.
The absolute temperature coefficient of refractive index ($dn/dt_{absolute}$) can be calculated by the following formula:

$$\frac{dn}{dt}_{absolute} = \frac{dn}{dt}_{relative} + n \cdot \frac{dn_{air}}{dt}$$

dn_{air}/dt is the temperature coefficient of refractive index of air listed in Table 3.

(Table 3)

Temperature Range(°C)	dn_{air}/dt (10^{-6}/°C)						
	t	C'	He-Ne	D	e	F'	g
–40 ~ –20	– 1.34	– 1.35	– 1.36	– 1.36	– 1.36	– 1.37	– 1.38
–20 ~ 0	– 1.15	– 1.16	– 1.16	– 1.16	– 1.16	– 1.17	– 1.17
0 ~ +20	– 0.99	– 1.00	– 1.00	– 1.00	– 1.00	– 1.01	– 1.01
+20 ~ +40	– 0.86	– 0.87	– 0.87	– 0.87	– 0.87	– 0.88	– 0.88
+40 ~ +60	– 0.76	– 0.77	– 0.77	– 0.77	– 0.77	– 0.77	– 0.78
+60 ~ +80	– 0.67	– 0.68	– 0.68	– 0.68	– 0.68	– 0.69	– 0.69

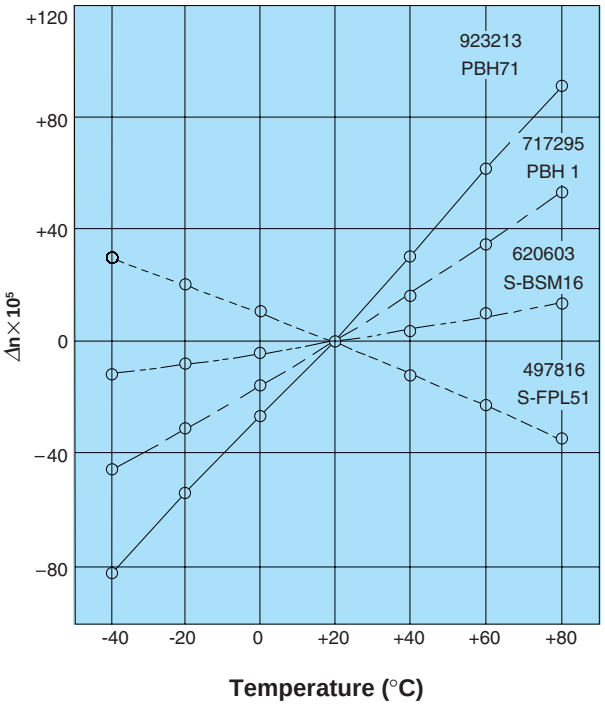


Fig. 1

Change of refractive index (n_e) as a function of temperature.

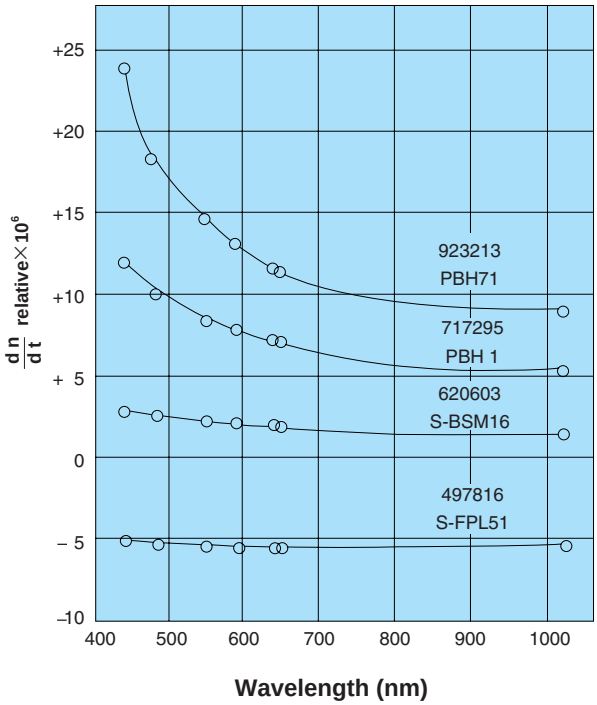


Fig. 2

Temperature coefficient of refractive index(dn/dt relative) as a function of wavelength (temperature range 20°C to 40°C).

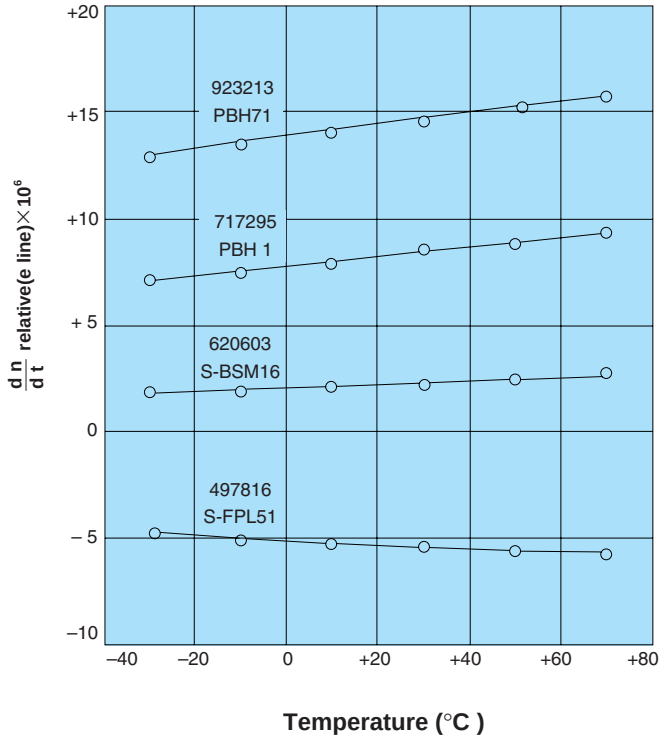


Fig. 3

Change of the temperature coefficient of refractive index (dn/dt relative)in the temperature range from –40°C to +80°C.

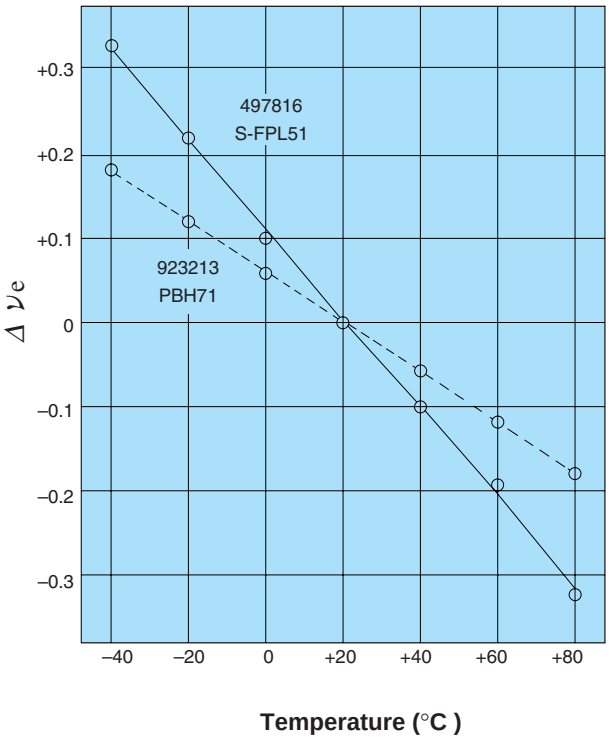


Fig. 4

Change of Abbe number(ν_e) in the temperature range from –40°C to +80°C.

2.5 The refractive indices in Ultraviolet and the Infrared Range.

The refractive indices in the ultraviolet and the infrared can be measured down to 237.833 nm in the ultraviolet and up to 2,325.42 nm in the infrared.

2.6 Internal Transmittance (τ)

Most types of Ohara optical glass are transparent and colorless because they are made of very pure materials. However, some optical glasses show remarkable absorption of light near the ultraviolet spectral range. For certain glasses with extreme optical properties, such as high refractive index, absorption extends to the visible range. This not only depends on the chemical composition, but also on unavoidable impurities. In this catalog the internal transmittance is given - i.e., reflection losses are eliminated. Glass varies slightly from melt to melt and, therefore, listed are typical values of internal transmittance obtained on 10 mm thick samples chosen from many melts, measured from 280 nm to 2400 nm.

3. THERMAL PROPERTIES

Thermal properties are essential to processing optical glass for annealing, heat treatment and coating. We have listed the strain point, annealing point, softening point, transformation point, yield point and thermal conductivity. The linear coefficient of thermal expansion is given for two temperature ranges.

3.1 Strain Point (StP)

The strain point corresponds to the lowest temperature in the annealing range at which viscous flow of glass will not occur. Viscosity of the glass is $10^{14.5}$ dPa ·s { poise } at this temperature.
The strain point is measured by the Fiber EIongation Method prescribed in JIS-R3103 and ASTM-C336.

3.2 Annealing Point (AP)

The annealing point corresponds to the maximum temperature in the annealing range at which the internal strain of glass will be substantially eliminated. Viscosity of the glass is 10^{13} dPa · s { poise } at this temperature. The annealing point is measured by the Fiber EIongation Method prescribed in ASTM-C336.

3.3 Softening Point (SP)

The softening point is the temperature at which glass deforms under its own weight. Viscosity of the glass is $10^{7.65}$ dPa· s { poise } at this temperature. The softening point is measured by the Fiber EIongation Method prescribed in JIS-R3104 and ASTM-C338.

3.4 Transformation Temperature (Tg) and Yield Point (At)

The transformation region is that temperature range in which a glass gradually transforms from its solid state into a “plastic” state. This region of transformation is defined as the transformation temperature (Tg).

The transformation temperature can be determined from the thermal expansion curve (Fig. 5). Viscosity coefficient at this temperature is approximately 10^{13} poise.

Yield point (At) is the deformation point temperature on the thermal expansion curve, or the point at which elongation becomes zero.

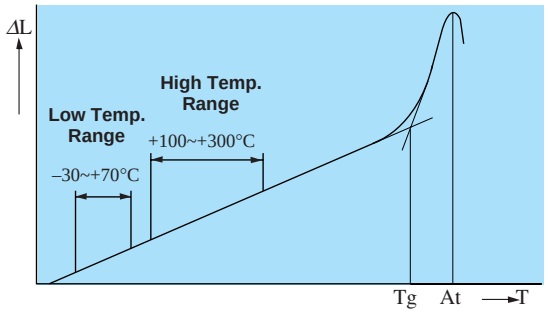


Fig. 5 Thermal Expansion Curve

3.5 Linear Coefficient of Thermal Expansion (α)

The thermal expansion curve is obtained by measuring a well-annealed glass sample of 4 mm diameter by 50 mm long heated at a rate of 2℃/min in the low temperature range and at a rate of 4℃/min in the high temperature range. From the temperature and elongation of the sample glass, the mean linear coefficient of thermal expansion between –30℃ to + 70℃ and + 100℃ to + 300℃ respectively up to 10^{-7}cm/cm℃ is determined and is given in the catalog.

3.6 Thermal Conductivity (k)

The thermal conductivity of most optical glasses at room temperature is located between 1.126W/(m•K) which is that of S-BSL 7 and 0.546W/(m•K) which is that of PBH71.

The thermal conductivity is measured in accordance with methods prescribed in JIS-R2618. The thermal conductivity of glass at a temperature of 35℃ is listed in the catalog. Accuracy is ±5%.

4. CHEMICAL PROPERTIES

There are some glasses that lack durability. Due to the chemical behavior of the constituents utilized in the composition.
These glasses are influenced by water vapor, acid, gasses, etc., as well as ions in the polishing slurry. Consequently, dimming and staining will occur on the surfaces of these glasses during processing and storage.
Since such phenomena have to do with surface conditions and environment, no single test can be accepted as a criterion of durability under all conditions.
We listed resistance to water and acid by the powder test method and resistance to weather by the surface test method. We have also listed resistance to acid and phosphate, following the test method of ISO8424 and 9689.

4.1 Water Resistance [RW(p)] and Acid Resistance [RA(p)] (Powder Method)

The glass to be tested is crushed to 425μm ~ 600μm grains. A sample of this powder equivalent to the specific gravity in grams is placed on a platinum basket. This is put in a flask of silica glass containing the reagent and boiled for 60 minutes. The sample is then carefully dried and re-weighed to determine the loss of weight (percent) and classified as per Tables 4 and 5.
The reagent used for the water resistance test is distilled water (pH 6.5 ~ 7.5). 1/100N nitric acid is used for the acid resistance test.

(Table 4) Water Resistance

Class	1	2	3	4	5	6
Loss of wt%	＜ 0.05	≧ 0.05 ＜ 0.10	≧ 0.10 ＜ 0.25	≧ 0.25 ＜ 0.60	≧ 0.60 ＜ 1.10	≧ 1.10

(Table 5) Acid Rsistance

Class	1	2	3	4	5	6
Loss of wt%	＜ 0.20	≧ 0.20 ＜ 0.35	≧ 0.35 ＜ 0.65	≧ 0.65 ＜ 1.20	≧ 1.20 ＜ 2.20	≧ 2.20

4.2 Weathering Resistance [W(s)] (Surface Method)

This test is carried out by putting freshly polished glass plates in a chamber at +50°C, 85% humidity for 24 hours. If the glass surface is severely attacked, another 6 hour test is carried out with new pieces. The classification into four groups is then obtained by inspecting the treated surface through a 50x microscope as per Table 6.

(Table 6)

Group	Classification
1	When there is no fading on the glass exposed in the chamber for 24 hours and observed at 6000 luxes.
2	When there is no fading observed on the glass exposed in the chamber for 24 hours at 1500 luxes but fading is observed at 6000 luxes.
3	When fading is observed on the glass exposed in the chamber for 24 hours when inspected at 1500 luxes.
4	When fading is observed on the glass exposed in the chamber for 6 hours when inspected at 1500 luxes.

4.3 ISO Method

4.3.1 Acid Resistance (SR)

Glass samples with dimensions of 30 x 30 x 2 mm are prepared. The surface of these samples are polished to the specified polishing conditions. They are hung by platinum wire into nitric acid solution (pH 0.3) or acetic acid buffer solution (pH 4.6) at 25°C for the length of times specified (10 minutes, 100 minutes, 16 hours or 100 hours).
After this treatment, the loss of mass of the sample is determined using an analytical balance. Calculation of the time $t_{0.1}$ in hours, necessary to etch a surface layer to a depth of 0.1μm is done using the following formula:

$$t_{0.1} = \frac{t_e \cdot d \cdot S}{(m_1 - m_2) \cdot 100}$$

$t_{0.1}$: the time (h) necessary to etch a surface layer to a depth of 0.1μm
t_e : the time (h) for attack in the experiment
d : the specific gravity of the sample
S : the surface area (cm^2) of the sample
m_1 : the mass (mg) of the sample before the test
m_2 : the mass (mg) of the sample after the test

The calculation is carried out by use of the value of the loss of mass which is observed by the minimum test condition (i.e.,test solution and test time) for obtaining a loss of mass greater than 1 mg */* sample. If the loss of mass is less than 1mg */* sample after 100 hours exposure to pH 0.3, this value shall be accepted.
The acid resistance class SR is obtained by comparison of the pH of the test solution and the time required for the attack to a depth of 0.1 μm (h) with time scales given in the classification Table 7.

(Table 7)

Acid resistance class SR	1	2	3	4	5		51	52	53
pH of the attacking solution	0.3	0.3	0.3	0.3	0.3	4.6	4.6	4.6	4.6
Time $t_{0.1}$ needed to etch to a depth of 0.1μm (h)	>100	100～10	10～1	1～0.1	<0.1	>10	10～1	1～0.1	<0.1

In addition, changes in the surface of the sample following the treatment are qualitatively evaluated with the naked eye. Additional classification numbers are given according to Table 8.

(Table 8)

Additional Number	Changes in the Surface
.0	No visible changes
.1	Clear, but irregular surface (wavy, pockmarked)
.2	Interference colors (slight selective leaching)
.3	Tenacious thin whitish layer (stronger selective leaching)
.4	Loosely adhering thick layer (Surface crust)

For example, it is indicated that the acid resistance class SR is SR 3.2 for the optical glass which needs 2 hours for the attack to a depth of 0.1μm by an attacking solution of pH 0.3 and with interference colors after the attack.

4.3.2. Phosphate Resistance (PR)

Glass samples with dimensions of 30 x 30 x 2 mm are prepared and all surfaces are polished to given specifications. They are hung by platinum wire into aqueous solution containing 0.01 mol / ℓ purified tripolyphosphate at 50°C for specified lengths of time (15 minutes, 1 hour, 4 hours or 16 hours).
After this treatment, the loss of mass of the sample is determined using an analytical balance. Calculation of the time $t_{0.1}$ necessary to etch a surface layer to a depth of 0.1 μm is made using the same formula which is used for obtaining the acid resistance (SR) in the previous section. In this case, however, the time units are minutes.
The calculation is carried out, as a rule, using the value of the loss of mass which is observed under the minimum test conditions (i.e.,test solution and test time for obtaining a loss of mass greater than 1 mg / sample).
The phosphate resistance class PR is obtained by comparison of the time required for the attack to a depth of 0.1 μm (min) with time scales given in classification Table 9.

(Table 9)

Phosphate Resistance Class PR	1	2	3	4
Time $t_{0.1}$ needed to etch to a depth of 0.1μm (min)	＞240	240~60	60~15	＜15

Next, changes in the surface of the sample following the treatment are qualitatively evaluated with the naked eye. Additional classification numbers are given in addition to the class number according to Table 8 used for obtaining the acid resistance (SR) in the previous section. For example, it is indicated that the phosphate resistance class is PR 2.0 for optical glass which needs 120 minutes for attack to a depth of 0.1μm, with no visible changes in the surface after the attack.

5. MECHANICAL PROPERTIES

5.1 Modulus of Elasticity

Young's modulus, Modulus of rigidity and Poisson's ratio are determined by measuring the velocities of the longitudinal and transverse elastic waves in a well annealed rod of size 100 ~ 150 x 10 x 10 mm at room temperature.
Young's modulus (E), Modulus of rigidity (G) and Poisson's ratio (σ) are calculated using the following equations. Accuracy is ±1%.

Modulus of rigidity $G = \upsilon_t^2 \cdot \rho$

Young's Modulus $E = \dfrac{9KG}{3K+G}$

Bulk Modulus $K = \upsilon_l^2 \cdot \rho - \dfrac{4}{3} G$

Poisson's ratio $\sigma = \dfrac{E}{2G} - 1$

υ_l : Velocity of longitudinal waves
υ_t : Velocity of transverse waves
ρ : Density

5.2 Knoop Hardness (Hk)

The indentation hardness of optical glass is determined with the aid of the micro hardness tester. One face of the specimen with the necessary thickness is polished.
The diamond indentor is formed rhombic so that the vertically opposite angle from two axes is 172° 30' and 130° respectively. The load time is 1 5 seconds, the load is 0.98 N.
The glass specimen is indented at 5 places. Knoop hardness can be computed with the following equation:

Knoop hardness $Hk = 1.451\ F/l^2$

F : Load (N)
l : Length of longer diagonal line (mm)

Table 10 shows how the glasses are classified according to Knoop hardness. Please note the Knoop hardness figures have been rounded to the nearest 5 (e.g. value of 158 is shown as 160.)

(Table 10)

Group	1	2	3	4	5	6	7
Knoop Hardness	＜150	≧150 ＜250	≧250 ＜350	≧350 ＜450	≧450 ＜550	≧550 ＜650	≧650

5.3 Abrasion (Aa)

A sample of size 30 x 30 x 10 mm is lapped on a 250 mm diameter cast iron flat, rotating at 60 rpm. The test piece is located 80 mm from the center of the flat and is under a 9.8N load. 20 ml of water containing 10 g of aluminous abrasive as the lapping material, with mean grain size 20μm(#800), is supplied evenly to the test piece for 5 minutes. The weight loss of the test piece is then measured. The known weight loss of the standard glass is compared according to the following equation:

$$\text{Abrasion} = \frac{\text{Weight loss of sample / Specific gravity}}{\text{Weight loss of standard sample / Specific gravity}} \times 100$$

Glasses showing a higher value are less resistant to abrasion.

5.4 Photoelastic Constant (β)

Optical glass is usually free of strain, but when mechanical or thermal stress is exerted upon it, glass shows birefringence.
Stress F(Pa), optical path difference δ(nm) and thickness of glass d(cm) have the following relationship:

$$\delta = \beta \cdot d \cdot F$$

In this case, proportional constant β is called the photoelastic constant. It is listed in this catalog at a unit of (nm/cm/10^5Pa).
The photoelastic constant is the material constant which will change by glass type. By using it, optical path difference can be computed from given stress. Internal stress can also be computed from optical path difference.

6. OTHER PROPERTIES

6.1 Bubble & Inclusion

It is most desirable to manufacture bubble-free optical glass, but the existence of bubbles to some extent is inevitable.
Bubbles in optical glass vary in size and number from one glass to another due to the many different compositions and production methods.
Such as the glasses are marked with [B].
The classification of bubble content is established by specifying in mm^2 the total bubble cross sections existing in 100mℓ of glass volume.
Inclusions such as small stones or crystals are treated as bubbles. The bubble classes are shown in Tab.11..
The classification includes all bubbles and inclusions measuring larger than 0.03mm.

(Table 11)

CLASS	1	2	3	4	5
The total cross section of bubbles (mm^2/100ml)	＜0.03	≧0.03 ＜0.1	≧0.1 ＜0.25	≧0.25 ＜0.5	≧0.5

6.2 Coloring

Internal transmittance (τ) of optical glass is listed for each glass type. To express absorption, a column labeled "Coloring" is provided in the catalog page.
Coloring can be determined by measuring spectral transmission including reflection losses with 10 mm thick test pieces. The wavelengths corresponding to 80% transmission and 5% transmission are given. For instance, the glass whose transmission is —

80% at wavelength of 404 nm
5% at wavelength of 355 nm

is indicated in the catalog as 40/36 as per Figure 6.
For glass types of S-TIH 53 , PBH 71 and LAH78 reflection losses are so large that we used the wavelength corresponding to 70% in place of 80%.

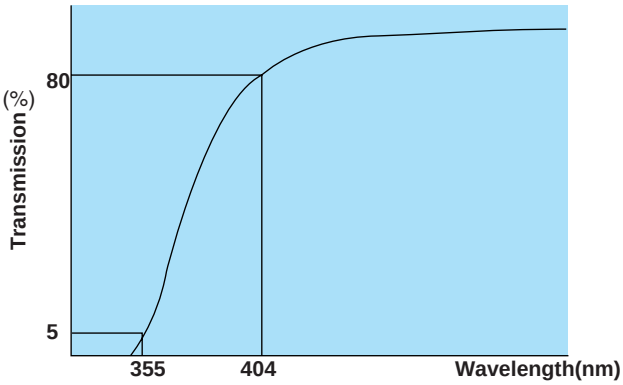


Fig. 6

6.3 Specific Gravity (d)

Specific gravity is the density value of well-annealed glass referenced against pure water at 4˚C, with the value shown to the second decimal place.

7. GUARANTEES OF QUALITY

7.1 Refractive Index and Abbe number

Refractive index and Abbe number values of our fine annealed products vary from catalog value by:

Refractive index : n_d = ±0.0005
Abbe number : ν_d = ±0.8%

Upon request, we will supply blanks of optical glass to the following tolerances:

Refractive index : n_d = ±0.0002
Abbe number : ν_d = ±0.3%

When special demand exists for specifications with other optical constants than the above, please consult us.
We urge our customers to enjoy the cost savings and benefits of our close index control, melt to melt, over long periods of production. Usually this is done at no extra cost. We normally send certification (melt data) of refractive indices measured at the spectral lines: C, d, F, g and ν_d. On special request, we can supply refractive indices measured at other spectral lines .
The following is the accuracy of standard measurements of refractive index and dispersion for raw glass and normal pressed blanks:

Refractive index = ±0.00003
Dispersion = ±0.00002

On request, we shall provide precision measurements of refractive index and dispersion:

Refractive index = ±0.00001
Dispersion = ±0.000003

We will report the environmental temperature, humidity and atmospheric pressure of the room where the precision measurement was undertaken. For, "ultraprecision measurements" and measurements at spectral line not described in this catalog, please contact us.

7.2 Homogeneity

It is sometimes necessary to measure the index variation across a blank. In such cases, Ohara pays special attention to each process and can supply high homogeneity "Grade Special A" blanks. Grade Special A is our term for precision annealed high homogeneity (Low Δn) optical glasses. Our Grade Special A glasses are available in the following homogeneity levels:

(Table 12)

Classification	Homogeneity (Δn)
Grade Special A1	$\pm 1 \times 10^{-6}$
Grade Special A2	$\pm 2 \times 10^{-6}$
Grade Special A5	$\pm 5 \times 10^{-6}$
Grade Special A20	$\pm 20 \times 10^{-6}$

Please note that the Grade Special A number indicates Δn in the sixth decimal place. The anneal required must also be specified in terms of birefringence (nm/cm). Generally, low Δn also implies low birefringence from precision annealing. Using phase measuring interferometers, we measure transmitted wavefront of each test piece. Interferograms are supplied for each blanks that is ordered with Grade Special A5 or higher homogeneity.

7.3 Stress Birefringence

Depending on the annealing condition, optical glass retains slight residual strain in most cases. This can be observed as optical birefringence, and measured by optical path differences and specified in nm/cm.
Stress birefringence of a rectangular plate is measured at the middle of the long side where maximum values occur at a point 5% of the width from the edge. A disc is measured at 4 points located 5% from the edge of the diameter. The maximum value of the 4 points is shown as the Birefringence value.
We guarantee the strain according to the grade of anneal as follows:

(Table 13)

Anneal	Birefringence (nm/cm)
Coarse	＞10
Fine	≦10
Precision	On Request

On request, we shall supply birefringence data for precision annealed blanks in the form of a "BMC" (Birefringence Measurement Chart).

7.4 Striae

Striae are thread-like veins or cords which are visual indications of abruptly varying density. Striae can also be considered to be a lack of homogeneity caused by incomplete stirring of the molten glass. Some glasses contain components that evaporate during melting, causing layers of varying density, and therefore parallel striae appear.
Striae in glass are detected by means of a striaescope, which consists of a point source of light and a collimating lens. Polished samples are examined at several different angles in the striaescope. They are then compared with the standards and graded. These established standard glasses are of a high order of quality and are certified to U.S. military specification MIL-G-174B.

(Table 14)

Striae Grade	Striae Content Using Striaescope
A	No visible striae
B	Striae is light and scattered
C	Striae is heavier than Grade B

7.5 Bubbles

Bubble content is determined by taking a sample of glass from each melt. The total bubble cross-section per 100mℓ of glass volume is measured. See Table 11 of this catalog.
On request, we shall undertake bubble examination with the method and procedures of MIL-G-174B or the customer's own specifications.

7.6 Coloring

Variation of coloring between melts is generally within ±10 nm.
On special request, we shall report the coloring or the transmission, including reflection losses, of the melt to be supplied by measuring spectral transmission.

7.7 Other

We showed each properties as representative value except for 7.1~1.6. Please contact us when you want to know the other value. In addition, please let us know your preferred specification when you place the orders.

8. FORMS OF SUPPLY

8.1 Raw Glass

8.1.1 Strip Glass

Strips are made by drawing glass out of a continuous flow furnace. Strips are rectangular in shape, have slightly rippled fire-polished surfaces, (unworked) and are flame cut to required lengths. The corners are radiused. Strips are coarse or fine annealed. This is the least expensive form of supply.

8.1.2 Slab Glass

Slabs are blocks or rectangles of raw glass that have been ground on all sides and then polished on two opposite sides for inspection. Generally, slabs are fine annealed.

8.2 Pressings (Reheat Pressings (RP))

Reheat or hand pressings (RP) are blanks formed by manually pressing softened glass. We urge the customer to specify the following:

1) Diameter (including grinding stock)
2) Center Thickness (including grinding stock)
3) Radii of curvature
4) Glass quality (striae, bubble, etc.)
5) Bevel
6) First processing side

Dimensional tolerances are given in Table 15.

(Table 15)

Diameter (mm)	Dimensional Tolerance	
	Thickness (mm)	Diameter (mm)
Less than 18	±0.5	±0.1
18 ~ 30	±0.4	±0.15
30 ~ 50	±0.4	±0.20
50 ~ 100	±0.3	±0.30
100 ~ 150	±0.3	±0.40
Over 150	±0.4	±0.50

8.3 Cut Blanks

Cut discs, cut rectangles, and cut prisms are blanks that are cut or core drilled from annealed strips or slabs. These forms are generally specified when delivery is urgent and quantities are small.

8.4 Saw cut Centerless Ground Cylindrical Blanks

These blanks are cut from a precisely ground rod formed on a centerless grinding machine. This process is very useful for making lenses that:

1) Are small in diameter but quite thick.
2) Are small in diameter with shallow radii.
3) Are such that the precise blank dimension can eliminate lens centering operations.
4) Can utilize precision spot blocks.

Diameter range of these blanks is 3 mm to 20 mm and the dimensional tolerances are given in Table 16.

(Table 16)

Diameter	Thickness	Diameter
ø 3 ~ 20 mm	±0.15mm	±0.015mm

Centerless ground blanks can be supplied in any glass type.

8.5 Moldings

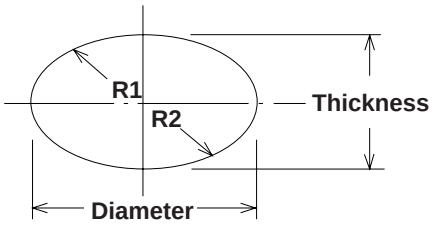
Pressing large blanks over 300mm in diameter or of an excessive thickness is difficult. Such large blanks are gravity molded. Blanks made by this method are generally supplied plano-plano. However, we can produce large plano-convex or plano-concave moldings.

8.6 High Homogeneity Glass

Ohara utilizes our leading edge technology to provide high homogeneity blanks in various glass types. Interferograms indicating the homogeneity of these blanks are typically provided with each shipment.

8.7 Fine Gob (FG)

We supply small diameter pre-formed "Fine Gobs" suitable for mold pressing into commercial lenses. FG is produced by direct molding of molten glasses with low softening properties. Shape of standard FG is convex on both sides as shown in the sketch below. Table 17 shows the current supply sizes for FG. When ordering, please specify necessary dimensions such as diameter, center thickness and radius of curvature. Optical properties (refractive indices, Abbe number, etc.) will change depending on thermal conditions during mold pressing. Refractive indices of FG products will adhere to the values shown in this catalog when FG is heat-treated using the conditions stipulated by Ohara.



(Table-17)

Volume(ml)	0.1	0.2	0.3	0.5	0.7
Diameter(mm)	6.0 ~ 6.5	7.5 ~ 8.5	9.0 ~ 10.0	11.0 ~ 12.5	12.0 ~ 14.5
Central thickness(mm)	4.5 ~ 5.0	5.5 ~ 6.5	6.0 ~ 7.0	7.0 ~ 8.0	7.5 ~ 8.5
R1(mm)	3.0 ~ 4.5	4.5 ~ 5.5	6.0 ~ 7.5	8.5 ~ 11.0	12.0 ~ 17.5
R2(mm)	3.0 ~ 4.5	4.5 ~ 7.0	5.0 ~ 8.5	6.0 ~ 10.0	6.5 ~ 12.0

Figures of R1 and R2 are radius curvatures within the scope of diameter 4 mm.

9.TABLE OF RECOMMENDED GLASSES

On pages 17 and 18 you will find a cross reference guide comparing glass types from Ohara and two other companies.
In these tables we have also shown approximate relative pricing for each Ohara glass type. For the relative pricing we are using a S-BSL7 pressing price as the standard (with a value of 10) and comparing all other glass types to this standard. Please contact us for a more detailed price quotation.

CODE: Along with Ohara´s glass type designation,the technical data sheets will show the six-digit code for each glass type. In the six-digit code the first three digits represent the refractive index at the helium line(n_d) and the last three digits represent the Abbe number(ν_d).Three six-digit codes are internationally recognized within the optical community.

GLASS TYPE: (G.T.) We have shown Ohara recommended glass types and corresponding glass types from Schott and Hoya.

PRICE RATIO: (P.R.) We are using a S-BSL7 pressing price as the standard (with a value of 10).

NEXT

CROSS REFERENCE CHART OF RECOMMENDED GLASSES

OHARA			SCHOTT		HOYA	
CODE	G.T.	P.R.	CODE	G.T.	CODE	G.T.
439950	S-FPL53	140	434950	N-FK 56		
456903	S-FPL52	86			457903	FCD 10
487702	S- FSL5	16	487704	N-FK 5	487704	FC 5
497816	S-FPL51	50	497816	N-PK 52	497816	FCD 1
516641	S- BSL7	10	517642	N-BK 7	517642	BSC 7
517524	S-NSL36	15			517522	E-CF 6
518590	S- NSL3	16			518590	E-C 3
522598	S- NSL5	17	522595	N-K 5		
532489	S- TIL6	16	532489	N-LLF 6	532488	E-FEL 6
540595	S-BAL12	17	540597	N-BAK 2		
541472	S- TIL2	16			541472	E-FEL 2
548458	S- TIL1	15	548459	N-LLF 1	548458	E-FEL 1
564607	S-BAL41	15	564608	N-SK 11	564608	BACD 11
567428	S- TIL26	16			567428	E-FL 6
569563	S-BAL14	15	569560	N-BAK 4	569560	BAC 4
571508	S- BAL2	18				
571530	S- BAL3	18				
573578	S-BAL11	17	573575	N-BAK 1		
575415	S- TIL27	16				
581407	S- TIL25	16	581408	N-LF 5	581409	E-FL 5
583464	S- BAM3	17	583466	N-BAF 3		
583594	S-BAL42	16				
589612	S-BAL35	16	589613	N-SK 5	589613	BACD 5
593353	S-FTM16	18			593355	FF 5
596392	S- TIM8	15			596392	E-F 8
603380	S- TIM5	15			603380	E-F 5
603607	S-BSM14	15	603606	N-SK 14	603607	BACD 14
603655	S-PHM53	45				

OHARA			SCHOTT		HOYA	
CODE	G.T.	P.R.	CODE	G.T.	CODE	G.T.
606437	S- BAM4	17	606437	N-BAF 4		
607568	S- BSM2	16	607567	N-SK 2	607567	BACD 2
613370	S- TIM3	15			613370	E-F 3
613443	S-NBM51	41	613445	N-KZFS4	613444	E-ADF10
613587	S- BSM4	15	613586	N-SK 4	613586	BACD 4
614550	S- BSM9	17				
618498	S-BSM28	21	618498	N-SSK 8		
618634	S-PHM52	33			618634	PCD 4
620363	S- TIM2	15	620364	N-F 2	620363	E-F 2
620603	S-BSM16	15	620603	N-SK 16	620603	BACD 16
622532	S-BSM22	18	622533	N-SSK 2		
623570	S-BSM10	16	623570	N-SK 10	623569	E-BACD 10
623582	S-BSM15	15	623580	N-SK 15	623581	BACD 15
626357	S- TIM1	15			626357	E-F 1
639449	S-BAM12	19				
639554	S-BSM18	15	639554	N-SK 18	639555	BACD 18
640345	S- TIM27	15			640346	E-FD 7
640601	S-BSM81	19	640601	N-LAK21	640602	LACL 60
648338	S- TIM22	14			648338	E-FD 2
649530	S-BSM71	17			649530	E-BACED20
651562	S- LAL54	21	651559	N-LAK22		
652585	S- LAL7	21	652585	N-LAK 7	652584	LAC 7
654397	S- NBH5	41			654396	E-ADF50
658509	S-BSM25	16	658509	N-SSK 5	658509	BACED 5
667330	S- TIM39	16				
667483	S-BAH11	16			667483	BAF 11
670393	S-BAH32	18				
670473	S-BAH10	16	670471	N-BAF10	670472	BAF 10

CODE: Along with Ohara´s glass type designation,the technical data sheets will show the six-digit code for each glass type. In the six-digit code the first three digits represent the refractive index at the helium line(n_d) and the last three digits represent the Abbe number(ν_d).Three six-digit codes are internationally recognized within the optical community.

GLASS TYPE: (G.T.) We have shown Ohara recommended glass types and corresponding glass types from Schott and Hoya.

PRICE RATIO: (P.R.) We are using a S-BSL7 pressing price as the standard (with a value of 10).

CROSS REFERENCE CHART OF RECOMMENDED GLASSES

OHARA			SCHOTT		HOYA	
CODE	G.T.	P.R.	CODE	G.T.	CODE	G.T.
673321	S- TIM25	15	673323	N-SF 5	673322	E-FD 5
678507	S- LAL56	21				
678553	S- LAL12	22	678552	N-LAK12	678555	LAC 12
689311	S- TIM28	17	689313	N-SF 8	689312	E-FD 8
691548	S- LAL9	22	691547	N-LAK 9	691547	LAC 9
694508	S- LAL58	22				
694532	S- LAL13	22			694533	LAC 13
697485	S-LAM59	21			697485	LAFL 2
697555	S- LAL14	22	697554	N-LAK14	697555	LAC 14
699301	S- TIM35	18	699302	N-SF 15	699301	E-FD 15
700481	S-LAM51	27				
702412	S-BAH27	17			702412	BAFD 7
713539	S- LAL8	23	713538	N-LAK 8	713539	LAC 8
717295	S- TIH1	19	717296	N-SF 1	717295	E-FD 1
717479	S- LAM3	24	717480	N-LAF 3	717480	LAF 3
720347	S- NBH8	46				
720420	S-LAM58	23				
720437	S-LAM52	24				
720460	S-LAM61	23				
720502	S- LAL10	23	720506	N-LAK10	720503	LAC 10
722292	S- TIH18	20				
723380	S-BAH28	17	724381	N-BASF51	723380	BAFD 8
728285	S- TIH10	19	728285	N-SF 10	728283	E-FD 10
729547	S- LAL18	47	729547	N-LAK34	729547	TAC 8
734515	S- LAL59	28			734511	TAC 4
740283	S- TIH3	19				
741278	S- TIH13	19			741278	E-FD 13
741527	S- LAL61	41			741526	TAC 2

OHARA			SCHOTT		HOYA	
CODE	G.T.	P.R.	CODE	G.T.	CODE	G.T.
743493	S-LAM60	23	743492	N-LAF35	743492	NBF 1
744448	S- LAM2	27	744449	N-LAF 2	744449	LAF 2
750353	S- LAM 7	25	749348	N-LAF 7	750350	E-LAF 7
750353	S-NBH51	35				
755275	S- TIH4	19	755274	N-SF 4	755275	E-FD 4
755523	S-YGH51	56	754524	N-LAK33	755523	TAC 6
757478	S-LAM54	26			757477	NBF 2
762265	S-TIH 14	21	762265	N-SF 14	762266	FD 140
762401	S-LAM55	33				
773496	S-LAH66	36	773496	N-LAF34	773496	TAF 1
785257	S-TIH 11	21			785257	FD 110
785263	S-TIH 23	20	785261	N-SF 56	785261	FDS 30
786442	S-LAH51	29	786441	N-LAF33	786439	NBFD 11
788474	S-LAH64	45	788475	N-LAF21	788475	TAF 4
800422	S-LAH52	29	800423	N-LAF36	800423	NBFD 12
801350	S-LAM66	22	801351	N-LASF 45		
804396	S-LAH63	30			805396	NBFD 3
804466	S-LAH65	49	804465	N-LASF44	804465	TAF 3
805254	S- TIH6	20	805254	N-SF 6	805255	FD 60
806409	S-LAH53	29	806406	N-LASF 43	806407	NBFD 13
808228	S- NPH1	75				
816466	S-LAH59	101			816466	TAF 5
834372	S-LAH60	29	834373	N-LASF40	834373	NBFD 10
835427	S-LAH55	52	835431	N-LASF41	835430	TAFD 5
847238	S- TIH53	23	847238	N-SF 57	847238	FDS 90
883408	S-LAH58	99	881410	N-LASF31	883408	TAFD 30
923189	S- NPH2	83			923209	E-FDS 1
003283	S-LAH79	518				

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$n_e - \nu_e$ DIAGRAM

ν_e ←

n_e ↑

95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15

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

S-LAH 79
S-NPH 2
S-LAH58
S-TIH53
S-LAH55
S-LAH60
S-LAH59
S-LAH53
S-LAH63
S-LAH65
S-LAH52
S-LAM66
S-TIH 6
S-NPH 1
S-LAH64
S-LAH51
S-TIH23
S-TIH11
S-LAH66
S-TIH14
S-LAM55
S-LAM54
S-TIH 4
S-YGH51
S-LAM 7
S-LAL61
S-LAM60
S-LAM 2
S-TIH3
S-TIH13
S-LAL18
S-NBH 51
S-LAL59
S-TIH10
S-LAM61
S-LAM58
S-BAH28
S-NBH 8
S-TIH18
S-LAL10
S-LAM52
S-TIH1
S-LAM 3
S-LAL 8
S-BAH27
S-LAL14
S-LAL13
S-LAM51
S-TIM35
S-LAM59
S-LAL 9
S-LAL58
S-TIM28
S-LAL12
S-LAL56
S-TIM25
S-BAH10
S-BAH32
S-BAH11
S-TIM39
S-LAL 7
S-LAL54
S-BSM25
S-NBH 5
S-TIM22
S-BSM71
S-BSM81
S-BAM12
S-TIM27
S-BSM18
S-BSM15
S-TIM 1
S-BSM28
S-BSM16
S-BSM10
S-BSM22
S-PHM52
S-TIM 2
S-NBM51
S-TIM 3
S-BSM14
S-BSM 4
S-BSM 9
S-TIM 5
S-PHM53
S-BSM 2
S-BAM 4
S-TIM 8
S-FTM16
S-BAL35
S-BAL42
S-BAM 3
S-TIL25
S-BAL 2
S-BAL11
S-TIL27
S-BAL 3
S-BAL41
S-BAL14
S-TIL26
S-TIL 1
S-BAL12
S-TIL 2
S-TIL 6
S-NSL 5
S-BSL 7
S-NSL 3
S-NSL36
S-FPL51
S-FSL 5
S-FPL52
S-FPL53

S-LAH
S-TIH
S-YGH
S-LAM
S-LAL
S-BAH
S-PHM
S-BAM
S-BSM
S-TIM
S-BAL
S-FPL
S-BSL
S-TIL
S-NSL
S-FSL

ν_e →

OHARA

n_d – ν_d DIAGRAM

ν_d ←

95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15

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

n_d

S-LAH79
S-NPH 2
S-LAH58
S-TIH53
S-LAH55
S-LAH60
S-LAH59
S-LAH65
S-LAH53
S-LAH63
S-TIH 6
S-NPH 1
S-LAM66
S-LAH52
S-LAH51
S-LAH64
S-TIH23
S-TIH11
S-LAH66
S-TIH14
S-LAM55
S-YGH51
S-LAM54
S-TIH 4
S-LAM 7
S-NBH51
S-LAL61
S-LAM60
S-LAM 2
S-TIH13
S-TIH 3
S-LAL18
S-LAL59
S-TIH10
S-LAM61
S-LAM52
S-LAM58
S-BAH28
S-NBH 8
S-TIH18
S-LAL10
S-LAM 3
S-TIH 1
S-LAL 8
S-LAM51
S-BAH27
S-LAL14
LAL58
S-TIM35
S-LAM59
S-LAL 9
S-LAL13
S-TIM28
S-LAL12
S-LAL56
S-BAH10
S-TIM25
S-BAH32
S-BAH11
S-TIM39
S-LAL 7
S-LAL54
S-BSM25
S-NBH 5
S-BSM71
S-TIM22
S-BSM18
S-BAM12
S-TIM27
S-BSM81
S-BSM15
S-BSM22
S-TIM 1
S-BSM16
S-BSM10
S-BSM28
S-TIM 2
S-PHM52
S-BSM 9
S-NBM51
S-TIM3
S-BSM 4
S-TIM 5
S-BSM14
S-BSM 2
S-BAM 4
S-PHM53
S-TIM 8
S-FTM16
S-BAL35
S-BAL42
S-BAM 3
S-TIL25
S-BAL11
S-BAL 2
S-TIL27
S-BAL 3
S-BAL14
S-TIL26
S-BAL41
S-BAL12
S-TIL 1
S-TIL 2
S-NSL 5
S-TIL 6
S-BSL 7
S-NSL 3
S-NSL36
S-FPL51
S-FSL 5
S-FPL52
S-FPL53

S-LAH
S-TIH
S-YGH
S-LAM
S-LAL
S-BAH
S-PHM
S-BAM
S-BSM
S-TIM
S-BAL
S-FPL
S-TIL
S-BSL
S-NSL
S-FSL

ν_d →

OHARA

$\theta_{g,F}$-ν_d DIAGRAM

$$\theta_{g,F} = \frac{n_g - n_F}{n_F - n_C}$$

ν_d ← (95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20)

$\theta_{g,F}$ (0.640 0.630 0.620 0.610 0.600 0.590 0.580 0.570 0.560 0.550 0.540 0.530)

S-NPH 2
S-NPH 1
S-TIH53
S-TIH11
S-TIH 6
S-TIH14
S-TIH23
S-TIH 4
S-TIH 3
S-TIH13
S-TIH10
S-TIH 1
S-TIH18
S-TIM35
S-TIM28
S-LAH 79
S-TIM25
S-TIM39
S-FTM16
S-TIM22
S-TIM27
S-TIM 1
S-TIM 2
S-LAM 7
S-TIM 3
S-LAM66
S-BAH28
S-TIM 5
S-NBH 8
PBM 2
S-BAH32
S-NBH 51
S-TIM 8
S-TIL27
S-TIL25
S-LAM55
S-LAH60
S-BAH27
S-NBH 5
S-LAH63
S-BAM 4
S-LAM58
S-LAM52
S-TIL26
S-LAH53
S-TIL 1
S-BAM12
S-LAH58
S-BAM 3
S-LAH52
S-TIL 2
S-LAM 2
S-BAH11
S-LAM61
S-LAH55
S-TIL 6
S-NBM51
S-BAH10
S-LAM59
S-LAH51
S-BSM28
S-LAM 3
S-LAM51
S-BAL 2
S-LAH65
S-NSL36
S-BSM25
S-LAL56
S-BAL 3
S-LAH59
S-BSM71
S-LAH64
S-BSM22
S-LAL58
S-LAL10
S-BSM18
S-BAL14
S-LAM60
S-LAM54
S-LAH66
S-LAL54
S-BSM 9
S-BSM 2
S-LAL13
S-LAL59
S-NSL 3
S-BSM15
S-LAL12
S-BAL12
S-YGH51
S-BSM10
S-LAL61
S-NSL 5
S-LAL 8
NSL 7
S-BAL11
S-PHM52
S-BSM 4
S-LAL 9
S-BSM16
S-LAL 7
S-LAL18
S-PHM53
S-BAL42
S-LAL14
S-BAL41
S-BSM14
S-BAL35
S-BSM81
S-FPL51
S-BSL 7
S-FPL53
S-FPL52
S-FSL 5

S–FPL51

497816
498810

Refractive Index	n_d	**1.49700** 1.496999	Abbe Number	ν_d	**81.6** 81.54	Dispersion	$n_F - n_C$ **0.00609** 0.006095
Refractive Index	n_e	1.498455	Abbe Number	ν_e	81.14	Dispersion	$n_{F'} - n_{C'}$ 0.006143

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.47952
n_{1970}	1.97009	1.48269
n_{1530}	1.52958	1.48610
n_{1129}	1.12864	1.48911
n_t	1.01398	1.49010
n_s	0.85211	1.49183
$n_{A'}$	0.76819	1.49300
n_r	0.70652	1.49407
n_C	0.65627	**1.49514**
$n_{C'}$	0.64385	1.49543
n_{He-Ne}	0.6328	1.49571
n_D	0.58929	1.49694
n_d	0.58756	**1.49700**
n_e	0.54607	1.49845
n_F	0.48613	**1.50123**
$n_{F'}$	0.47999	1.50158
n_{He-Cd}	0.44157	1.50407
n_g	0.435835	**1.50451**
n_h	0.404656	1.50720
n_i	0.365015	1.51176

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	-0.1035
$\Delta\theta_{C,A'}$	-0.0246
$\Delta\theta_{g,d}$	0.0364
$\Delta\theta_{g,F}$	0.0280
$\Delta\theta_{i,g}$	0.1478

Constants of Dispersion Formula

A_1	1.17010505
A_2	$4.75710783 \cdot 10^{-2}$
A_3	$7.63832445 \cdot 10^{-1}$
B_1	$6.16203924 \cdot 10^{-3}$
B_2	$2.63372876 \cdot 10^{-2}$
B_3	$1.41882642 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.62
Remarks		

Partial Dispersions

$n_C - n_t$	0.005033
$n_C - n_{A'}$	0.002134
$n_d - n_C$	0.001863
$n_e - n_C$	0.003319
$n_g - n_d$	0.007508
$n_g - n_F$	0.003276
$n_h - n_g$	0.002698
$n_i - n_g$	0.007253
$n_{C'} - n_t$	0.005330
$n_e - n_{C'}$	0.003022
$n_{F'} - n_e$	0.003121
$n_i - n_{F'}$	0.010184

Thermal Properties

Strain Point	StP (℃)	
Annealing Point	AP (℃)	
Transformation Temperature	Tg (℃)	458
Yield Point	At (℃)	489
Softening Point	SP (℃)	
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	131
	(+100～+300℃)	155
Thermal Conductivity	k (W/m·K)	0.780

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	727
Rigidity Modulus G	(10^8N/m^2)	280
Poisson's Ratio	σ	0.299
Knoop Hardness	Hk	350[4]
Abrasion	Aa	449
Photoelastic Constant (nm/cm/10^5Pa)	β	0.74

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	52.1
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8258
$\theta_{C,A'}$	0.3501
$\theta_{d,C}$	0.3057
$\theta_{e,C}$	0.5445
$\theta_{g,d}$	1.2318
$\theta_{g,F}$	0.5375
$\theta_{h,g}$	0.4427
$\theta_{i,g}$	1.1900
$\theta'_{C',t}$	0.8677
$\theta'_{e,C'}$	0.4919
$\theta'_{F',e}$	0.5081
$\theta'_{i,F'}$	1.6578

Coloring

λ 80／λ 5	34/29

Internal Transmittance

λ (nm)	τ 10mm
280	0.01
290	0.05
300	0.17
310	0.37
320	0.60
330	0.77
340	0.88
350	0.947
360	0.975
370	0.988
380	0.994
390	0.996
400	0.995
420	0.994
440	0.994
460	0.996
480	0.997
500	0.998
550	0.999
600	0.998
650	0.998
700	0.998
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.999
1600	0.999
1800	0.999
2000	0.999
2200	0.997
2400	0.996

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	-5.7	-5.5	-5.5	-5.4	-5.4	-5.3	-5.1
−20 ～ 0	-5.9	-5.8	-5.7	-5.7	-5.6	-5.5	-5.3
0 ～ 20	-6.2	-6.0	-6.0	-5.9	-5.8	-5.7	-5.5
20 ～ 40	-6.4	-6.2	-6.2	-6.2	-6.1	-5.9	-5.8
40 ～ 60	-6.7	-6.5	-6.5	-6.4	-6.3	-6.1	-6.0
60 ～ 80	-6.9	-6.7	-6.7	-6.7	-6.6	-6.4	-6.2

S–FPL52

456903
457900

Refractive Index	n_d	**1.45600** 1.455999	Abbe Number	ν_d	**90.3** 90.28	Dispersion	$n_F - n_C$ **0.00505** 0.005051
Refractive Index	n_e	1.457205	Abbe Number	ν_e	89.88	Dispersion	$n_{F'} - n_{C'}$ 0.005087

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.44074
n_{1970}	1.97009	1.44360
n_{1530}	1.52958	1.44667
n_{1129}	1.12864	1.44933
n_t	1.01398	1.45019
n_s	0.85211	1.45167
$n_{A'}$	0.76819	1.45266
n_r	0.70652	1.45356
n_C	0.65627	**1.45445**
$n_{C'}$	0.64385	1.45470
$n_{He\text{-}Ne}$	0.6328	1.45493
n_D	0.58929	1.45595
n_d	0.58756	**1.45600**
n_e	0.54607	1.45721
n_F	0.48613	**1.45950**
$n_{F'}$	0.47999	1.45978
$n_{He\text{-}Cd}$	0.44157	1.46184
n_g	0.435835	**1.46220**
n_h	0.404656	1.46441
n_i	0.365015	1.46813

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.1281
$\Delta\theta_{C,A'}$	−0.0317
$\Delta\theta_{g,d}$	0.0498
$\Delta\theta_{g,F}$	0.0386
$\Delta\theta_{i,g}$	0.2062

Constants of Dispersion Formula

A_1	1.06785857
A_2	$3.35857718 \cdot 10^{-2}$
A_3	1.10219763
B_1	$6.99227302 \cdot 10^{-3}$
B_2	$-2.07608925 \cdot 10^{-2}$
B_3	$2.26496541 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	3.53
Remarks		

Partial Dispersions

$n_C - n_t$	0.004254
$n_C - n_{A'}$	0.001786
$n_d - n_C$	0.001550
$n_e - n_C$	0.002756
$n_g - n_d$	0.006198
$n_g - n_F$	0.002697
$n_h - n_g$	0.002215
$n_i - n_g$	0.005936
$n_{C'} - n_t$	0.004502
$n_e - n_{C'}$	0.002508
$n_{F'} - n_e$	0.002579
$n_i - n_{F'}$	0.008349

Thermal Properties

Strain Point	StP (℃)	—
Annealing Point	AP (℃)	—
Transformation Temperature	Tg (℃)	445
Yield Point	At (℃)	473
Softening Point	SP (℃)	—
Expansion Coefficients (−30～+70℃)		133
α (10^{-7}/℃) (+100～+300℃)		158
Thermal Conductivity	k (W/m·K)	0.849

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	717
Rigidity Modulus G	(10^8N/m^2)	276
Poisson's Ratio	σ	0.299
Knoop Hardness	Hk	360[4]
Abrasion	Aa	447
Photoelastic Constant (nm/cm/10^5Pa)	β	0.73

Chemical Properties

Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	4
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	52.0
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8422
$\theta_{C,A'}$	0.3536
$\theta_{d,C}$	0.3069
$\theta_{e,C}$	0.5456
$\theta_{g,d}$	1.2271
$\theta_{g,F}$	0.5340
$\theta_{h,g}$	0.4385
$\theta_{i,g}$	1.1752
$\theta'_{C',t}$	0.8850
$\theta'_{e,C'}$	0.4930
$\theta'_{F',e}$	0.5070
$\theta'_{i,F'}$	1.6412

Coloring

λ 80／λ 5	34/29

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.01
300	0.07
310	0.23
320	0.48
330	0.69
340	0.86
350	0.927
360	0.966
370	0.985
380	0.993
390	0.995
400	0.995
420	0.994
440	0.994
460	0.995
480	0.997
500	0.998
550	0.999
600	0.998
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.998
1600	0.998
1800	0.998
2000	0.998
2200	0.998
2400	0.998

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−5.0	−4.9	−4.9	−4.8	−4.8	−4.6	−4.5
−20 ～ 0	−5.3	−5.2	−5.2	−5.1	−5.1	−4.9	−4.8
0 ～ 20	−5.6	−5.5	−5.5	−5.4	−5.3	−5.2	−5.1
20 ～ 40	−5.9	−5.8	−5.7	−5.7	−5.6	−5.5	−5.4
40 ～ 60	−6.2	−6.0	−6.0	−6.0	−5.9	−5.8	−5.6
60 ～ 80	−6.4	−6.3	−6.3	−6.3	−6.2	−6.1	−5.9

S–FPL53

439950
440946

Refractive Index	n_d	**1.43875** 1.438750	Abbe Number ν_d	**95.0** 94.93	Dispersion $n_F - n_C$	**0.00462** 0.004622
Refractive Index	n_e	1.439854	Abbe Number ν_e	94.49	Dispersion $n_{F'} - n_{C'}$	0.004655

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.42512
n_{1970}	1.97009	1.42762
n_{1530}	1.52958	1.43032
n_{1129}	1.12864	1.43269
n_t	1.01398	1.43346
n_s	0.85211	1.43480
$n_{A'}$	0.76819	1.43570
n_r	0.70652	1.43652
n_C	0.65627	**1.43733**
$n_{C'}$	0.64385	1.43756
$n_{He\text{-}Ne}$	0.6328	1.43777
n_D	0.58929	1.43871
n_d	0.58756	**1.43875**
n_e	0.54607	1.43985
n_F	0.48613	**1.44195**
$n_{F'}$	0.47999	1.44221
$n_{He\text{-}Cd}$	0.44157	1.44410
n_g	0.435835	**1.44442**
n_h	0.404656	1.44645
n_i	0.365015	1.44986

Partial Dispersions	
$n_C - n_t$	0.003870
$n_C - n_{A'}$	0.001631
$n_d - n_C$	0.001417
$n_e - n_C$	0.002521
$n_g - n_d$	0.005673
$n_g - n_F$	0.002468
$n_h - n_g$	0.002028
$n_i - n_g$	0.005437
$n_{C'} - n_t$	0.004097
$n_e - n_{C'}$	0.002294
$n_{F'} - n_e$	0.002361
$n_i - n_{F'}$	0.007645

Relative Partial Dispersions	
$\theta_{C,t}$	0.8373
$\theta_{C,A'}$	0.3529
$\theta_{d,C}$	0.3066
$\theta_{e,C}$	0.5454
$\theta_{g,d}$	1.2274
$\theta_{g,F}$	0.5340
$\theta_{h,g}$	0.4388
$\theta_{i,g}$	1.1763
$\theta'_{C',t}$	0.8801
$\theta'_{e,C'}$	0.4928
$\theta'_{F',e}$	0.5072
$\theta'_{i,F'}$	1.6423

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	−0.1548
$\Delta\theta_{C,A'}$	−0.0381
$\Delta\theta_{g,d}$	0.0598
$\Delta\theta_{g,F}$	0.0461
$\Delta\theta_{i,g}$	0.2462

Thermal Properties		
Strain Point	StP (℃)	—
Annealing Point	AP (℃)	—
Transformation Temperature	Tg (℃)	426
Yield Point	At (℃)	456
Softening Point	SP (℃)	—
Expansion Coefficients (−30～+70℃)		145
α (10^{-7}/℃) (+100～+300℃)		169
Thermal Conductivity	k(W/m·K)	0.857

Coloring	
λ 80／λ 5	33/29

Internal Transmittance	
λ (nm)	τ 10mm
280	0.04
290	0.12
300	0.28
310	0.51
320	0.71
330	0.85
340	0.928
350	0.967
360	0.985
370	0.992
380	0.996
390	0.997
400	0.996
420	0.995
440	0.995
460	0.996
480	0.997
500	0.998
550	0.999
600	0.998
650	0.997
700	0.998
800	0.998
900	0.997
1000	0.997
1200	0.998
1400	0.998
1600	0.998
1800	0.998
2000	0.998
2200	0.997
2400	0.998

Constants of Dispersion Formula	
A_1	$9.83532327 \cdot 10^{-1}$
A_2	$6.95688140 \cdot 10^{-2}$
A_3	1.11409238
B_1	$4.92234955 \cdot 10^{-3}$
B_2	$1.93581091 \cdot 10^{-2}$
B_3	$2.64275294 \cdot 10^{2}$

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	691
Rigidity Modulus G	(10^8N/m^2)	265
Poisson's Ratio	σ	0.303
Knoop Hardness	Hk	320[3]
Abrasion	Aa	451
Photoelastic Constant (nm/cm/10^5Pa)	β	0.57

Other Properties		
Bubble Quality Group	B	B
Specific Gravity	d	3.62
Remarks		

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	52.3
Phosphate Resistance	PR	4.3

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−5.9	−5.8	−5.8	−5.7	−5.7	−5.6	−5.5
−20 ～ 0	−6.2	−6.1	−6.1	−6.1	−6.0	−5.9	−5.8
0 ～ 20	−6.5	−6.4	−6.4	−6.4	−6.3	−6.2	−6.1
20 ～ 40	−6.9	−6.8	−6.7	−6.7	−6.6	−6.5	−6.4
40 ～ 60	−7.2	−7.1	−7.1	−7.0	−7.0	−6.8	−6.7
60 ～ 80	−7.5	−7.4	−7.4	−7.3	−7.3	−7.2	−7.0

S–FSL 5

487702
489701

Refractive Index	n_d	**1.48749** 1.487490	Abbe Number	ν_d	**70.2** 70.23	Dispersion	$n_F - n_C$ **0.00694** 0.006941
Refractive Index	n_e	1.489147	Abbe Number	ν_e	70.04	Dispersion	$n_{F'} - n_{C'}$ 0.006984

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.46227
n_{1970}	1.97009	1.46765
n_{1530}	1.52958	1.47324
n_{1129}	1.12864	1.47778
n_t	1.01398	1.47915
n_s	0.85211	1.48138
$n_{A'}$	0.76819	1.48282
n_r	0.70652	1.48410
n_C	0.65627	**1.48534**
$n_{C'}$	0.64385	1.48569
n_{He-Ne}	0.6328	1.48601
n_D	0.58929	1.48743
n_d	0.58756	**1.48749**
n_e	0.54607	1.48915
n_F	0.48613	**1.49228**
$n_{F'}$	0.47999	1.49267
n_{He-Cd}	0.44157	1.49548
n_g	0.435835	**1.49596**
n_h	0.404656	1.49898
n_i	0.365015	1.50406

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0162
$\Delta\theta_{C,A'}$	0.0023
$\Delta\theta_{g,d}$	0.0020
$\Delta\theta_{g,F}$	0.0022
$\Delta\theta_{i,g}$	0.0299

Constants of Dispersion Formula

A_1	1.17447043
A_2	$1.40056154 \cdot 10^{-2}$
A_3	1.19272435
B_1	$8.41855181 \cdot 10^{-3}$
B_2	$-5.81790767 \cdot 10^{-2}$
B_3	$1.29599726 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.46
Remarks		

Partial Dispersions

$n_C - n_t$	0.006194
$n_C - n_{A'}$	0.002522
$n_d - n_C$	0.002146
$n_e - n_C$	0.003803
$n_g - n_d$	0.008474
$n_g - n_F$	0.003679
$n_h - n_g$	0.003019
$n_i - n_g$	0.008099
$n_{C'} - n_t$	0.006539
$n_e - n_{C'}$	0.003458
$n_{F'} - n_e$	0.003526
$n_i - n_{F'}$	0.011390

Thermal Properties

Strain Point	StP (℃)	457
Annealing Point	AP (℃)	491
Transformation Temperature	Tg (℃)	500
Yield Point	At (℃)	568
Softening Point	SP (℃)	679
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	90
	(+100～+300℃)	95
Thermal Conductivity	k (W/m·K)	1.007

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	623
Rigidity Modulus G	(10^8N/m^2)	254
Poisson's Ratio	σ	0.227
Knoop Hardness	Hk	520[5]
Abrasion	Aa	111
Photoelastic Constant (nm/cm/10^5Pa)	β	2.87

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	3.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8924
$\theta_{C,A'}$	0.3633
$\theta_{d,C}$	0.3092
$\theta_{e,C}$	0.5479
$\theta_{g,d}$	1.2209
$\theta_{g,F}$	0.5300
$\theta_{h,g}$	0.4350
$\theta_{i,g}$	1.1668
$\theta'_{C',t}$	0.9363
$\theta'_{e,C'}$	0.4951
$\theta'_{F',e}$	0.5049
$\theta'_{i,F'}$	1.6309

Coloring

λ 80／λ 5	31/28

Internal Transmittance

λ (nm)	τ 10mm
280	0.13
290	0.43
300	0.73
310	0.89
320	0.961
330	0.984
340	0.992
350	0.995
360	0.995
370	0.998
380	0.998
390	0.999
400	0.999
420	0.999
440	0.999
460	0.999
480	0.999
500	0.999
550	0.999
600	0.999
650	0.999
700	0.999
800	0.999
900	0.999
1000	0.998
1200	0.998
1400	0.982
1600	0.992
1800	0.985
2000	0.971
2200	0.88
2400	0.87

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	−1.3	−1.2	−1.2	−1.1	−1.1	−0.9	−0.7
−20 ~ 0	−1.3	−1.1	−1.1	−1.0	−1.0	−0.8	−0.6
0 ~ 20	−1.3	−1.1	−1.0	−0.9	−0.8	−0.6	−0.4
20 ~ 40	−1.1	−0.8	−0.8	−0.7	−0.6	−0.4	−0.3
40 ~ 60	−1.0	−0.6	−0.6	−0.5	−0.4	−0.2	0.0
60 ~ 80	−0.9	−0.4	−0.4	−0.3	−0.2	−0.1	0.2

S–BSL 7

516641
518639

Refractive Index	n_d	**1.51633** 1.516330	Abbe Number	ν_d	**64.1** 64.14	Dispersion	$n_F - n_C$ **0.00805** 0.008050
Refractive Index	n_e	1.518251	Abbe Number	ν_e	63.93	Dispersion	$n_{F'} - n_{C'}$ 0.008107

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.48899
n_{1970}	1.97009	1.49462
n_{1530}	1.52958	1.50050
n_{1129}	1.12864	1.50536
n_t	1.01398	1.50686
n_s	0.85211	1.50935
$n_{A'}$	0.76819	1.51097
n_r	0.70652	1.51243
n_C	0.65627	**1.51386**
$n_{C'}$	0.64385	1.51425
n_{He-Ne}	0.6328	1.51462
n_D	0.58929	1.51626
n_d	0.58756	**1.51633**
n_e	0.54607	1.51825
n_F	0.48613	**1.52191**
$n_{F'}$	0.47999	1.52236
n_{He-Cd}	0.44157	1.52564
n_g	0.435835	**1.52621**
n_h	0.404656	1.52977
n_i	0.365015	1.53578

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0211
$\Delta\theta_{C,A'}$	0.0044
$\Delta\theta_{g,d}$	−0.0037
$\Delta\theta_{g,F}$	−0.0024
$\Delta\theta_{i,g}$	0.0010

Constants of Dispersion Formula

A_1	1.15150190
A_2	$1.18583612 \cdot 10^{-1}$
A_3	1.26301359
B_1	$1.05984130 \cdot 10^{-2}$
B_2	$-1.18225190 \cdot 10^{-2}$
B_3	$1.29617662 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.52
Remarks		

Partial Dispersions

$n_C - n_t$	0.006993
$n_C - n_{A'}$	0.002882
$n_d - n_C$	0.002475
$n_e - n_C$	0.004396
$n_g - n_d$	0.009884
$n_g - n_F$	0.004309
$n_h - n_g$	0.003554
$n_i - n_g$	0.009571
$n_{C'} - n_t$	0.007389
$n_e - n_{C'}$	0.004000
$n_{F'} - n_e$	0.004107
$n_i - n_{F'}$	0.013427

Thermal Properties

Strain Point	StP (℃)	532
Annealing Point	AP (℃)	563
Transformation Temperature	Tg (℃)	576
Yield Point	At (℃)	625
Softening Point	SP (℃)	718
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	72
	(+100～+300℃)	86
Thermal Conductivity	k (W/m·K)	1.130

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	800
Rigidity Modulus G	(10^8N/m^2)	332
Poisson's Ratio	σ	0.205
Knoop Hardness	Hk	570[6]
Abrasion	Aa	94
Photoelastic Constant (nm/cm/10^5Pa)	β	2.79

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8687
$\theta_{C,A'}$	0.3580
$\theta_{d,C}$	0.3075
$\theta_{e,C}$	0.5461
$\theta_{g,d}$	1.2278
$\theta_{g,F}$	0.5353
$\theta_{h,g}$	0.4415
$\theta_{i,g}$	1.1889
$\theta'_{C',t}$	0.9114
$\theta'_{e,C'}$	0.4934
$\theta'_{F',e}$	0.5066
$\theta'_{i,F'}$	1.6562

Coloring

λ 80／λ 5	33/29

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.08
300	0.31
310	0.58
320	0.77
330	0.88
340	0.940
350	0.968
360	0.984
370	0.991
380	0.991
390	0.996
400	0.997
420	0.996
440	0.995
460	0.995
480	0.996
500	0.996
550	0.998
600	0.997
650	0.997
700	0.998
800	0.998
900	0.997
1000	0.996
1200	0.995
1400	0.982
1600	0.991
1800	0.980
2000	0.961
2200	0.89
2400	0.85

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.1	2.3	2.3	2.4	2.5	2.7	3.0
−20 ～ 0	2.1	2.4	2.4	2.5	2.6	2.8	3.1
0 ～ 20	2.2	2.5	2.5	2.6	2.7	3.0	3.2
20 ～ 40	2.2	2.6	2.6	2.7	2.8	3.1	3.3
40 ～ 60	2.3	2.6	2.7	2.8	2.9	3.2	3.5
60 ～ 80	2.4	2.7	2.7	2.9	3.0	3.3	3.6

S–BSM 2

607568
610565

Refractive Index	n_d	**1.60738** 1.607379	Abbe Number	ν_d	**56.8** 56.81	Dispersion	$n_F - n_C$ **0.01069** 0.010691
Refractive Index	n_e	1.609927	Abbe Number	ν_e	56.53	Dispersion	$n_{F'} - n_{C'}$ 0.010790

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.57874
n_{1970}	1.97009	1.58374
n_{1530}	1.52958	1.58913
n_{1129}	1.12864	1.59398
n_t	1.01398	1.59561
n_s	0.85211	1.59849
$n_{A'}$	0.76819	1.60048
n_r	0.70652	1.60231
n_C	0.65627	**1.60414**
$n_{C'}$	0.64385	1.60466
$n_{He\text{-}Ne}$	0.6328	1.60514
n_D	0.58929	1.60728
n_d	0.58756	**1.60738**
n_e	0.54607	1.60993
n_F	0.48613	**1.61483**
$n_{F'}$	0.47999	1.61545
$n_{He\text{-}Cd}$	0.44157	1.61992
n_g	0.435835	**1.62070**
n_h	0.404656	1.62558
n_i	0.365015	1.63394

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0150
$\Delta\theta_{C,A'}$	−0.0022
$\Delta\theta_{g,d}$	−0.0010
$\Delta\theta_{g,F}$	−0.0013
$\Delta\theta_{i,g}$	−0.0105

Constants of Dispersion Formula

A_1	$8.67168676 \cdot 10^{-1}$
A_2	$6.72848343 \cdot 10^{-1}$
A_3	1.18456107
B_1	$3.69311003 \cdot 10^{-3}$
B_2	$1.81652804 \cdot 10^{-2}$
B_3	$1.32376147 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.53
Remarks		

Partial Dispersions

$n_C - n_t$	0.008534
$n_C - n_{A'}$	0.003662
$n_d - n_C$	0.003235
$n_e - n_C$	0.005783
$n_g - n_d$	0.013318
$n_g - n_F$	0.005862
$n_h - n_g$	0.004885
$n_i - n_g$	0.013244
$n_{C'} - n_t$	0.009048
$n_e - n_{C'}$	0.005269
$n_{F'} - n_e$	0.005521
$n_i - n_{F'}$	0.018493

Thermal Properties

Strain Point	StP (℃)	612
Annealing Point	AP (℃)	643
Transformation Temperature	Tg (℃)	654
Yield Point	At (℃)	690
Softening Point	SP (℃)	778
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	65
	(+100～+300℃)	74
Thermal Conductivity	k (W/m·K)	0.802

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	780
Rigidity Modulus G	(10^8N/m^2)	309
Poisson's Ratio	σ	0.264
Knoop Hardness	Hk	560[6]
Abrasion	Aa	133
Photoelastic Constant (nm/cm/10^5Pa)	β	2.26

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	5.2
Phosphate Resistance	PR	2.2

Relative Partial Dispersions

$\theta_{C,t}$	0.7982
$\theta_{C,A'}$	0.3425
$\theta_{d,C}$	0.3026
$\theta_{e,C}$	0.5409
$\theta_{g,d}$	1.2457
$\theta_{g,F}$	0.5483
$\theta_{h,g}$	0.4569
$\theta_{i,g}$	1.2388
$\theta'_{C',t}$	0.8386
$\theta'_{e,C'}$	0.4883
$\theta'_{F',e}$	0.5117
$\theta'_{i,F'}$	1.7139

Coloring

λ 80／λ 5	35/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.04
320	0.27
330	0.57
340	0.77
350	0.88
360	0.941
370	0.967
380	0.981
390	0.987
400	0.991
420	0.991
440	0.990
460	0.991
480	0.993
500	0.995
550	0.997
600	0.997
650	0.996
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.994
1600	0.997
1800	0.992
2000	0.984
2200	0.951
2400	0.89

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.1	3.5	3.6	3.7	3.8	4.2	4.5
−20 ～ 0	3.2	3.6	3.7	3.8	3.9	4.3	4.7
0 ～ 20	3.3	3.7	3.7	3.9	4.0	4.4	4.8
20 ～ 40	3.4	3.8	3.8	4.0	4.1	4.5	4.9
40 ～ 60	3.4	3.9	3.9	4.1	4.3	4.7	5.1
60 ～ 80	3.5	4.0	4.0	4.2	4.4	4.8	5.2

S–BSM 4

613587
615584

Refractive Index	n_d	**1.61272** 1.612716	Abbe Number ν_d	**58.7** 58.72	Dispersion $n_F - n_C$	**0.01043** 0.010435
Refractive Index	n_e	1.615204	Abbe Number ν_e	58.45	Dispersion $n_{F'} - n_{C'}$	0.010526

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.58338
n_{1970}	1.97009	1.58871
n_{1530}	1.52958	1.59440
n_{1129}	1.12864	1.59941
n_t	1.01398	1.60107
n_s	0.85211	1.60396
$n_{A'}$	0.76819	1.60594
n_r	0.70652	1.60775
n_C	0.65627	**1.60955**
$n_{C'}$	0.64385	1.61005
$n_{He\text{-}Ne}$	0.6328	1.61052
n_D	0.58929	1.61262
n_d	0.58756	**1.61272**
n_e	0.54607	1.61520
n_F	0.48613	**1.61998**
$n_{F'}$	0.47999	1.62058
$n_{He\text{-}Cd}$	0.44157	1.62491
n_g	0.435835	**1.62567**
n_h	0.404656	1.63039
n_i	0.365015	1.63845

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0101
$\Delta\theta_{C,A'}$	−0.0012
$\Delta\theta_{g,d}$	−0.0016
$\Delta\theta_{g,F}$	−0.0016
$\Delta\theta_{i,g}$	−0.0088

Constants of Dispersion Formula

A_1	$9.62443080 \cdot 10^{-1}$
A_2	$5.95939234 \cdot 10^{-1}$
A_3	1.10558352
B_1	$4.68062141 \cdot 10^{-3}$
B_2	$1.78772082 \cdot 10^{-2}$
B_3	$1.15896432 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.57
Remarks		

Partial Dispersions

$n_C - n_t$	0.008474
$n_C - n_{A'}$	0.003609
$n_d - n_C$	0.003169
$n_e - n_C$	0.005657
$n_g - n_d$	0.012952
$n_g - n_F$	0.005686
$n_h - n_g$	0.004723
$n_i - n_g$	0.012778
$n_{C'} - n_t$	0.008978
$n_e - n_{C'}$	0.005153
$n_{F'} - n_e$	0.005373
$n_i - n_{F'}$	0.017869

Thermal Properties

Strain Point	StP (℃)	613
Annealing Point	AP (℃)	643
Transformation Temperature	Tg (℃)	660
Yield Point	At (℃)	694
Softening Point	SP (℃)	757
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	67
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.836

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	816
Rigidity Modulus G	(10^8N/m^2)	322
Poisson's Ratio	σ	0.265
Knoop Hardness	Hk	560[6]
Abrasion	Aa	142
Photoelastic Constant (nm/cm/10^5Pa)	β	1.77

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	2.2

Relative Partial Dispersions

$\theta_{C,t}$	0.8121
$\theta_{C,A'}$	0.3459
$\theta_{d,C}$	0.3037
$\theta_{e,C}$	0.5421
$\theta_{g,d}$	1.2412
$\theta_{g,F}$	0.5449
$\theta_{h,g}$	0.4526
$\theta_{i,g}$	1.2245
$\theta'_{C',t}$	0.8529
$\theta'_{e,C'}$	0.4895
$\theta'_{F',e}$	0.5105
$\theta'_{i,F'}$	1.6976

Coloring

λ 80／λ 5	35/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.04
320	0.24
330	0.52
340	0.73
350	0.85
360	0.924
370	0.960
380	0.977
390	0.985
400	0.991
420	0.994
440	0.995
460	0.996
480	0.997
500	0.998
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.997
1000	0.997
1200	0.997
1400	0.990
1600	0.994
1800	0.985
2000	0.971
2200	0.911
2400	0.82

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.8	2.0	2.0	2.1	2.2	2.5	2.8
−20 ~ 0	1.9	2.1	2.1	2.2	2.3	2.6	2.9
0 ~ 20	1.9	2.2	2.2	2.3	2.4	2.8	3.1
20 ~ 40	2.0	2.3	2.3	2.4	2.6	2.9	3.2
40 ~ 60	2.0	2.3	2.4	2.5	2.7	3.0	3.3
60 ~ 80	2.1	2.4	2.5	2.6	2.8	3.1	3.5

S–BSM9

614550
617547

Refractive Index	n_d	**1.61405** 1.614047	Abbe Number	ν_d	**55.0** 54.99	Dispersion	$n_F - n_C$ **0.01117** 0.011167
Refractive Index	n_e	1.616707	Abbe Number	ν_e	54.70	Dispersion	$n_{F'} - n_{C'}$ 0.011274

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.58406
n_{1970}	1.97009	1.58932
n_{1530}	1.52958	1.59499
n_{1129}	1.12864	1.60007
n_t	1.01398	1.60177
n_s	0.85211	1.60478
$n_{A'}$	0.76819	1.60686
n_r	0.70652	1.60876
n_C	0.65627	**1.61067**
$n_{C'}$	0.64385	1.61121
n_{He-Ne}	0.6328	1.61171
n_D	0.58929	1.61395
n_d	0.58756	**1.61405**
n_e	0.54607	1.61671
n_F	0.48613	**1.62184**
$n_{F'}$	0.47999	1.62248
n_{He-Cd}	0.44157	1.62717
n_g	0.435835	**1.62799**
n_h	0.404656	1.63314
n_i	0.365015	1.64200

Partial Dispersions	
$n_C - n_t$	0.008899
$n_C - n_{A'}$	0.003817
$n_d - n_C$	0.003374
$n_e - n_C$	0.006034
$n_g - n_d$	0.013944
$n_g - n_F$	0.006151
$n_h - n_g$	0.005147
$n_i - n_g$	0.014012
$n_{C'} - n_t$	0.009434
$n_e - n_{C'}$	0.005499
$n_{F'} - n_e$	0.005775
$n_i - n_{F'}$	0.019521

Relative Partial Dispersions	
$\theta_{C,t}$	0.7969
$\theta_{C,A'}$	0.3418
$\theta_{d,C}$	0.3021
$\theta_{e,C}$	0.5403
$\theta_{g,d}$	1.2487
$\theta_{g,F}$	0.5508
$\theta_{h,g}$	0.4609
$\theta_{i,g}$	1.2548
$\theta'_{C',t}$	0.8368
$\theta'_{e,C'}$	0.4878
$\theta'_{F',e}$	0.5122
$\theta'_{i,F'}$	1.7315

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	-0.0078
$\Delta\theta_{C,A'}$	-0.0007
$\Delta\theta_{g,d}$	-0.0018
$\Delta\theta_{g,F}$	-0.0017
$\Delta\theta_{i,g}$	-0.0098

Thermal Properties		
Strain Point	StP (℃)	633
Annealing Point	AP (℃)	662
Transformation Temperature	Tg (℃)	679
Yield Point	At (℃)	723
Softening Point	SP (℃)	797
Expansion Coefficients (−30～+70℃)		64
α (10^{-7}/℃) (+100～+300℃)		77
Thermal Conductivity	k (W/m·K)	0.916

Coloring	
λ 80／λ 5	37/33

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.03
340	0.28
350	0.60
360	0.80
370	0.904
380	0.947
390	0.969
400	0.980
420	0.987
440	0.989
460	0.991
480	0.993
500	0.995
550	0.997
600	0.996
650	0.995
700	0.996
800	0.998
900	0.997
1000	0.995
1200	0.996
1400	0.992
1600	0.994
1800	0.989
2000	0.980
2200	0.940
2400	0.88

Constants of Dispersion Formula	
A_1	1.37020077
A_2	$1.89397267 \cdot 10^{-1}$
A_3	1.24202324
B_1	$7.57631457 \cdot 10^{-3}$
B_2	$3.00787515 \cdot 10^{-2}$
B_3	$1.31350111 \cdot 10^{2}$

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	865
Rigidity Modulus G	(10^8N/m^2)	342
Poisson's Ratio	σ	0.264
Knoop Hardness	Hk	560[6]
Abrasion	Aa	124
Photoelastic Constant (nm/cm/10^5Pa)	β	1.94

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.22
Remarks		

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	2
Weathering Resistance (Surface) Group	W (S)	2
Acid Resistance (Surface) Group	SR	4.2
Phosphate Resistance	PR	1.0

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.8	3.2	3.3	3.4	3.5	3.9	4.2
−20 ～ 0	2.9	3.3	3.3	3.5	3.6	4.0	4.4
0 ～ 20	3.0	3.4	3.4	3.6	3.7	4.1	4.5
20 ～ 40	3.0	3.5	3.5	3.6	3.8	4.2	4.6
40 ～ 60	3.1	3.6	3.6	3.7	3.9	4.3	4.7
60 ～ 80	3.2	3.7	3.7	3.8	4.0	4.4	4.9

S–BSM10

623570
625568

Refractive Index	n_d	**1.62280** 1.622799	Abbe Number ν_d	**57.0** 57.05	Dispersion $n_F - n_C$	**0.01092** 0.010916
Refractive Index	n_e	1.625401	Abbe Number ν_e	56.78	Dispersion $n_{F'} - n_{C'}$	0.011014

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.59271
n_{1970}	1.97009	1.59809
n_{1530}	1.52958	1.60386
n_{1129}	1.12864	1.60898
n_t	1.01398	1.61069
n_s	0.85211	1.61368
$n_{A'}$	0.76819	1.61573
n_r	0.70652	1.61761
n_C	0.65627	**1.61949**
$n_{C'}$	0.64385	1.62001
$n_{He\text{-}Ne}$	0.6328	1.62051
n_D	0.58929	1.62270
n_d	0.58756	**1.62280**
n_e	0.54607	1.62540
n_F	0.48613	**1.63041**
$n_{F'}$	0.47999	1.63103
$n_{He\text{-}Cd}$	0.44157	1.63558
n_g	0.435835	**1.63637**
n_h	0.404656	1.64133
n_i	0.365015	1.64980

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0082
$\Delta\theta_{C,A'}$	−0.0006
$\Delta\theta_{g,d}$	−0.0031
$\Delta\theta_{g,F}$	−0.0028
$\Delta\theta_{i,g}$	−0.0172

Constants of Dispersion Formula

A_1	$9.45443081 \cdot 10^{-1}$
A_2	$6.43237376 \cdot 10^{-1}$
A_3	1.17752968
B_1	$1.57263798 \cdot 10^{-2}$
B_2	$1.61924066 \cdot 10^{-3}$
B_3	$1.21361748 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.60
Remarks		

Partial Dispersions

$n_C - n_t$	0.008800
$n_C - n_{A'}$	0.003759
$n_d - n_C$	0.003310
$n_e - n_C$	0.005912
$n_g - n_d$	0.013570
$n_g - n_F$	0.005964
$n_h - n_g$	0.004960
$n_i - n_g$	0.013428
$n_{C'} - n_t$	0.009326
$n_e - n_{C'}$	0.005386
$n_{F'} - n_e$	0.005628
$n_i - n_{F'}$	0.018768

Thermal Properties

Strain Point	StP (℃)	622
Annealing Point	AP (℃)	650
Transformation Temperature	Tg (℃)	668
Yield Point	At (℃)	709
Softening Point	SP (℃)	773
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	65
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.822

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	835
Rigidity Modulus G	(10^8N/m^2)	330
Poisson's Ratio	σ	0.266
Knoop Hardness	Hk	550[6]
Abrasion	Aa	142
Photoelastic Constant (nm/cm/10^5Pa)	β	1.88

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8062
$\theta_{C,A'}$	0.3444
$\theta_{d,C}$	0.3032
$\theta_{e,C}$	0.5416
$\theta_{g,d}$	1.2431
$\theta_{g,F}$	0.5464
$\theta_{h,g}$	0.4544
$\theta_{i,g}$	1.2301
$\theta'_{C',t}$	0.8467
$\theta'_{e,C'}$	0.4890
$\theta'_{F',e}$	0.5110
$\theta'_{i,F'}$	1.7040

Coloring

λ 80／λ 5	35/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.08
320	0.31
330	0.57
340	0.75
350	0.86
360	0.929
370	0.962
380	0.977
390	0.986
400	0.991
420	0.994
440	0.995
460	0.996
480	0.997
500	0.998
550	0.998
600	0.998
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.990
1600	0.993
1800	0.985
2000	0.971
2200	0.913
2400	0.82

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.0	2.4	2.4	2.5	2.6	3.0	3.3
−20 ~ 0	2.1	2.5	2.5	2.6	2.7	3.1	3.4
0 ~ 20	2.2	2.6	2.6	2.7	2.8	3.2	3.5
20 ~ 40	2.2	2.6	2.7	2.8	2.9	3.3	3.6
40 ~ 60	2.3	2.7	2.8	2.9	3.0	3.4	3.8
60 ~ 80	2.4	2.8	2.8	3.0	3.1	3.5	3.9

S–BSM14

603607
605604

Refractive Index	n_d	**1.60311** 1.603112	Abbe Number	ν_d	**60.7** 60.64	Dispersion	$n_F - n_C$ **0.00994** 0.009945
Refractive Index	n_e	1.605484	Abbe Number	ν_e	60.39	Dispersion	$n_{F'} - n_{C'}$ 0.010027

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.57300
n_{1970}	1.97009	1.57880
n_{1530}	1.52958	1.58491
n_{1129}	1.12864	1.59013
n_t	1.01398	1.59180
n_s	0.85211	1.59467
$n_{A'}$	0.76819	1.59660
n_r	0.70652	1.59835
n_C	0.65627	**1.60008**
$n_{C'}$	0.64385	1.60056
n_{He-Ne}	0.6328	1.60101
n_D	0.58929	1.60302
n_d	0.58756	**1.60311**
n_e	0.54607	1.60548
n_F	0.48613	**1.61002**
$n_{F'}$	0.47999	1.61059
n_{He-Cd}	0.44157	1.61470
n_g	0.435835	**1.61541**
n_h	0.404656	1.61987
n_i	0.365015	1.62745

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0009
$\Delta\theta_{C,A'}$	0.0007
$\Delta\theta_{g,d}$	−0.0023
$\Delta\theta_{g,F}$	−0.0019
$\Delta\theta_{i,g}$	−0.0062

Constants of Dispersion Formula

A_1	1.28286270
A_2	$2.47647429 \cdot 10^{-1}$
A_3	1.10383999
B_1	$1.22902399 \cdot 10^{-2}$
B_2	$-6.13142361 \cdot 10^{-3}$
B_3	$1.06883378 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.43
Remarks		

Partial Dispersions

$n_C - n_t$	0.008275
$n_C - n_{A'}$	0.003482
$n_d - n_C$	0.003033
$n_e - n_C$	0.005405
$n_g - n_d$	0.012297
$n_g - n_F$	0.005385
$n_h - n_g$	0.004461
$n_i - n_g$	0.012043
$n_{C'} - n_t$	0.008758
$n_e - n_{C'}$	0.004922
$n_{F'} - n_e$	0.005105
$n_i - n_{F'}$	0.016863

Thermal Properties

Strain Point	StP (℃)	614
Annealing Point	AP (℃)	641
Transformation Temperature	Tg (℃)	663
Yield Point	At (℃)	698
Softening Point	SP (℃)	757
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	62
	(+100～+300℃)	73
Thermal Conductivity	k (W/m·K)	0.891

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	849
Rigidity Modulus G	(10^8N/m^2)	338
Poisson's Ratio	σ	0.257
Knoop Hardness	Hk	570[6]
Abrasion	Aa	131
Photoelastic Constant (nm/cm/10^5Pa)	β	2.01

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	2.2

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.5	2.7	2.7	2.8	2.9	3.1	3.4
−20 ~ 0	2.5	2.8	2.8	2.9	3.0	3.3	3.5
0 ~ 20	2.6	2.9	2.9	3.0	3.1	3.4	3.7
20 ~ 40	2.6	2.9	3.0	3.1	3.2	3.5	3.8
40 ~ 60	2.7	3.0	3.1	3.2	3.3	3.6	4.0
60 ~ 80	2.7	3.1	3.1	3.3	3.4	3.8	4.1

Relative Partial Dispersions

$\theta_{C,t}$	0.8321
$\theta_{C,A'}$	0.3501
$\theta_{d,C}$	0.3050
$\theta_{e,C}$	0.5435
$\theta_{g,d}$	1.2365
$\theta_{g,F}$	0.5415
$\theta_{h,g}$	0.4486
$\theta_{i,g}$	1.2110
$\theta'_{C',t}$	0.8734
$\theta'_{e,C'}$	0.4909
$\theta'_{F',e}$	0.5091
$\theta'_{i,F'}$	1.6818

Coloring

λ 80／λ 5	35/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.17
320	0.45
330	0.68
340	0.82
350	0.906
360	0.948
370	0.968
380	0.980
390	0.987
400	0.991
420	0.994
440	0.994
460	0.995
480	0.996
500	0.997
550	0.998
600	0.998
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.990
1600	0.995
1800	0.988
2000	0.976
2200	0.919
2400	0.81

S–BSM15

623582
626579

Refractive Index	n_d	**1.62299** 1.622992	Abbe Number ν_d	**58.2** 58.16	Dispersion $n_F - n_C$	**0.01071** 0.010711
Refractive Index	n_e	1.625545	Abbe Number ν_e	57.89	Dispersion $n_{F'} - n_{C'}$	0.010805

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.59236
n_{1970}	1.97009	1.59797
n_{1530}	1.52958	1.60399
n_{1129}	1.12864	1.60927
n_t	1.01398	1.61100
n_s	0.85211	1.61399
$n_{A'}$	0.76819	1.61603
n_r	0.70652	1.61789
n_C	0.65627	**1.61974**
$n_{C'}$	0.64385	1.62026
n_{He-Ne}	0.6328	1.62074
n_D	0.58929	1.62290
n_d	0.58756	**1.62299**
n_e	0.54607	1.62555
n_F	0.48613	**1.63045**
$n_{F'}$	0.47999	1.63106
n_{He-Cd}	0.44157	1.63552
n_g	0.435835	**1.63630**
n_h	0.404656	1.64116
n_i	0.365015	1.64948

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0035
$\Delta\theta_{C,A'}$	−0.0001
$\Delta\theta_{g,d}$	−0.0018
$\Delta\theta_{g,F}$	−0.0016
$\Delta\theta_{i,g}$	−0.0069

Constants of Dispersion Formula

A_1	$9.53128328 \cdot 10^{-1}$
A_2	$6.37613977 \cdot 10^{-1}$
A_3	1.65245647
B_1	$3.87638985 \cdot 10^{-3}$
B_2	$1.85094632 \cdot 10^{-2}$
B_3	$1.59442367 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.60
Remarks		

Partial Dispersions

$n_C - n_t$	0.008741
$n_C - n_{A'}$	0.003709
$n_d - n_C$	0.003253
$n_e - n_C$	0.005806
$n_g - n_d$	0.013304
$n_g - n_F$	0.005846
$n_h - n_g$	0.004866
$n_i - n_g$	0.013186
$n_{C'} - n_t$	0.009259
$n_e - n_{C'}$	0.005288
$n_{F'} - n_e$	0.005517
$n_i - n_{F'}$	0.018420

Thermal Properties

Strain Point	StP (℃)	615
Annealing Point	AP (℃)	639
Transformation Temperature	Tg (℃)	658
Yield Point	At (℃)	685
Softening Point	SP (℃)	746
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	65
	(+100～+300℃)	78
Thermal Conductivity	k (W/m·K)	0.845

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	854
Rigidity Modulus G	(10^8N/m^2)	338
Poisson's Ratio	σ	0.265
Knoop Hardness	Hk	560[6]
Abrasion	Aa	133
Photoelastic Constant (nm/cm/10^5Pa)	β	1.80

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	3.2

Relative Partial Dispersions

$\theta_{C,t}$	0.8161
$\theta_{C,A'}$	0.3463
$\theta_{d,C}$	0.3037
$\theta_{e,C}$	0.5421
$\theta_{g,d}$	1.2421
$\theta_{g,F}$	0.5458
$\theta_{h,g}$	0.4543
$\theta_{i,g}$	1.2311
$\theta'_{C',t}$	0.8569
$\theta'_{e,C'}$	0.4894
$\theta'_{F',e}$	0.5106
$\theta'_{i,F'}$	1.7048

Coloring

λ 80／λ 5	36/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.13
340	0.44
350	0.70
360	0.85
370	0.926
380	0.959
390	0.976
400	0.985
420	0.991
440	0.992
460	0.994
480	0.995
500	0.997
550	0.998
600	0.997
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.991
1600	0.994
1800	0.987
2000	0.973
2200	0.918
2400	0.81

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.3	1.6	1.6	1.7	1.8	2.1	2.4
−20 ~ 0	1.4	1.7	1.7	1.8	1.9	2.2	2.5
0 ~ 20	1.4	1.8	1.8	1.9	2.0	2.4	2.7
20 ~ 40	1.5	1.9	1.9	2.0	2.2	2.5	2.8
40 ~ 60	1.6	2.0	2.0	2.1	2.3	2.6	3.0
60 ~ 80	1.6	2.1	2.1	2.2	2.4	2.8	3.1

S–BSM16

620603
623601

Refractive Index	n_d	**1.62041** 1.620411	Abbe Number	ν_d	**60.3** 60.29	Dispersion	$n_F - n_C$ **0.01029** 0.010290
Refractive Index	n_e	1.622865	Abbe Number	ν_e	60.03	Dispersion	$n_{F'} - n_{C'}$ 0.010376

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.58957
n_{1970}	1.97009	1.59545
n_{1530}	1.52958	1.60168
n_{1129}	1.12864	1.60702
n_t	1.01398	1.60874
n_s	0.85211	1.61170
$n_{A'}$	0.76819	1.61368
n_r	0.70652	1.61549
n_C	0.65627	**1.61728**
$n_{C'}$	0.64385	1.61778
$n_{He\text{-}Ne}$	0.6328	1.61824
n_D	0.58929	1.62032
n_d	0.58756	**1.62041**
n_e	0.54607	1.62287
n_F	0.48613	**1.62757**
$n_{F'}$	0.47999	1.62815
$n_{He\text{-}Cd}$	0.44157	1.63241
n_g	0.435835	**1.63315**
n_h	0.404656	1.63778
n_i	0.365015	1.64567

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0005
$\Delta\theta_{C,A'}$	0.0004
$\Delta\theta_{g,d}$	−0.0015
$\Delta\theta_{g,F}$	−0.0012
$\Delta\theta_{i,g}$	−0.0035

Constants of Dispersion Formula

A_1	1.14490383
A_2	$4.39563911 \cdot 10^{-1}$
A_3	1.27688079
B_1	$1.37034916 \cdot 10^{-2}$
B_2	$-1.86514205 \cdot 10^{-3}$
B_3	$1.19535585 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.59
Remarks		

Partial Dispersions

$n_C - n_t$	0.008531
$n_C - n_{A'}$	0.003595
$n_d - n_C$	0.003135
$n_e - n_C$	0.005589
$n_g - n_d$	0.012739
$n_g - n_F$	0.005584
$n_h - n_g$	0.004632
$n_i - n_g$	0.012520
$n_{C'} - n_t$	0.009030
$n_e - n_{C'}$	0.005090
$n_{F'} - n_e$	0.005286
$n_i - n_{F'}$	0.017519

Thermal Properties

Strain Point	StP (℃)	606
Annealing Point	AP (℃)	634
Transformation Temperature	Tg (℃)	657
Yield Point	At (℃)	689
Softening Point	SP (℃)	738
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	67
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.835

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	878
Rigidity Modulus G	(10^8N/m^2)	348
Poisson's Ratio	σ	0.262
Knoop Hardness	Hk	570[6]
Abrasion	Aa	146
Photoelastic Constant (nm/cm/10^5Pa)	β	1.81

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	53.2
Phosphate Resistance	PR	4.2

Relative Partial Dispersions

$\theta_{C,t}$	0.8291
$\theta_{C,A'}$	0.3494
$\theta_{d,C}$	0.3047
$\theta_{e,C}$	0.5431
$\theta_{g,d}$	1.2380
$\theta_{g,F}$	0.5427
$\theta_{h,g}$	0.4501
$\theta_{i,g}$	1.2167
$\theta'_{C',t}$	0.8703
$\theta'_{e,C'}$	0.4906
$\theta'_{F',e}$	0.5094
$\theta'_{i,F'}$	1.6884

Coloring

λ 80／λ 5	35/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.01
320	0.18
330	0.49
340	0.72
350	0.85
360	0.924
370	0.959
380	0.976
390	0.984
400	0.989
420	0.992
440	0.993
460	0.994
480	0.996
500	0.997
550	0.999
600	0.998
650	0.997
700	0.998
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.992
1600	0.995
1800	0.987
2000	0.972
2200	0.911
2400	0.79

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.2	1.4	1.5	1.6	1.7	1.9	2.2
−20 ～ 0	1.2	1.5	1.6	1.7	1.8	2.1	2.3
0 ～ 20	1.3	1.6	1.6	1.8	1.9	2.2	2.5
20 ～ 40	1.4	1.7	1.7	1.9	2.0	2.3	2.6
40 ～ 60	1.4	1.8	1.8	2.0	2.1	2.4	2.7
60 ～ 80	1.6	1.9	1.9	2.1	2.2	2.5	2.9

S–BSM18

639554
641551

Refractive Index	n_d	**1.63854** 1.638539	Abbe Number ν_d	**55.4** 55.38	Dispersion $n_F - n_C$	**0.01153** 0.011531
Refractive Index	n_e	1.641287	Abbe Number ν_e	55.10	Dispersion $n_{F'} - n_{C'}$	0.011638

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.60779
n_{1970}	1.97009	1.61314
n_{1530}	1.52958	1.61892
n_{1129}	1.12864	1.62411
n_t	1.01398	1.62586
n_s	0.85211	1.62896
$n_{A'}$	0.76819	1.63111
n_r	0.70652	1.63308
n_C	0.65627	**1.63505**
$n_{C'}$	0.64385	1.63560
$n_{He\text{-}Ne}$	0.6328	1.63612
n_D	0.58929	1.63844
n_d	0.58756	**1.63854**
n_e	0.54607	1.64129
n_F	0.48613	**1.64658**
$n_{F'}$	0.47999	1.64724
$n_{He\text{-}Cd}$	0.44157	1.65207
n_g	0.435835	**1.65291**
n_h	0.404656	1.65818
n_i	0.365015	1.66720

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	-0.0097
$\Delta\theta_{C,A'}$	-0.0008
$\Delta\theta_{g,d}$	-0.0038
$\Delta\theta_{g,F}$	-0.0035
$\Delta\theta_{i,g}$	-0.0219

Constants of Dispersion Formula	
A_1	$9.27886025 \cdot 10^{-1}$
A_2	$7.08858526 \cdot 10^{-1}$
A_3	1.18610897
B_1	$4.17549199 \cdot 10^{-3}$
B_2	$1.84691838 \cdot 10^{-2}$
B_3	$1.22210416 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.69
Remarks		

Partial Dispersions	
$n_C - n_t$	0.009188
$n_C - n_{A'}$	0.003946
$n_d - n_C$	0.003488
$n_e - n_C$	0.006236
$n_g - n_d$	0.014367
$n_g - n_F$	0.006324
$n_h - n_g$	0.005271
$n_i - n_g$	0.014291
$n_{C'} - n_t$	0.009742
$n_e - n_{C'}$	0.005682
$n_{F'} - n_e$	0.005956
$n_i - n_{F'}$	0.019954

Thermal Properties		
Strain Point	StP (℃)	567
Annealing Point	AP (℃)	600
Transformation Temperature	Tg (℃)	613
Yield Point	At (℃)	655
Softening Point	SP (℃)	717
Expansion Coefficients (−30～+70℃)		70
α (10^{-7}/℃) (+100～+300℃)		84
Thermal Conductivity	k (W/m·K)	0.815

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	885
Rigidity Modulus G	(10^8N/m^2)	349
Poisson's Ratio	σ	0.268
Knoop Hardness	Hk	570[6]
Abrasion	Aa	159
Photoelastic Constant (nm/cm/10^5Pa)	β	1.79

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	4
Weathering Resistance (Surface) Group	W (S)	2
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	2.0

Relative Partial Dispersions	
$\theta_{C,t}$	0.7968
$\theta_{C,A'}$	0.3422
$\theta_{d,C}$	0.3025
$\theta_{e,C}$	0.5408
$\theta_{g,d}$	1.2459
$\theta_{g,F}$	0.5484
$\theta_{h,g}$	0.4571
$\theta_{i,g}$	1.2394
$\theta'_{C',t}$	0.8371
$\theta'_{e,C'}$	0.4882
$\theta'_{F',e}$	0.5118
$\theta'_{i,F'}$	1.7146

Coloring	
λ 80／λ 5	36/31

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	0.08
320	0.31
330	0.57
340	0.75
350	0.86
360	0.929
370	0.961
380	0.977
390	0.985
400	0.990
420	0.993
440	0.994
460	0.995
480	0.996
500	0.997
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.993
1600	0.994
1800	0.986
2000	0.973
2200	0.924
2400	0.84

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.8	2.2	2.3	2.4	2.5	2.9	3.2
−20 ～ 0	1.8	2.3	2.3	2.4	2.6	3.0	3.3
0 ～ 20	1.9	2.4	2.4	2.5	2.7	3.1	3.4
20 ～ 40	1.9	2.4	2.5	2.6	2.8	3.2	3.5
40 ～ 60	2.0	2.5	2.5	2.7	2.9	3.3	3.7
60 ～ 80	2.1	2.6	2.6	2.8	2.9	3.4	3.8

S–BSM22

622532
625529

Refractive Index	n_d	**1.62230** 1.622296	Abbe Number ν_d	**53.2** 53.17	Dispersion $n_F - n_C$	**0.01170** 0.011704
Refractive Index	n_e	1.625083	Abbe Number ν_e	52.88	Dispersion $n_{F'} - n_{C'}$	0.011821

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.59157
n_{1970}	1.97009	1.59687
n_{1530}	1.52958	1.60260
n_{1129}	1.12864	1.60778
n_t	1.01398	1.60953
n_s	0.85211	1.61264
$n_{A'}$	0.76819	1.61479
n_r	0.70652	1.61678
n_C	0.65627	1.61877
$n_{C'}$	0.64385	1.61933
n_{He-Ne}	0.6328	1.61985
n_D	0.58929	1.62219
n_d	0.58756	1.62230
n_e	0.54607	1.62508
n_F	0.48613	1.63047
$n_{F'}$	0.47999	1.63115
n_{He-Cd}	0.44157	1.63610
n_g	0.435835	1.63696
n_h	0.404656	1.64241
n_i	0.365015	1.65185

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	-0.0070
$\Delta\theta_{C,A'}$	-0.0005
$\Delta\theta_{g,d}$	-0.0014
$\Delta\theta_{g,F}$	-0.0012
$\Delta\theta_{i,g}$	-0.0072

Constants of Dispersion Formula

A_1	1.44305741
A_2	$1.40786358 \cdot 10^{-1}$
A_3	1.26093951
B_1	$8.19208910 \cdot 10^{-3}$
B_2	$3.56911455 \cdot 10^{-2}$
B_3	$1.31959337 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.24
Remarks		

Partial Dispersions

$n_C - n_t$	0.009237
$n_C - n_{A'}$	0.003977
$n_d - n_C$	0.003526
$n_e - n_C$	0.006313
$n_g - n_d$	0.014664
$n_g - n_F$	0.006486
$n_h - n_g$	0.005451
$n_i - n_g$	0.014894
$n_{C'} - n_t$	0.009796
$n_e - n_{C'}$	0.005754
$n_{F'} - n_e$	0.006067
$n_i - n_{F'}$	0.020704

Thermal Properties

Strain Point	StP (℃)	637
Annealing Point	AP (℃)	663
Transformation Temperature	Tg (℃)	685
Yield Point	At (℃)	726
Softening Point	SP (℃)	822
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	66
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.916

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	874
Rigidity Modulus G	(10^8N/m^2)	345
Poisson's Ratio	σ	0.265
Knoop Hardness	Hk	580[6]
Abrasion	Aa	120
Photoelastic Constant (nm/cm/10^5Pa)	β	1.97

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	2
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	3.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7892
$\theta_{C,A'}$	0.3398
$\theta_{d,C}$	0.3013
$\theta_{e,C}$	0.5394
$\theta_{g,d}$	1.2529
$\theta_{g,F}$	0.5542
$\theta_{h,g}$	0.4657
$\theta_{i,g}$	1.2726
$\theta'_{C',t}$	0.8287
$\theta'_{e,C'}$	0.4868
$\theta'_{F',e}$	0.5132
$\theta'_{i,F'}$	1.7515

Coloring

λ 80／λ 5	38/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.08
350	0.37
360	0.65
370	0.81
380	0.901
390	0.942
400	0.964
420	0.981
440	0.985
460	0.988
480	0.991
500	0.994
550	0.997
600	0.995
650	0.994
700	0.996
800	0.998
900	0.998
1000	0.997
1200	0.998
1400	0.993
1600	0.995
1800	0.990
2000	0.980
2200	0.938
2400	0.87

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	3.0	3.4	3.4	3.6	3.7	4.1	4.4
−20 ~ 0	3.0	3.4	3.4	3.6	3.8	4.1	4.5
0 ~ 20	3.1	3.5	3.5	3.6	3.8	4.2	4.6
20 ~ 40	3.1	3.5	3.6	3.7	3.9	4.3	4.8
40 ~ 60	3.1	3.6	3.6	3.7	4.0	4.4	4.9
60 ~ 80	3.1	3.7	3.7	3.8	4.0	4.5	5.0

S–BSM25

658509
662506

Refractive Index	n_d	**1.65844** 1.658441	Abbe Number	ν_d	**50.9** 50.88	Dispersion	$n_F - n_C$ **0.01294** 0.012942
Refractive Index	n_e	1.661522	Abbe Number	ν_e	50.59	Dispersion	$n_{F'} - n_{C'}$ 0.013076

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.62613
n_{1970}	1.97009	1.63145
n_{1530}	1.52958	1.63727
n_{1129}	1.12864	1.64264
n_t	1.01398	1.64450
n_s	0.85211	1.64785
$n_{A'}$	0.76819	1.65019
n_r	0.70652	1.65237
n_C	0.65627	**1.65455**
$n_{C'}$	0.64385	1.65517
n_{He-Ne}	0.6328	1.65574
n_D	0.58929	1.65833
n_d	0.58756	**1.65844**
n_e	0.54607	1.66152
n_F	0.48613	**1.66749**
$n_{F'}$	0.47999	1.66824
n_{He-Cd}	0.44157	1.67373
n_g	0.435835	**1.67469**
n_h	0.404656	1.68074
n_i	0.365015	1.69121

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0089
$\Delta\theta_{C,A'}$	−0.0005
$\Delta\theta_{g,d}$	−0.0034
$\Delta\theta_{g,F}$	−0.0031
$\Delta\theta_{i,g}$	−0.0228

Constants of Dispersion Formula

A_1	1.34814257
A_2	$3.47530319 \cdot 10^{-1}$
A_3	1.38798368
B_1	$6.95364366 \cdot 10^{-3}$
B_2	$2.77863478 \cdot 10^{-2}$
B_3	$1.42138122 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.50
Remarks		

Partial Dispersions

$n_C - n_t$	0.010049
$n_C - n_{A'}$	0.004361
$n_d - n_C$	0.003888
$n_e - n_C$	0.006969
$n_g - n_d$	0.016250
$n_g - n_F$	0.007196
$n_h - n_g$	0.006049
$n_i - n_g$	0.016516
$n_{C'} - n_t$	0.010664
$n_e - n_{C'}$	0.006354
$n_{F'} - n_e$	0.006722
$n_i - n_{F'}$	0.022963

Thermal Properties

Strain Point	StP (℃)	605
Annealing Point	AP (℃)	630
Transformation Temperature	Tg (℃)	638
Yield Point	At (℃)	686
Softening Point	SP (℃)	760
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	68
	(+100～+300℃)	82
Thermal Conductivity	k (W/m·K)	0.891

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	951
Rigidity Modulus	G (10^8N/m^2)	374
Poisson's Ratio	σ	0.272
Knoop Hardness	Hk	560[6]
Abrasion	Aa	123
Photoelastic Constant (nm/cm/10^5Pa)	β	2.08

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	5.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7765
$\theta_{C,A'}$	0.3370
$\theta_{d,C}$	0.3004
$\theta_{e,C}$	0.5385
$\theta_{g,d}$	1.2556
$\theta_{g,F}$	0.5560
$\theta_{h,g}$	0.4674
$\theta_{i,g}$	1.2762
$\theta'_{C',t}$	0.8155
$\theta'_{e,C'}$	0.4859
$\theta'_{F',e}$	0.5141
$\theta'_{i,F'}$	1.7561

Coloring

λ 80／λ 5	38/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.03
340	0.19
350	0.48
360	0.71
370	0.84
380	0.910
390	0.945
400	0.964
420	0.980
440	0.984
460	0.988
480	0.991
500	0.994
550	0.996
600	0.995
650	0.995
700	0.996
800	0.997
900	0.997
1000	0.996
1200	0.997
1400	0.995
1600	0.995
1800	0.989
2000	0.980
2200	0.947
2400	0.87

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.4	3.8	3.9	4.0	4.2	4.7	5.1
−20 ～ 0	3.5	3.9	3.9	4.1	4.3	4.8	5.3
0 ～ 20	3.6	4.0	4.0	4.2	4.4	4.9	5.4
20 ～ 40	3.6	4.1	4.1	4.3	4.5	5.0	5.5
40 ～ 60	3.7	4.2	4.2	4.4	4.6	5.1	5.7
60 ～ 80	3.8	4.2	4.3	4.5	4.7	5.2	5.8

S–BSM28

618498
621495

Refractive Index	n_d	**1.61772** 1.617722	Abbe Number	ν_d	**49.8** 49.81	Dispersion	$n_F - n_C$ **0.01240** 0.012401
Refractive Index	n_e	1.620671	Abbe Number	ν_e	49.52	Dispersion	$n_{F'} - n_{C'}$ 0.012534

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.58652
n_{1970}	1.97009	1.59173
n_{1530}	1.52958	1.59740
n_{1129}	1.12864	1.60260
n_t	1.01398	1.60439
n_s	0.85211	1.60760
$n_{A'}$	0.76819	1.60984
n_r	0.70652	1.61192
n_C	0.65627	**1.61401**
$n_{C'}$	0.64385	1.61459
n_{He-Ne}	0.6328	1.61514
n_D	0.58929	1.61761
n_d	0.58756	**1.61772**
n_e	0.54607	1.62067
n_F	0.48613	**1.62641**
$n_{F'}$	0.47999	1.62713
n_{He-Cd}	0.44157	1.63242
n_g	0.435835	**1.63335**
n_h	0.404656	1.63924
n_i	0.365015	1.64953

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0053
$\Delta\theta_{C,A'}$	−0.0003
$\Delta\theta_{g,d}$	−0.0008
$\Delta\theta_{g,F}$	−0.0006
$\Delta\theta_{i,g}$	−0.0032

Constants of Dispersion Formula

A_1	1.43822841
A_2	$1.28100017 \cdot 10^{-1}$
A_3	1.34355530
B_1	$8.59779750 \cdot 10^{-3}$
B_2	$4.08617854 \cdot 10^{-2}$
B_3	$1.43709890 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.23
Remarks		

Partial Dispersions

$n_C - n_t$	0.009612
$n_C - n_{A'}$	0.004166
$n_d - n_C$	0.003717
$n_e - n_C$	0.006666
$n_g - n_d$	0.015632
$n_g - n_F$	0.006948
$n_h - n_g$	0.005882
$n_i - n_g$	0.016179
$n_{C'} - n_t$	0.010200
$n_e - n_{C'}$	0.006078
$n_{F'} - n_e$	0.006456
$n_i - n_{F'}$	0.022406

Thermal Properties

Strain Point	StP (℃)	530
Annealing Point	AP (℃)	559
Transformation Temperature	Tg (℃)	578
Yield Point	At (℃)	618
Softening Point	SP (℃)	680
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	84
	(+100～+300℃)	96
Thermal Conductivity	k (W/m·K)	0.878

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	853
Rigidity Modulus G	(10^8N/m^2)	339
Poisson's Ratio	σ	0.258
Knoop Hardness	Hk	540[5]
Abrasion	Aa	168
Photoelastic Constant (nm/cm/10^5Pa)	β	2.05

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	3.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7751
$\theta_{C,A'}$	0.3359
$\theta_{d,C}$	0.2997
$\theta_{e,C}$	0.5375
$\theta_{g,d}$	1.2605
$\theta_{g,F}$	0.5603
$\theta_{h,g}$	0.4743
$\theta_{i,g}$	1.3047
$\theta'_{C',t}$	0.8138
$\theta'_{e,C'}$	0.4849
$\theta'_{F',e}$	0.5151
$\theta'_{i,F'}$	1.7876

Coloring

λ 80／λ 5	39/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.02
350	0.24
360	0.54
370	0.74
380	0.85
390	0.918
400	0.950
420	0.975
440	0.982
460	0.987
480	0.990
500	0.993
550	0.997
600	0.996
650	0.996
700	0.997
800	0.997
900	0.997
1000	0.996
1200	0.996
1400	0.994
1600	0.995
1800	0.988
2000	0.978
2200	0.944
2400	0.88

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.5	0.9	1.0	1.1	1.3	1.7	2.1
−20 ～ 0	0.6	1.0	1.0	1.2	1.4	1.8	2.3
0 ～ 20	0.7	1.1	1.1	1.2	1.5	1.9	2.4
20 ～ 40	0.7	1.1	1.2	1.3	1.5	2.0	2.5
40 ～ 60	0.8	1.2	1.2	1.4	1.6	2.1	2.6
60 ～ 80	0.8	1.3	1.3	1.5	1.7	2.2	2.8

S–BSM71

649530
651527

Refractive Index	n_d	**1.64850** 1.648498	Abbe Number	ν_d	**53.0** 53.02	Dispersion	$n_F - n_C$ **0.01223** 0.012231
Refractive Index	n_e	1.651410	Abbe Number	ν_e	52.73	Dispersion	$n_{F'} - n_{C'}$ 0.012353

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.61657
n_{1970}	1.97009	1.62205
n_{1530}	1.52958	1.62799
n_{1129}	1.12864	1.63336
n_t	1.01398	1.63518
n_s	0.85211	1.63842
$n_{A'}$	0.76819	1.64067
n_r	0.70652	1.64274
n_C	0.65627	**1.64482**
$n_{C'}$	0.64385	1.64540
n_{He-Ne}	0.6328	1.64595
n_D	0.58929	1.64839
n_d	0.58756	**1.64850**
n_e	0.54607	1.65141
n_F	0.48613	**1.65705**
$n_{F'}$	0.47999	1.65775
n_{He-Cd}	0.44157	1.66293
n_g	0.435835	**1.66383**
n_h	0.404656	1.66954
n_i	0.365015	1.67943

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0080
$\Delta\theta_{C,A'}$	−0.0008
$\Delta\theta_{g,d}$	−0.0010
$\Delta\theta_{g,F}$	−0.0010
$\Delta\theta_{i,g}$	−0.0057

Constants of Dispersion Formula

A_1	1.50847885
A_2	$1.58099826 \cdot 10^{-1}$
A_3	1.36815368
B_1	$8.12769076 \cdot 10^{-3}$
B_2	$3.54200898 \cdot 10^{-2}$
B_3	$1.36110038 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.74
Remarks		

Partial Dispersions

$n_C - n_t$	0.009631
$n_C - n_{A'}$	0.004150
$n_d - n_C$	0.003683
$n_e - n_C$	0.006595
$n_g - n_d$	0.015333
$n_g - n_F$	0.006785
$n_h - n_g$	0.005706
$n_i - n_g$	0.015599
$n_{C'} - n_t$	0.010215
$n_e - n_{C'}$	0.006011
$n_{F'} - n_e$	0.006342
$n_i - n_{F'}$	0.021678

Thermal Properties

Strain Point	StP (℃)	607
Annealing Point	AP (℃)	635
Transformation Temperature	Tg (℃)	651
Yield Point	At (℃)	687
Softening Point	SP (℃)	737
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	71
	(+100～+300℃)	83
Thermal Conductivity	k (W/m·K)	0.773

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	862
Rigidity Modulus G	(10^8N/m^2)	339
Poisson's Ratio	σ	0.273
Knoop Hardness	Hk	560[6]
Abrasion	Aa	173
Photoelastic Constant (nm/cm/10^5Pa)	β	1.81

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	53.2
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7874
$\theta_{C,A'}$	0.3393
$\theta_{d,C}$	0.3011
$\theta_{e,C}$	0.5392
$\theta_{g,d}$	1.2536
$\theta_{g,F}$	0.5547
$\theta_{h,g}$	0.4665
$\theta_{i,g}$	1.2754
$\theta'_{C',t}$	0.8269
$\theta'_{e,C'}$	0.4866
$\theta'_{F',e}$	0.5134
$\theta'_{i,F'}$	1.7549

Coloring

λ 80／λ 5	38/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.15
350	0.47
360	0.72
370	0.86
380	0.926
390	0.958
400	0.973
420	0.985
440	0.988
460	0.990
480	0.993
500	0.995
550	0.998
600	0.997
650	0.996
700	0.997
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.993
1600	0.993
1800	0.985
2000	0.972
2200	0.925
2400	0.82

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.3	1.5	1.6	1.7	1.8	2.1	2.6
−20 ~ 0	1.2	1.6	1.6	1.8	1.9	2.3	2.7
0 ~ 20	1.3	1.8	1.8	1.9	2.1	2.5	3.0
20 ~ 40	1.4	2.0	2.0	2.1	2.3	2.8	3.2
40 ~ 60	1.5	2.2	2.2	2.4	2.6	3.1	3.5
60 ~ 80	1.6	2.5	2.5	2.7	2.9	3.5	3.9

S–BSM81

640601
643599

Refractive Index	n_d	**1.64000** 1.639999	Abbe Number	ν_d	**60.1** 60.08	Dispersion	$n_F - n_C$ **0.01065** 0.010653
Refractive Index	n_e	1.642540	Abbe Number	ν_e	59.88	Dispersion	$n_{F'} - n_{C'}$ 0.010730

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.60385
n_{1970}	1.97009	1.61138
n_{1530}	1.52958	1.61917
n_{1129}	1.12864	1.62555
n_t	1.01398	1.62752
n_s	0.85211	1.63078
$n_{A'}$	0.76819	1.63293
n_r	0.70652	1.63484
n_C	0.65627	**1.63673**
$n_{C'}$	0.64385	1.63725
n_{He-Ne}	0.6328	1.63774
n_D	0.58929	1.63990
n_d	0.58756	**1.64000**
n_e	0.54607	1.64254
n_F	0.48613	**1.64738**
$n_{F'}$	0.47999	1.64798
n_{He-Cd}	0.44157	1.65235
n_g	0.435835	**1.65310**
n_h	0.404656	1.65783
n_i	0.365015	1.66586

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0359
$\Delta\theta_{C,A'}$	0.0082
$\Delta\theta_{g,d}$	-0.0100
$\Delta\theta_{g,F}$	-0.0073
$\Delta\theta_{i,g}$	-0.0240

Constants of Dispersion Formula

A_1	$9.96356844 \cdot 10^{-1}$
A_2	$6.51392837 \cdot 10^{-1}$
A_3	1.22432622
B_1	$1.44821587 \cdot 10^{-2}$
B_2	$1.54826389 \cdot 10^{-3}$
B_3	$8.99818604 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.06
Remarks		

Partial Dispersions

$n_C - n_t$	0.009210
$n_C - n_{A'}$	0.003802
$n_d - n_C$	0.003271
$n_e - n_C$	0.005812
$n_g - n_d$	0.013103
$n_g - n_F$	0.005721
$n_h - n_g$	0.004730
$n_i - n_g$	0.012761
$n_{C'} - n_t$	0.009734
$n_e - n_{C'}$	0.005288
$n_{F'} - n_e$	0.005442
$n_i - n_{F'}$	0.017881

Thermal Properties

Strain Point	StP (℃)	604
Annealing Point	AP (℃)	624
Transformation Temperature	Tg (℃)	653
Yield Point	At (℃)	679
Softening Point	SP (℃)	721
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	58
	(+100～+300℃)	72
Thermal Conductivity	k (W/m·K)	1.001

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1057
Rigidity Modulus G	(10^8N/m^2)	416
Poisson's Ratio	σ	0.271
Knoop Hardness	Hk	660[7]
Abrasion	Aa	84
Photoelastic Constant (nm/cm/10^5Pa)	β	2.00

Chemical Properties

Water Resistance (Powder) Group	RW(P)	4
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	53.0
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8645
$\theta_{C,A'}$	0.3569
$\theta_{d,C}$	0.3070
$\theta_{e,C}$	0.5456
$\theta_{g,d}$	1.2300
$\theta_{g,F}$	0.5370
$\theta_{h,g}$	0.4440
$\theta_{i,g}$	1.1979
$\theta'_{C',t}$	0.9072
$\theta'_{e,C'}$	0.4928
$\theta'_{F',e}$	0.5072
$\theta'_{i,F'}$	1.6664

Coloring

λ 80／λ 5	37/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.01
300	0.03
310	0.10
320	0.21
330	0.38
340	0.56
350	0.71
360	0.82
370	0.89
380	0.934
390	0.957
400	0.970
420	0.981
440	0.985
460	0.989
480	0.992
500	0.995
550	0.995
600	0.992
650	0.993
700	0.995
800	0.997
900	0.997
1000	0.996
1200	0.996
1400	0.993
1600	0.994
1800	0.985
2000	0.961
2200	0.87
2400	0.61

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.8	3.1	3.1	3.3	3.3	3.6	3.8
−20 ～ 0	2.9	3.2	3.2	3.4	3.5	3.7	4.0
0 ～ 20	3.0	3.3	3.4	3.5	3.6	3.9	4.2
20 ～ 40	3.2	3.5	3.5	3.6	3.7	4.0	4.3
40 ～ 60	3.2	3.6	3.6	3.7	3.9	4.2	4.5
60 ～ 80	3.2	3.7	3.7	3.8	4.0	4.4	4.7

S–NSL 3

518590
520586

Refractive Index	n_d	**1.51823** 1.518229	Abbe Number	ν_d	**59.0** 58.90	Dispersion	$n_F - n_C$ **0.00879** 0.008798
Refractive Index	n_e	1.520326	Abbe Number	ν_e	58.63	Dispersion	$n_{F'} - n_{C'}$ 0.008875

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.49273
n_{1970}	1.97009	1.49747
n_{1530}	1.52958	1.50252
n_{1129}	1.12864	1.50692
n_t	1.01398	1.50835
n_s	0.85211	1.51083
$n_{A'}$	0.76819	1.51250
n_r	0.70652	1.51403
n_C	0.65627	**1.51556**
$n_{C'}$	0.64385	1.51598
$n_{He\text{-}Ne}$	0.6328	1.51638
n_D	0.58929	1.51815
n_d	0.58756	**1.51823**
n_e	0.54607	1.52033
n_F	0.48613	**1.52435**
$n_{F'}$	0.47999	1.52486
$n_{He\text{-}Cd}$	0.44157	1.52852
n_g	0.435835	**1.52915**
n_h	0.404656	1.53315
n_i	0.365015	1.53999

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0040
$\Delta\theta_{C,A'}$	−0.0004
$\Delta\theta_{g,d}$	−0.0005
$\Delta\theta_{g,F}$	−0.0005
$\Delta\theta_{i,g}$	−0.0006

Constants of Dispersion Formula

A_1	$8.82514764 \cdot 10^{-1}$
A_2	$3.89271907 \cdot 10^{-1}$
A_3	1.10693448
B_1	$4.64504582 \cdot 10^{-3}$
B_2	$2.00551397 \cdot 10^{-2}$
B_3	$1.36234339 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.48
Remarks		

Partial Dispersions

$n_C - n_t$	0.007206
$n_C - n_{A'}$	0.003052
$n_d - n_C$	0.002673
$n_e - n_C$	0.004770
$n_g - n_d$	0.010926
$n_g - n_F$	0.004801
$n_h - n_g$	0.003996
$n_i - n_g$	0.010832
$n_{C'} - n_t$	0.007631
$n_e - n_{C'}$	0.004345
$n_{F'} - n_e$	0.004530
$n_i - n_{F'}$	0.015131

Thermal Properties

Strain Point	StP (℃)	455
Annealing Point	AP (℃)	492
Transformation Temperature	Tg (℃)	500
Yield Point	At (℃)	553
Softening Point	SP (℃)	668
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	90
	(+100～+300℃)	110
Thermal Conductivity	k (W/m·K)	1.026

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	700
Rigidity Modulus G	(10^8N/m^2)	288
Poisson's Ratio	σ	0.217
Knoop Hardness	Hk	510[5]
Abrasion	Aa	111
Photoelastic Constant (nm/cm/10^5Pa)	β	2.60

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8190
$\theta_{C,A'}$	0.3469
$\theta_{d,C}$	0.3038
$\theta_{e,C}$	0.5422
$\theta_{g,d}$	1.2419
$\theta_{g,F}$	0.5457
$\theta_{h,g}$	0.4542
$\theta_{i,g}$	1.2312
$\theta'_{C',t}$	0.8598
$\theta'_{e,C'}$	0.4896
$\theta'_{F',e}$	0.5104
$\theta'_{i,F'}$	1.7049

Coloring

λ 80／λ 5	34/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.15
330	0.53
340	0.80
350	0.924
360	0.968
370	0.984
380	0.990
390	0.995
400	0.997
420	0.997
440	0.997
460	0.997
480	0.998
500	0.998
550	0.999
600	0.999
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.992
1600	0.991
1800	0.968
2000	0.930
2200	0.86
2400	0.81

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.3	0.6	0.6	0.7	0.8	1.1	1.4
−20 ～ 0	0.3	0.6	0.6	0.7	0.8	1.1	1.4
0 ～ 20	0.3	0.6	0.6	0.7	0.9	1.2	1.5
20 ～ 40	0.3	0.6	0.6	0.7	0.9	1.2	1.6
40 ～ 60	0.3	0.6	0.7	0.8	0.9	1.3	1.6
60 ～ 80	0.3	0.6	0.7	0.8	1.0	1.3	1.7

S–NSL 5

522598
525596

Refractive Index	n_d	**1.52249** 1.522494	Abbe Number	ν_d	**59.8** 59.84	Dispersion	$n_F - n_C$ **0.00874** 0.008732
Refractive Index	n_e	1.524576	Abbe Number	ν_e	59.58	Dispersion	$n_{F'} - n_{C'}$ 0.008805

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.49592
n_{1970}	1.97009	1.50104
n_{1530}	1.52958	1.50646
n_{1129}	1.12864	1.51108
n_t	1.01398	1.51256
n_s	0.85211	1.51509
$n_{A'}$	0.76819	1.51678
n_r	0.70652	1.51831
n_C	0.65627	**1.51983**
$n_{C'}$	0.64385	1.52026
n_{He-Ne}	0.6328	1.52065
n_D	0.58929	1.52242
n_d	0.58756	**1.52249**
n_e	0.54607	1.52458
n_F	0.48613	**1.52857**
$n_{F'}$	0.47999	1.52906
n_{He-Cd}	0.44157	1.53269
n_g	0.435835	**1.53332**
n_h	0.404656	1.53727
n_i	0.365015	1.54403

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0052
$\Delta\theta_{C,A'}$	0.0013
$\Delta\theta_{g,d}$	−0.0011
$\Delta\theta_{g,F}$	−0.0007
$\Delta\theta_{i,g}$	0.0032

Constants of Dispersion Formula

A_1	1.04574577
A_2	$2.39613026 \cdot 10^{-1}$
A_3	1.15906850
B_1	$5.85232280 \cdot 10^{-3}$
B_2	$2.36858752 \cdot 10^{-2}$
B_3	$1.31329061 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.49
Remarks		

Partial Dispersions

$n_C - n_t$	0.007270
$n_C - n_{A'}$	0.003054
$n_d - n_C$	0.002660
$n_e - n_C$	0.004742
$n_g - n_d$	0.010822
$n_g - n_F$	0.004750
$n_h - n_g$	0.003952
$n_i - n_g$	0.010715
$n_{C'} - n_t$	0.007694
$n_e - n_{C'}$	0.004318
$n_{F'} - n_e$	0.004487
$n_i - n_{F'}$	0.014968

Thermal Properties

Strain Point	StP (℃)	502
Annealing Point	AP (℃)	536
Transformation Temperature	Tg (℃)	548
Yield Point	At (℃)	596
Softening Point	SP (℃)	700
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	82
	(+100～+300℃)	95
Thermal Conductivity	k (W/m·K)	1.058

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	691
Rigidity Modulus	G (10^8N/m^2)	303
Poisson's Ratio	σ	0.140
Knoop Hardness	Hk	540[5]
Abrasion	Aa	114
Photoelastic Constant (nm/cm/10^5Pa)	β	2.67

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8326
$\theta_{C,A'}$	0.3497
$\theta_{d,C}$	0.3046
$\theta_{e,C}$	0.5431
$\theta_{g,d}$	1.2393
$\theta_{g,F}$	0.5440
$\theta_{h,g}$	0.4526
$\theta_{i,g}$	1.2271
$\theta'_{C',t}$	0.8738
$\theta'_{e,C'}$	0.4904
$\theta'_{F',e}$	0.5096
$\theta'_{i,F'}$	1.6999

Coloring

λ 80／λ 5	35/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.04
330	0.32
340	0.67
350	0.86
360	0.941
370	0.972
380	0.984
390	0.992
400	0.995
420	0.996
440	0.996
460	0.996
480	0.997
500	0.998
550	0.998
600	0.998
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.998
1200	0.997
1400	0.988
1600	0.992
1800	0.972
2000	0.939
2200	0.86
2400	0.81

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.0	1.1	1.2	1.2	1.4	1.6	1.9
−20 ～ 0	1.0	1.2	1.2	1.3	1.4	1.7	2.0
0 ～ 20	1.0	1.2	1.3	1.4	1.5	1.8	2.1
20 ～ 40	1.0	1.3	1.3	1.4	1.6	1.9	2.2
40 ～ 60	1.0	1.4	1.4	1.5	1.6	2.0	2.3
60 ～ 80	1.1	1.4	1.4	1.5	1.7	2.0	2.4

S–NSL36

517524
520522

Refractive Index	n_d	**1.51742** 1.517417	Abbe Number ν_d	**52.4** 52.43	Dispersion n_F-n_C	**0.00987** 0.009869
Refractive Index	n_e	1.519765	Abbe Number ν_e	52.14	Dispersion $n_{F'}-n_{C'}$	0.009968

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.49004
n_{1970}	1.97009	1.49501
n_{1530}	1.52958	1.50033
n_{1129}	1.12864	1.50501
n_t	1.01398	1.50656
n_s	0.85211	1.50924
$n_{A'}$	0.76819	1.51108
n_r	0.70652	1.51276
n_C	0.65627	**1.51444**
$n_{C'}$	0.64385	1.51492
n_{He-Ne}	0.6328	1.51536
n_D	0.58929	1.51733
n_d	0.58756	**1.51742**
n_e	0.54607	1.51976
n_F	0.48613	**1.52431**
$n_{F'}$	0.47999	1.52488
n_{He-Cd}	0.44157	1.52907
n_g	0.435835	**1.52980**
n_h	0.404656	1.53444
n_i	0.365015	1.54252

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0065
$\Delta\theta_{C,A'}$	0.0016
$\Delta\theta_{g,d}$	−0.0007
$\Delta\theta_{g,F}$	−0.0002
$\Delta\theta_{i,g}$	0.0024

Constants of Dispersion Formula

A_1	1.09666153
A_2	$1.68990073 \cdot 10^{-1}$
A_3	1.20580827
B_1	$6.67491123 \cdot 10^{-3}$
B_2	$3.36095450 \cdot 10^{-2}$
B_3	$1.41668738 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.46
Remarks		

Partial Dispersions

n_C-n_t	0.007887
$n_C-n_{A'}$	0.003365
n_d-n_C	0.002973
n_e-n_C	0.005321
n_g-n_d	0.012387
n_g-n_F	0.005491
n_h-n_g	0.004635
n_i-n_g	0.012715
$n_{C'}-n_t$	0.008359
$n_e-n_{C'}$	0.004849
$n_{F'}-n_e$	0.005119
$n_i-n_{F'}$	0.017635

Thermal Properties

Strain Point	StP (℃)	429
Annealing Point	AP (℃)	465
Transformation Temperature	Tg (℃)	464
Yield Point	At (℃)	522
Softening Point	SP (℃)	655
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	80
	(+100～+300℃)	93
Thermal Conductivity	k (W/m·K)	1.089

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	640
Rigidity Modulus G	(10^8N/m^2)	281
Poisson's Ratio	σ	0.139
Knoop Hardness	Hk	480[5]
Abrasion	Aa	103
Photoelastic Constant (nm/cm/10^5Pa)	β	2.82

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7992
$\theta_{C,A'}$	0.3410
$\theta_{d,C}$	0.3012
$\theta_{e,C}$	0.5392
$\theta_{g,d}$	1.2551
$\theta_{g,F}$	0.5564
$\theta_{h,g}$	0.4697
$\theta_{i,g}$	1.2884
$\theta'_{C',t}$	0.8386
$\theta'_{e,C'}$	0.4865
$\theta'_{F',e}$	0.5135
$\theta'_{i,F'}$	1.7692

Coloring

λ 80／λ 5	36/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.18
350	0.57
360	0.81
370	0.917
380	0.960
390	0.980
400	0.989
420	0.995
440	0.996
460	0.997
480	0.998
500	0.998
550	0.999
600	0.999
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.996
1600	0.994
1800	0.978
2000	0.950
2200	0.89
2400	0.86

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.8	2.2	2.2	2.3	2.5	2.8	3.2
−20 ~ 0	1.8	2.2	2.2	2.3	2.5	2.9	3.3
0 ~ 20	1.8	2.2	2.3	2.4	2.6	2.9	3.3
20 ~ 40	1.9	2.3	2.3	2.4	2.6	3.0	3.4
40 ~ 60	1.9	2.3	2.3	2.5	2.7	3.1	3.5
60 ~ 80	1.9	2.3	2.3	2.5	2.7	3.1	3.6

S–BAL 2

571508
574505

Refractive Index	n_d	**1.57099** 1.570989	Abbe Number	ν_d	**50.8** 50.80	Dispersion	$n_F - n_C$ **0.01124** 0.011240
Refractive Index	n_e	1.573663	Abbe Number	ν_e	50.50	Dispersion	$n_{F'} - n_{C'}$ 0.011359

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.54240
n_{1970}	1.97009	1.54721
n_{1530}	1.52958	1.55244
n_{1129}	1.12864	1.55722
n_t	1.01398	1.55886
n_s	0.85211	1.56179
$n_{A'}$	0.76819	1.56383
n_r	0.70652	1.56572
n_C	0.65627	1.56762
$n_{C'}$	0.64385	**1.56815**
n_{He-Ne}	0.6328	1.56865
n_D	0.58929	1.57089
n_d	0.58756	1.57099
n_e	0.54607	**1.57366**
n_F	0.48613	1.57886
$n_{F'}$	0.47999	**1.57951**
n_{He-Cd}	0.44157	1.58430
n_g	0.435835	1.58514
n_h	0.404656	**1.59045**
n_i	0.365015	1.59972

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0063
$\Delta\theta_{C,A'}$	−0.0005
$\Delta\theta_{g,d}$	−0.0005
$\Delta\theta_{g,F}$	−0.0005
$\Delta\theta_{i,g}$	−0.0024

Constants of Dispersion Formula

A_1	1.30923813
A_2	$1.14137353 \cdot 10^{-1}$
A_3	1.17882259
B_1	$8.38873953 \cdot 10^{-3}$
B_2	$3.99436485 \cdot 10^{-2}$
B_3	$1.40257892 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.89
Remarks		

Partial Dispersions

$n_C - n_t$	0.008753
$n_C - n_{A'}$	0.003787
$n_d - n_C$	0.003373
$n_e - n_C$	0.006047
$n_g - n_d$	0.014148
$n_g - n_F$	0.006281
$n_h - n_g$	0.005308
$n_i - n_g$	0.014580
$n_{C'} - n_t$	0.009286
$n_e - n_{C'}$	0.005514
$n_{F'} - n_e$	0.005845
$n_i - n_{F'}$	0.020209

Thermal Properties

Strain Point	StP (℃)	492
Annealing Point	AP (℃)	525
Transformation Temperature	Tg (℃)	540
Yield Point	At (℃)	582
Softening Point	SP (℃)	663
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	91
	(+100～+300℃)	109
Thermal Conductivity	k (W/m·K)	0.901

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	727
Rigidity Modulus	G (10^8N/m^2)	292
Poisson's Ratio	σ	0.245
Knoop Hardness	Hk	510[5]
Abrasion	Aa	163
Photoelastic Constant (nm/cm/10^5Pa)	β	2.32

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7787
$\theta_{C,A'}$	0.3369
$\theta_{d,C}$	0.3001
$\theta_{e,C}$	0.5380
$\theta_{g,d}$	1.2587
$\theta_{g,F}$	0.5588
$\theta_{h,g}$	0.4722
$\theta_{i,g}$	1.2972
$\theta'_{C',t}$	0.8175
$\theta'_{e,C'}$	0.4854
$\theta'_{F',e}$	0.5146
$\theta'_{i,F'}$	1.7791

Coloring

λ 80／λ 5	37/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.10
350	0.47
360	0.76
370	0.89
380	0.947
390	0.971
400	0.983
420	0.992
440	0.993
460	0.995
480	0.996
500	0.997
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.992
1600	0.992
1800	0.976
2000	0.951
2200	0.89
2400	0.84

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−0.7	−0.3	−0.3	−0.2	0.0	0.4	0.7
−20 ～ 0	−0.7	−0.3	−0.3	−0.1	0.0	0.4	0.8
0 ～ 20	−0.6	−0.2	−0.2	−0.1	0.1	0.5	0.9
20 ～ 40	−0.6	−0.2	−0.2	0.0	0.2	0.6	1.1
40 ～ 60	−0.6	−0.1	−0.1	0.1	0.2	0.7	1.2
60 ～ 80	−0.5	−0.1	−0.1	0.1	0.3	0.8	1.3

S–BAL 3

571530
574527

Refractive Index	n_d	**1.57135** 1.571351	Abbe Number ν_d	**53.0** 52.95	Dispersion $n_F - n_C$	**0.01079** 0.010790
Refractive Index	n_e	1.573920	Abbe Number ν_e	52.65	Dispersion $n_{F'} - n_{C'}$	0.010900

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.54361
n_{1970}	1.97009	1.54831
n_{1530}	1.52958	1.55341
n_{1129}	1.12864	1.55806
n_t	1.01398	1.55965
n_s	0.85211	1.56248
$n_{A'}$	0.76819	1.56445
n_r	0.70652	1.56627
n_C	0.65627	**1.56810**
$n_{C'}$	0.64385	1.56862
n_{He-Ne}	0.6328	1.56910
n_D	0.58929	1.57126
n_d	0.58756	**1.57135**
n_e	0.54607	1.57392
n_F	0.48613	**1.57889**
$n_{F'}$	0.47999	1.57952
n_{He-Cd}	0.44157	1.58409
n_g	0.435835	**1.58489**
n_h	0.404656	1.58993
n_i	0.365015	1.59867

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0114
$\Delta\theta_{C,A'}$	−0.0015
$\Delta\theta_{g,d}$	−0.0003
$\Delta\theta_{g,F}$	−0.0005
$\Delta\theta_{i,g}$	−0.0041

Constants of Dispersion Formula

A_1	1.29366890
A_2	$1.32440252 \cdot 10^{-1}$
A_3	1.10197293
B_1	$8.00367962 \cdot 10^{-3}$
B_2	$3.54711196 \cdot 10^{-2}$
B_3	$1.34517431 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.98
Remarks		

Partial Dispersions

$n_C - n_t$	0.008456
$n_C - n_{A'}$	0.003653
$n_d - n_C$	0.003246
$n_e - n_C$	0.005815
$n_g - n_d$	0.013536
$n_g - n_F$	0.005992
$n_h - n_g$	0.005041
$n_i - n_g$	0.013784
$n_{C'} - n_t$	0.008970
$n_e - n_{C'}$	0.005301
$n_{F'} - n_e$	0.005599
$n_i - n_{F'}$	0.019152

Thermal Properties

Strain Point	StP (℃)	483
Annealing Point	AP (℃)	516
Transformation Temperature	Tg (℃)	531
Yield Point	At (℃)	573
Softening Point	SP (℃)	652
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	95
	(+100～+300℃)	111
Thermal Conductivity	k (W/m·K)	0.864

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	719
Rigidity Modulus G	(10^8N/m^2)	288
Poisson's Ratio	σ	0.249
Knoop Hardness	Hk	510[5]
Abrasion	Aa	172
Photoelastic Constant (nm/cm/10^5Pa)	β	2.18

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7837
$\theta_{C,A'}$	0.3386
$\theta_{d,C}$	0.3008
$\theta_{e,C}$	0.5389
$\theta_{g,d}$	1.2545
$\theta_{g,F}$	0.5553
$\theta_{h,g}$	0.4672
$\theta_{i,g}$	1.2775
$\theta'_{C',t}$	0.8229
$\theta'_{e,C'}$	0.4863
$\theta'_{F',e}$	0.5137
$\theta'_{i,F'}$	1.7571

Coloring

λ 80／λ 5	36/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.01
340	0.26
350	0.63
360	0.84
370	0.928
380	0.963
390	0.979
400	0.988
420	0.994
440	0.994
460	0.995
480	0.996
500	0.997
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.996
1400	0.991
1600	0.990
1800	0.972
2000	0.945
2200	0.88
2400	0.83

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	−1.0	−0.8	−0.7	−0.6	−0.5	−0.1	0.2
−20 ~ 0	−1.0	−0.7	−0.7	−0.6	−0.4	−0.1	0.3
0 ~ 20	−1.0	−0.7	−0.7	−0.6	−0.4	0.0	0.4
20 ~ 40	−1.0	−0.7	−0.6	−0.5	−0.3	0.1	0.5
40 ~ 60	−1.0	−0.7	−0.6	−0.5	−0.3	0.1	0.5
60 ~ 80	−1.0	−0.6	−0.6	−0.4	−0.2	0.2	0.6

S-BAL11

573578
575575

Refractive Index	n_d	**1.57250** 1.572501	Abbe Number	ν_d	**57.8** 57.74	Dispersion	$n_F - n_C$ **0.00991** 0.009915
Refractive Index	n_e	1.574864	Abbe Number	ν_e	57.47	Dispersion	$n_{F'} - n_{C'}$ 0.010002

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.54394
n_{1970}	1.97009	1.54922
n_{1530}	1.52958	1.55486
n_{1129}	1.12864	1.55978
n_t	1.01398	1.56139
n_s	0.85211	1.56417
$n_{A'}$	0.76819	1.56605
n_r	0.70652	1.56778
n_C	0.65627	**1.56949**
$n_{C'}$	0.64385	1.56997
n_{He-Ne}	0.6328	1.57042
n_D	0.58929	1.57241
n_d	0.58756	**1.57250**
n_e	0.54607	1.57486
n_F	0.48613	**1.57940**
$n_{F'}$	0.47999	1.57997
n_{He-Cd}	0.44157	1.58410
n_g	0.435835	**1.58481**
n_h	0.404656	1.58932
n_i	0.365015	1.59701

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0004
$\Delta\theta_{C,A'}$	0.0006
$\Delta\theta_{g,d}$	−0.0029
$\Delta\theta_{g,F}$	−0.0024
$\Delta\theta_{i,g}$	−0.0113

Constants of Dispersion Formula

A_1	$8.21314256 \cdot 10^{-1}$
A_2	$6.12586478 \cdot 10^{-1}$
A_3	1.24859637
B_1	$3.51436131 \cdot 10^{-3}$
B_2	$1.79762375 \cdot 10^{-2}$
B_3	$1.33456670 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.02
Remarks		

Partial Dispersions

$n_C - n_t$	0.008103
$n_C - n_{A'}$	0.003436
$n_d - n_C$	0.003012
$n_e - n_C$	0.005375
$n_g - n_d$	0.012313
$n_g - n_F$	0.005410
$n_h - n_g$	0.004502
$n_i - n_g$	0.012197
$n_{C'} - n_t$	0.008582
$n_e - n_{C'}$	0.004896
$n_{F'} - n_e$	0.005106
$n_i - n_{F'}$	0.017041

Thermal Properties

Strain Point	StP (℃)	498
Annealing Point	AP (℃)	534
Transformation Temperature	Tg (℃)	548
Yield Point	At (℃)	593
Softening Point	SP (℃)	670
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	66
	(+100～+300℃)	80
Thermal Conductivity	k (W/m·K)	0.974

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	819
Rigidity Modulus	G (10^8N/m^2)	331
Poisson's Ratio	σ	0.237
Knoop Hardness	Hk	590[6]
Abrasion	Aa	109
Photoelastic Constant (nm/cm/10^5Pa)	β	2.42

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	2.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8172
$\theta_{C,A'}$	0.3465
$\theta_{d,C}$	0.3038
$\theta_{e,C}$	0.5421
$\theta_{g,d}$	1.2419
$\theta_{g,F}$	0.5456
$\theta_{h,g}$	0.4541
$\theta_{i,g}$	1.2302
$\theta'_{C',t}$	0.8580
$\theta'_{e,C'}$	0.4895
$\theta'_{F',e}$	0.5105
$\theta'_{i,F'}$	1.7038

Coloring

λ 80／λ 5	35/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.01
330	0.24
340	0.61
350	0.84
360	0.932
370	0.967
380	0.982
390	0.989
400	0.993
420	0.995
440	0.996
460	0.997
480	0.998
500	0.998
550	0.999
600	0.999
650	0.998
700	0.999
800	0.999
900	0.999
1000	0.998
1200	0.998
1400	0.989
1600	0.995
1800	0.988
2000	0.979
2200	0.929
2400	0.89

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.0	3.4	3.5	3.6	3.7	4.0	4.3
−20 ～ 0	3.1	3.5	3.5	3.7	3.8	4.1	4.4
0 ～ 20	3.2	3.6	3.6	3.7	3.9	4.2	4.6
20 ～ 40	3.2	3.6	3.7	3.8	4.0	4.3	4.7
40 ～ 60	3.3	3.7	3.7	3.9	4.0	4.4	4.8
60 ～ 80	3.3	3.8	3.8	3.9	4.1	4.5	4.9

S–BAL12

540595
542592

Refractive Index	n_d	**1.53996** 1.539956	Abbe Number ν_d	**59.5** 59.46	Dispersion $n_F - n_C$	**0.00908** 0.009081
Refractive Index	n_e	1.542121	Abbe Number ν_e	59.20	Dispersion $n_{F'} - n_{C'}$	0.009158

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.51358
n_{1970}	1.97009	1.51848
n_{1530}	1.52958	1.52370
n_{1129}	1.12864	1.52825
n_t	1.01398	1.52974
n_s	0.85211	1.53230
$n_{A'}$	0.76819	1.53404
n_r	0.70652	1.53562
n_C	0.65627	**1.53719**
$n_{C'}$	0.64385	1.53763
n_{He-Ne}	0.6328	1.53804
n_D	0.58929	1.53988
n_d	0.58756	**1.53996**
n_e	0.54607	1.54212
n_F	0.48613	**1.54627**
$n_{F'}$	0.47999	1.54679
n_{He-Cd}	0.44157	1.55056
n_g	0.435835	**1.55122**
n_h	0.404656	1.55532
n_i	0.365015	1.56232

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0046
$\Delta\theta_{C,A'}$	−0.0005
$\Delta\theta_{g,d}$	−0.0012
$\Delta\theta_{g,F}$	−0.0012
$\Delta\theta_{i,g}$	−0.0040

Constants of Dispersion Formula

A_1	$7.14605258 \cdot 10^{-1}$
A_2	$6.21993289 \cdot 10^{-1}$
A_3	1.22537681
B_1	$3.01763913 \cdot 10^{-3}$
B_2	$1.66505450 \cdot 10^{-2}$
B_3	$1.43506314 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.75
Remarks		

Partial Dispersions

$n_C - n_t$	0.007456
$n_C - n_{A'}$	0.003156
$n_d - n_C$	0.002762
$n_e - n_C$	0.004927
$n_g - n_d$	0.011260
$n_g - n_F$	0.004941
$n_h - n_g$	0.004105
$n_i - n_g$	0.011107
$n_{C'} - n_t$	0.007896
$n_e - n_{C'}$	0.004487
$n_{F'} - n_e$	0.004671
$n_i - n_{F'}$	0.015531

Thermal Properties

Strain Point	StP (℃)	432
Annealing Point	AP (℃)	468
Transformation Temperature	Tg (℃)	478
Yield Point	At (℃)	527
Softening Point	SP (℃)	624
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	86
	(+100～+300℃)	102
Thermal Conductivity	k (W/m·K)	0.982

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	710
Rigidity Modulus G	(10^8N/m^2)	306
Poisson's Ratio	σ	0.161
Knoop Hardness	Hk	520[5]
Abrasion	Aa	105
Photoelastic Constant (nm/cm/10^5Pa)	β	2.60

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8211
$\theta_{C,A'}$	0.3475
$\theta_{d,C}$	0.3042
$\theta_{e,C}$	0.5426
$\theta_{g,d}$	1.2400
$\theta_{g,F}$	0.5441
$\theta_{h,g}$	0.4520
$\theta_{i,g}$	1.2231
$\theta'_{C',t}$	0.8622
$\theta'_{e,C'}$	0.4900
$\theta'_{F',e}$	0.5100
$\theta'_{i,F'}$	1.6959

Coloring

λ 80／λ 5	34/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	0.02
310	0.23
320	0.57
330	0.80
340	0.914
350	0.959
360	0.979
370	0.989
380	0.992
390	0.995
400	0.997
420	0.997
440	0.997
460	0.997
480	0.998
500	0.999
550	0.999
600	0.999
650	0.998
700	0.999
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.993
1600	0.995
1800	0.983
2000	0.966
2200	0.920
2400	0.89

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.4	1.7	1.8	1.8	2.0	2.3	2.6
−20 ~ 0	1.4	1.7	1.8	1.9	2.0	2.3	2.6
0 ~ 20	1.4	1.7	1.8	1.9	2.0	2.3	2.7
20 ~ 40	1.4	1.7	1.8	1.9	2.0	2.4	2.7
40 ~ 60	1.4	1.7	1.8	1.9	2.1	2.4	2.8
60 ~ 80	1.4	1.8	1.8	1.9	2.1	2.4	2.8

S-BAL14

569563
571561

Refractive Index	n_d	**1.56883** 1.568832	Abbe Number	ν_d	**56.3** 56.36	Dispersion	$n_F - n_C$ **0.01010** 0.010092
Refractive Index	n_e	1.571237	Abbe Number	ν_e	56.09	Dispersion	$n_{F'} - n_{C'}$ 0.010185

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.54050
n_{1970}	1.97009	1.54565
n_{1530}	1.52958	1.55116
n_{1129}	1.12864	1.55601
n_t	1.01398	1.55761
n_s	0.85211	1.56040
$n_{A'}$	0.76819	1.56230
n_r	0.70652	1.56404
n_C	0.65627	**1.56577**
$n_{C'}$	0.64385	1.56626
n_{He-Ne}	0.6328	1.56671
n_D	0.58929	1.56874
n_d	0.58756	**1.56883**
n_e	0.54607	1.57124
n_F	0.48613	**1.57587**
$n_{F'}$	0.47999	1.57645
n_{He-Cd}	0.44157	1.58067
n_g	0.435835	**1.58141**
n_h	0.404656	1.58604
n_i	0.365015	1.59400

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0021
$\Delta\theta_{C,A'}$	0.0002
$\Delta\theta_{g,d}$	−0.0018
$\Delta\theta_{g,F}$	−0.0014
$\Delta\theta_{i,g}$	−0.0051

Constants of Dispersion Formula

A_1	1.27553696
A_2	$1.46083393 \cdot 10^{-1}$
A_3	1.16754699
B_1	$7.49692359 \cdot 10^{-3}$
B_2	$3.10421530 \cdot 10^{-2}$
B_3	$1.28947092 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.89
Remarks		

Partial Dispersions

$n_C - n_t$	0.008164
$n_C - n_{A'}$	0.003476
$n_d - n_C$	0.003057
$n_e - n_C$	0.005462
$n_g - n_d$	0.012574
$n_g - n_F$	0.005539
$n_h - n_g$	0.004629
$n_i - n_g$	0.012595
$n_{C'} - n_t$	0.008650
$n_e - n_{C'}$	0.004976
$n_{F'} - n_e$	0.005209
$n_i - n_{F'}$	0.017555

Thermal Properties

Strain Point	StP (℃)	533
Annealing Point	AP (℃)	562
Transformation Temperature	Tg (℃)	580
Yield Point	At (℃)	622
Softening Point	SP (℃)	700
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	80
	(+100～+300℃)	93
Thermal Conductivity	k (W/m·K)	0.967

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	811
Rigidity Modulus G	(10^8N/m^2)	327
Poisson's Ratio	σ	0.240
Knoop Hardness	Hk	570[6]
Abrasion	Aa	134
Photoelastic Constant (nm/cm/10^5Pa)	β	2.32

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8090
$\theta_{C,A'}$	0.3444
$\theta_{d,C}$	0.3029
$\theta_{e,C}$	0.5412
$\theta_{g,d}$	1.2459
$\theta_{g,F}$	0.5489
$\theta_{h,g}$	0.4587
$\theta_{i,g}$	1.2480
$\theta'_{C',t}$	0.8493
$\theta'_{e,C'}$	0.4886
$\theta'_{F',e}$	0.5114
$\theta'_{i,F'}$	1.7236

Coloring

λ 80／λ 5	36/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.09
340	0.44
350	0.74
360	0.88
370	0.946
380	0.970
390	0.983
400	0.989
420	0.992
440	0.993
460	0.994
480	0.995
500	0.997
550	0.998
600	0.998
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.989
1600	0.993
1800	0.983
2000	0.967
2200	0.914
2400	0.86

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.2	1.5	1.5	1.6	1.8	2.1	2.4
−20 ～ 0	1.2	1.5	1.6	1.7	1.8	2.2	2.5
0 ～ 20	1.3	1.6	1.6	1.7	1.9	2.2	2.6
20 ～ 40	1.3	1.7	1.7	1.8	2.0	2.3	2.7
40 ～ 60	1.4	1.7	1.8	1.8	2.0	2.4	2.8
60 ～ 80	1.4	1.8	1.8	1.9	2.1	2.5	2.9

S–BAL35

589612
591609

Refractive Index	n_d	**1.58913** 1.589130	Abbe Number ν_d	**61.2** 61.14	Dispersion $n_F - n_C$	**0.00963** 0.009636
Refractive Index	n_e	1.591429	Abbe Number ν_e	60.88	Dispersion $n_{F'} - n_{C'}$	0.009714

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.55959
n_{1970}	1.97009	1.56531
n_{1530}	1.52958	1.57134
n_{1129}	1.12864	1.57648
n_t	1.01398	1.57813
n_s	0.85211	1.58093
$n_{A'}$	0.76819	1.58280
n_r	0.70652	1.58450
n_C	0.65627	**1.58619**
$n_{C'}$	0.64385	1.58666
n_{He-Ne}	0.6328	1.58710
n_D	0.58929	1.58904
n_d	0.58756	**1.58913**
n_e	0.54607	1.59143
n_F	0.48613	**1.59582**
$n_{F'}$	0.47999	1.59637
n_{He-Cd}	0.44157	1.60034
n_g	0.435835	**1.60103**
n_h	0.404656	1.60535
n_i	0.365015	1.61268

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0030
$\Delta\theta_{C,A'}$	0.0012
$\Delta\theta_{g,d}$	−0.0024
$\Delta\theta_{g,F}$	−0.0018
$\Delta\theta_{i,g}$	−0.0044

Constants of Dispersion Formula

A_1	$9.41357273 \cdot 10^{-1}$
A_2	$5.46174895 \cdot 10^{-1}$
A_3	1.16168917
B_1	$1.40333996 \cdot 10^{-2}$
B_2	$9.06635683 \cdot 10^{-4}$
B_3	$1.14163758 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.31
Remarks		

Partial Dispersions

$n_C - n_t$	0.008061
$n_C - n_{A'}$	0.003384
$n_d - n_C$	0.002942
$n_e - n_C$	0.005241
$n_g - n_d$	0.011904
$n_g - n_F$	0.005210
$n_h - n_g$	0.004314
$n_i - n_g$	0.011647
$n_{C'} - n_t$	0.008530
$n_e - n_{C'}$	0.004772
$n_{F'} - n_e$	0.004942
$n_i - n_{F'}$	0.016310

Thermal Properties

Strain Point	StP (℃)	619
Annealing Point	AP (℃)	646
Transformation Temperature	Tg (℃)	669
Yield Point	At (℃)	709
Softening Point	SP (℃)	768
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	57
	(+100～+300℃)	67
Thermal Conductivity	k (W/m·K)	0.915

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	832
Rigidity Modulus G	(10^8N/m^2)	333
Poisson's Ratio	σ	0.250
Knoop Hardness	Hk	590[6]
Abrasion	Aa	115
Photoelastic Constant (nm/cm/10^5Pa)	β	2.15

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	4.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8366
$\theta_{C,A'}$	0.3512
$\theta_{d,C}$	0.3053
$\theta_{e,C}$	0.5439
$\theta_{g,d}$	1.2354
$\theta_{g,F}$	0.5407
$\theta_{h,g}$	0.4477
$\theta_{i,g}$	1.2087
$\theta'_{C',t}$	0.8781
$\theta'_{e,C'}$	0.4912
$\theta'_{F',e}$	0.5088
$\theta'_{i,F'}$	1.6790

Coloring

λ 80／λ 5	35/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	0.01
310	0.16
320	0.43
330	0.67
340	0.82
350	0.904
360	0.949
370	0.972
380	0.983
390	0.989
400	0.993
420	0.995
440	0.995
460	0.996
480	0.997
500	0.998
550	0.999
600	0.998
650	0.998
700	0.999
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.984
1600	0.994
1800	0.987
2000	0.972
2200	0.89
2400	0.80

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.9	3.1	3.1	3.3	3.4	3.6	3.9
−20 ～ 0	3.0	3.3	3.3	3.4	3.5	3.8	4.1
0 ～ 20	3.2	3.5	3.5	3.6	3.7	4.0	4.3
20 ～ 40	3.3	3.6	3.6	3.8	3.9	4.2	4.5
40 ～ 60	3.5	3.8	3.8	3.9	4.1	4.4	4.7
60 ～ 80	3.6	3.9	4.0	4.1	4.2	4.5	4.9

S–BAL41

564607
566604

Refractive Index	n_d	**1.56384** 1.563839	Abbe Number	ν_d	**60.7** 60.67	Dispersion	$n_F - n_C$ **0.00929** 0.009294
Refractive Index	n_e	1.566056	Abbe Number	ν_e	60.42	Dispersion	$n_{F'} - n_{C'}$ 0.009369

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.53530
n_{1970}	1.97009	1.54083
n_{1530}	1.52958	1.54667
n_{1129}	1.12864	1.55164
n_t	1.01398	1.55322
n_s	0.85211	1.55593
$n_{A'}$	0.76819	1.55774
n_r	0.70652	1.55938
n_C	0.65627	**1.56100**
$n_{C'}$	0.64385	1.56145
$n_{He\text{-}Ne}$	0.6328	1.56188
n_D	0.58929	1.56376
n_d	0.58756	**1.56384**
n_e	0.54607	1.56606
n_F	0.48613	**1.57029**
$n_{F'}$	0.47999	1.57082
$n_{He\text{-}Cd}$	0.44157	1.57465
n_g	0.435835	**1.57532**
n_h	0.404656	1.57947
n_i	0.365015	1.58652

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0057
$\Delta\theta_{C,A'}$	0.0019
$\Delta\theta_{g,d}$	−0.0038
$\Delta\theta_{g,F}$	−0.0031
$\Delta\theta_{i,g}$	−0.0111

Constants of Dispersion Formula

A_1	1.24344200
A_2	$1.66301104 \cdot 10^{-1}$
A_3	1.10586114
B_1	$1.16396708 \cdot 10^{-2}$
B_2	$-8.90464938 \cdot 10^{-3}$
B_3	$1.14111220 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.78
Remarks		

Partial Dispersions

$n_C - n_t$	0.007779
$n_C - n_{A'}$	0.003265
$n_d - n_C$	0.002838
$n_e - n_C$	0.005055
$n_g - n_d$	0.011477
$n_g - n_F$	0.005021
$n_h - n_g$	0.004155
$n_i - n_g$	0.011208
$n_{C'} - n_t$	0.008231
$n_e - n_{C'}$	0.004603
$n_{F'} - n_e$	0.004766
$n_i - n_{F'}$	0.015702

Thermal Properties

Strain Point	StP (℃)	486
Annealing Point	AP (℃)	521
Transformation Temperature	Tg (℃)	541
Yield Point	At (℃)	577
Softening Point	SP (℃)	644
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	75
	(+100～+300℃)	91
Thermal Conductivity	k (W/m·K)	1.043

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	890
Rigidity Modulus G	(10^8N/m^2)	358
Poisson's Ratio	σ	0.242
Knoop Hardness	Hk	600[6]
Abrasion	Aa	122
Photoelastic Constant (nm/cm/10^5Pa)	β	2.32

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	3.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8370
$\theta_{C,A'}$	0.3513
$\theta_{d,C}$	0.3054
$\theta_{e,C}$	0.5439
$\theta_{g,d}$	1.2349
$\theta_{g,F}$	0.5402
$\theta_{h,g}$	0.4471
$\theta_{i,g}$	1.2059
$\theta'_{C',t}$	0.8785
$\theta'_{e,C'}$	0.4913
$\theta'_{F',e}$	0.5087
$\theta'_{i,F'}$	1.6760

Coloring

λ 80／λ 5	35/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	0.05
310	0.25
320	0.51
330	0.72
340	0.85
350	0.925
360	0.960
370	0.978
380	0.985
390	0.990
400	0.993
420	0.994
440	0.994
460	0.995
480	0.997
500	0.998
550	0.999
600	0.998
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.987
1600	0.993
1800	0.984
2000	0.971
2200	0.908
2400	0.83

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.1	2.3	2.3	2.4	2.5	2.8	3.0
−20 ~ 0	2.1	2.3	2.3	2.4	2.6	2.9	3.2
0 ~ 20	2.1	2.4	2.4	2.5	2.7	3.0	3.3
20 ~ 40	2.1	2.5	2.5	2.6	2.7	3.1	3.4
40 ~ 60	2.2	2.5	2.5	2.7	2.8	3.2	3.5
60 ~ 80	2.2	2.6	2.6	2.7	2.9	3.2	3.6

S–BAL42

583594
585591

Refractive Index	n_d	**1.58313** 1.583126	Abbe Number ν_d	**59.4** 59.38	Dispersion $n_F - n_C$	**0.00982** 0.009821
Refractive Index	n_e	1.585468	Abbe Number ν_e	59.11	Dispersion $n_{F'} - n_{C'}$	0.009905

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.55463
n_{1970}	1.97009	1.55992
n_{1530}	1.52958	1.56557
n_{1129}	1.12864	1.57048
n_t	1.01398	1.57208
n_s	0.85211	1.57485
$n_{A'}$	0.76819	1.57673
n_r	0.70652	1.57844
n_C	0.65627	**1.58014**
$n_{C'}$	0.64385	1.58061
n_{He-Ne}	0.6328	1.58106
n_D	0.58929	1.58304
n_d	0.58756	**1.58313**
n_e	0.54607	1.58547
n_F	0.48613	**1.58996**
$n_{F'}$	0.47999	1.59052
n_{He-Cd}	0.44157	1.59459
n_g	0.435835	**1.59530**
n_h	0.404656	1.59972
n_i	0.365015	1.60724

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0050
$\Delta\theta_{C,A'}$	−0.0004
$\Delta\theta_{g,d}$	−0.0021
$\Delta\theta_{g,F}$	−0.0020
$\Delta\theta_{i,g}$	−0.0114

Constants of Dispersion Formula

A_1	1.39570615
A_2	$7.18505070 \cdot 10^{-2}$
A_3	1.27129267
B_1	$1.12218843 \cdot 10^{-2}$
B_2	$-2.52117422 \cdot 10^{-2}$
B_3	$1.34497860 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.19
Remarks		

Partial Dispersions

$n_C - n_t$	0.008056
$n_C - n_{A'}$	0.003413
$n_d - n_C$	0.002987
$n_e - n_C$	0.005329
$n_g - n_d$	0.012171
$n_g - n_F$	0.005337
$n_h - n_g$	0.004424
$n_i - n_g$	0.011946
$n_{C'} - n_t$	0.008531
$n_e - n_{C'}$	0.004854
$n_{F'} - n_e$	0.005051
$n_i - n_{F'}$	0.016724

Thermal Properties

Strain Point	StP (℃)	503
Annealing Point	AP (℃)	534
Transformation Temperature	Tg (℃)	550
Yield Point	At (℃)	588
Softening Point	SP (℃)	672
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	66
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.974

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	847
Rigidity Modulus G	(10^8N/m^2)	340
Poisson's Ratio	σ	0.246
Knoop Hardness	Hk	570[6]
Abrasion	Aa	117
Photoelastic Constant (nm/cm/10^5Pa)	β	2.20

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	2
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8203
$\theta_{C,A'}$	0.3475
$\theta_{d,C}$	0.3041
$\theta_{e,C}$	0.5426
$\theta_{g,d}$	1.2393
$\theta_{g,F}$	0.5434
$\theta_{h,g}$	0.4505
$\theta_{i,g}$	1.2164
$\theta'_{C',t}$	0.8613
$\theta'_{e,C'}$	0.4901
$\theta'_{F',e}$	0.5099
$\theta'_{i,F'}$	1.6884

Coloring

λ 80／λ 5	34/29

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.03
300	0.15
310	0.36
320	0.58
330	0.75
340	0.86
350	0.932
360	0.964
370	0.979
380	0.986
390	0.991
400	0.993
420	0.995
440	0.995
460	0.996
480	0.997
500	0.998
550	0.999
600	0.998
650	0.998
700	0.998
800	0.998
900	0.997
1000	0.997
1200	0.997
1400	0.987
1600	0.994
1800	0.985
2000	0.973
2200	0.917
2400	0.86

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.9	3.2	3.2	3.3	3.5	3.8	4.0
−20 ～ 0	2.9	3.3	3.3	3.4	3.5	3.8	4.1
0 ～ 20	3.0	3.3	3.3	3.4	3.6	3.9	4.2
20 ～ 40	3.0	3.4	3.4	3.5	3.7	4.0	4.3
40 ～ 60	3.0	3.4	3.4	3.6	3.7	4.1	4.4
60 ～ 80	3.1	3.5	3.5	3.7	3.8	4.2	4.5

S–BAM3

583464
586461

Refractive Index	n_d	**1.58267** 1.582673	Abbe Number ν_d	**46.4** 46.42	Dispersion $n_F - n_C$	**0.01255** 0.012551
Refractive Index	n_e	1.585655	Abbe Number ν_e	46.13	Dispersion $n_{F'} - n_{C'}$	0.012696

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.55175
n_{1970}	1.97009	1.55685
n_{1530}	1.52958	1.56242
n_{1129}	1.12864	1.56755
n_t	1.01398	1.56932
n_s	0.85211	1.57251
$n_{A'}$	0.76819	1.57475
n_r	0.70652	1.57683
n_C	0.65627	1.57893
$n_{C'}$	0.64385	1.57952
$n_{He\text{-}Ne}$	0.6328	1.58007
n_D	0.58929	1.58256
n_d	0.58756	1.58267
n_e	0.54607	1.58565
n_F	0.48613	1.59148
$n_{F'}$	0.47999	1.59222
$n_{He\text{-}Cd}$	0.44157	1.59764
n_g	0.435835	1.59860
n_h	0.404656	1.60469
n_i	0.365015	1.61551

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0009
$\Delta\theta_{C,A'}$	0.0009
$\Delta\theta_{g,d}$	0.0006
$\Delta\theta_{g,F}$	0.0007
$\Delta\theta_{i,g}$	0.0112

Constants of Dispersion Formula

A_1	1.36955358
A_2	$8.53825867 \cdot 10^{-2}$
A_3	1.16159771
B_1	$9.41331434 \cdot 10^{-3}$
B_2	$5.04359027 \cdot 10^{-2}$
B_3	$1.30548899 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.75
Remarks		

Partial Dispersions

$n_C - n_t$	0.009607
$n_C - n_{A'}$	0.004179
$n_d - n_C$	0.003743
$n_e - n_C$	0.006725
$n_g - n_d$	0.015926
$n_g - n_F$	0.007118
$n_h - n_g$	0.006087
$n_i - n_g$	0.016912
$n_{C'} - n_t$	0.010198
$n_e - n_{C'}$	0.006134
$n_{F'} - n_e$	0.006562
$n_i - n_{F'}$	0.023294

Thermal Properties

Strain Point	StP (℃)	519
Annealing Point	AP (℃)	549
Transformation Temperature	Tg (℃)	572
Yield Point	At (℃)	614
Softening Point	SP (℃)	688
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	85
	(+100～+300℃)	100
Thermal Conductivity	k (W/m·K)	0.965

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	771
Rigidity Modulus G	(10^8N/m^2)	311
Poisson's Ratio	σ	0.242
Knoop Hardness	Hk	520[5]
Abrasion	Aa	155
Photoelastic Constant (nm/cm/10^5Pa)	β	2.63

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7654
$\theta_{C,A'}$	0.3330
$\theta_{d,C}$	0.2982
$\theta_{e,C}$	0.5358
$\theta_{g,d}$	1.2689
$\theta_{g,F}$	0.5671
$\theta_{h,g}$	0.4850
$\theta_{i,g}$	1.3475
$\theta'_{C',t}$	0.8032
$\theta'_{e,C'}$	0.4831
$\theta'_{F',e}$	0.5169
$\theta'_{i,F'}$	1.8348

Coloring

λ 80／λ 5	38/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.11
360	0.44
370	0.71
380	0.85
390	0.920
400	0.954
420	0.979
440	0.986
460	0.989
480	0.992
500	0.994
550	0.997
600	0.997
650	0.996
700	0.997
800	0.998
900	0.998
1000	0.998
1200	0.997
1400	0.991
1600	0.993
1800	0.981
2000	0.964
2200	0.911
2400	0.87

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	0.2	0.8	0.8	0.9	1.2	1.6	2.0
−20 ~ 0	0.4	0.8	0.9	1.0	1.2	1.7	2.2
0 ~ 20	0.4	0.9	0.9	1.1	1.3	1.8	2.3
20 ~ 40	0.5	1.0	1.0	1.2	1.4	1.9	2.5
40 ~ 60	0.6	1.1	1.1	1.3	1.5	2.0	2.6
60 ~ 80	0.5	1.1	1.2	1.4	1.6	2.2	2.8

S–BAM 4

606437
609434

Refractive Index	n_d	**1.60562** 1.605620	Abbe Number	ν_d	**43.7** 43.70	Dispersion	$n_F - n_C$ **0.01385** 0.013857
Refractive Index	n_e	1.608909	Abbe Number	ν_e	43.41	Dispersion	$n_{F'} - n_{C'}$ 0.014026

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.57351
n_{1970}	1.97009	1.57850
n_{1530}	1.52958	1.58402
n_{1129}	1.12864	1.58926
n_t	1.01398	1.59113
n_s	0.85211	1.59453
$n_{A'}$	0.76819	1.59695
n_r	0.70652	1.59921
n_C	0.65627	**1.60151**
$n_{C'}$	0.64385	1.60215
n_{He-Ne}	0.6328	1.60276
n_D	0.58929	1.60550
n_d	0.58756	**1.60562**
n_e	0.54607	1.60891
n_F	0.48613	**1.61536**
$n_{F'}$	0.47999	1.61618
n_{He-Cd}	0.44157	1.62222
n_g	0.435835	**1.62329**
n_h	0.404656	1.63010
n_i	0.365015	1.64228

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0026
$\Delta\theta_{C,A'}$	0.0001
$\Delta\theta_{g,d}$	0.0012
$\Delta\theta_{g,F}$	0.0013
$\Delta\theta_{i,g}$	0.0115

Constants of Dispersion Formula

A_1	1.41059317
A_2	$1.11201306 \cdot 10^{-1}$
A_3	1.34148939
B_1	$9.63312192 \cdot 10^{-3}$
B_2	$4.98778210 \cdot 10^{-2}$
B_3	$1.52237696 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.91
Remarks		

Partial Dispersions

$n_C - n_t$	0.010380
$n_C - n_{A'}$	0.004557
$n_d - n_C$	0.004113
$n_e - n_C$	0.007402
$n_g - n_d$	0.017671
$n_g - n_F$	0.007927
$n_h - n_g$	0.006811
$n_i - n_g$	0.018992
$n_{C'} - n_t$	0.011028
$n_e - n_{C'}$	0.006754
$n_{F'} - n_e$	0.007272
$n_i - n_{F'}$	0.026102

Thermal Properties

Strain Point	StP (℃)	548
Annealing Point	AP (℃)	577
Transformation Temperature	Tg (℃)	599
Yield Point	At (℃)	641
Softening Point	SP (℃)	722
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	84
	(+100～+300℃)	97
Thermal Conductivity	k (W/m·K)	0.931

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	762
Rigidity Modulus G	(10^8N/m^2)	306
Poisson's Ratio	σ	0.244
Knoop Hardness	Hk	520[5]
Abrasion	Aa	151
Photoelastic Constant (nm/cm/10^5Pa)	β	2.41

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7491
$\theta_{C,A'}$	0.3289
$\theta_{d,C}$	0.2968
$\theta_{e,C}$	0.5342
$\theta_{g,d}$	1.2752
$\theta_{g,F}$	0.5721
$\theta_{h,g}$	0.4915
$\theta_{i,g}$	1.3706
$\theta'_{C',t}$	0.7863
$\theta'_{e,C'}$	0.4815
$\theta'_{F',e}$	0.5185
$\theta'_{i,F'}$	1.8610

Coloring

λ 80／λ 5	38/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.06
360	0.41
370	0.72
380	0.87
390	0.938
400	0.965
420	0.986
440	0.991
460	0.991
480	0.993
500	0.995
550	0.998
600	0.997
650	0.996
700	0.997
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.995
1600	0.994
1800	0.980
2000	0.962
2200	0.919
2400	0.89

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.6	1.0	1.0	1.2	1.4	1.9	2.4
−20 ～ 0	0.7	1.1	1.1	1.3	1.5	2.0	2.6
0 ～ 20	0.7	1.1	1.2	1.3	1.6	2.1	2.7
20 ～ 40	0.8	1.2	1.2	1.4	1.7	2.2	2.9
40 ～ 60	0.8	1.3	1.3	1.5	1.8	2.4	3.0
60 ～ 80	0.9	1.4	1.4	1.6	1.9	2.5	3.2

S–BAM12

639449
643446

Refractive Index	n_d	**1.63930** 1.639300	Abbe Number	ν_d	**44.9** 44.87	Dispersion	$n_F - n_C$ **0.01424** 0.014247
Refractive Index	n_e	1.642684	Abbe Number	ν_e	44.59	Dispersion	$n_{F'} - n_{C'}$ 0.014414

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.60480
n_{1970}	1.97009	1.61040
n_{1530}	1.52958	1.61653
n_{1129}	1.12864	1.62223
n_t	1.01398	1.62422
n_s	0.85211	1.62781
$n_{A'}$	0.76819	1.63033
n_r	0.70652	1.63268
n_C	0.65627	**1.63506**
$n_{C'}$	0.64385	1.63573
n_{He-Ne}	0.6328	1.63635
n_D	0.58929	1.63917
n_d	0.58756	**1.63930**
n_e	0.54607	1.64268
n_F	0.48613	**1.64930**
$n_{F'}$	0.47999	1.65014
n_{He-Cd}	0.44157	1.65631
n_g	0.435835	**1.65740**
n_h	0.404656	1.66433
n_i	0.365015	1.67665

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0034
$\Delta\theta_{C,A'}$	0.0014
$\Delta\theta_{g,d}$	−0.0010
$\Delta\theta_{g,F}$	−0.0006
$\Delta\theta_{i,g}$	0.0014

Constants of Dispersion Formula

A_1	1.50161605
A_2	$1.26987445 \cdot 10^{-1}$
A_3	1.43544052
B_1	$9.40761826 \cdot 10^{-3}$
B_2	$4.72602195 \cdot 10^{-2}$
B_3	$1.41666499 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.18
Remarks		

Partial Dispersions

$n_C - n_t$	0.010836
$n_C - n_{A'}$	0.004725
$n_d - n_C$	0.004243
$n_e - n_C$	0.007627
$n_g - n_d$	0.018101
$n_g - n_F$	0.008097
$n_h - n_g$	0.006929
$n_i - n_g$	0.019244
$n_{C'} - n_t$	0.011505
$n_e - n_{C'}$	0.006958
$n_{F'} - n_e$	0.007456
$n_i - n_{F'}$	0.026505

Thermal Properties

Strain Point	StP (℃)	565
Annealing Point	AP (℃)	592
Transformation Temperature	Tg (℃)	608
Yield Point	At (℃)	645
Softening Point	SP (℃)	717
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	76
	(+100～+300℃)	91
Thermal Conductivity	k (W/m·K)	0.954

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	904
Rigidity Modulus	G (10^8N/m^2)	361
Poisson's Ratio	σ	0.253
Knoop Hardness	Hk	550[6]
Abrasion	Aa	144
Photoelastic Constant (nm/cm/10^5Pa)	β	2.30

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	3.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7606
$\theta_{C,A'}$	0.3316
$\theta_{d,C}$	0.2978
$\theta_{e,C}$	0.5353
$\theta_{g,d}$	1.2705
$\theta_{g,F}$	0.5683
$\theta_{h,g}$	0.4863
$\theta_{i,g}$	1.3507
$\theta'_{C',t}$	0.7982
$\theta'_{e,C'}$	0.4827
$\theta'_{F',e}$	0.5173
$\theta'_{i,F'}$	1.8388

Coloring

λ 80／λ 5	39/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.13
360	0.49
370	0.75
380	0.87
390	0.928
400	0.955
420	0.977
440	0.983
460	0.987
480	0.990
500	0.993
550	0.997
600	0.996
650	0.996
700	0.997
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.992
1600	0.995
1800	0.987
2000	0.976
2200	0.932
2400	0.86

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.3	2.6	2.7	2.8	3.0	3.5	4.1
−20 ~ 0	2.3	2.7	2.7	2.9	3.1	3.6	4.2
0 ~ 20	2.3	2.7	2.8	3.0	3.2	3.7	4.3
20 ~ 40	2.4	2.8	2.8	3.0	3.3	3.8	4.5
40 ~ 60	2.4	2.8	2.9	3.1	3.3	3.9	4.6
60 ~ 80	2.4	2.9	2.9	3.1	3.4	4.0	4.7

S–BAH10

670473
673470

Refractive Index	n_d	**1.67003** 1.670029	Abbe Number	ν_d	**47.3** 47.23	Dispersion	$n_F - n_C$ **0.01418** 0.014186
Refractive Index	n_e	1.673402	Abbe Number	ν_e	46.94	Dispersion	$n_{F'} - n_{C'}$ 0.014345

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.63546
n_{1970}	1.97009	1.64108
n_{1530}	1.52958	1.64722
n_{1129}	1.12864	1.65293
n_t	1.01398	1.65492
n_s	0.85211	1.65852
$n_{A'}$	0.76819	1.66105
n_r	0.70652	1.66341
n_C	0.65627	**1.66579**
$n_{C'}$	0.64385	1.66646
n_{He-Ne}	0.6328	1.66709
n_D	0.58929	1.66990
n_d	0.58756	**1.67003**
n_e	0.54607	1.67340
n_F	0.48613	**1.67997**
$n_{F'}$	0.47999	1.68080
n_{He-Cd}	0.44157	1.68689
n_g	0.435835	**1.68796**
n_h	0.404656	1.69473
n_i	0.365015	1.70663

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0023
$\Delta\theta_{C,A'}$	0.0007
$\Delta\theta_{g,d}$	−0.0028
$\Delta\theta_{g,F}$	−0.0024
$\Delta\theta_{i,g}$	−0.0134

Constants of Dispersion Formula

A_1	1.59034337
A_2	$1.38464579 \cdot 10^{-1}$
A_3	1.21988043
B_1	$9.32734340 \cdot 10^{-3}$
B_2	$4.27498654 \cdot 10^{-2}$
B_3	$1.19251777 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.48
Remarks		

Partial Dispersions

$n_C - n_t$	0.010866
$n_C - n_{A'}$	0.004735
$n_d - n_C$	0.004241
$n_e - n_C$	0.007614
$n_g - n_d$	0.017928
$n_g - n_F$	0.007983
$n_h - n_g$	0.006774
$n_i - n_g$	0.018670
$n_{C'} - n_t$	0.011535
$n_e - n_{C'}$	0.006945
$n_{F'} - n_e$	0.007400
$n_i - n_{F'}$	0.025825

Thermal Properties

Strain Point	StP (℃)	584
Annealing Point	AP (℃)	612
Transformation Temperature	Tg (℃)	623
Yield Point	At (℃)	669
Softening Point	SP (℃)	734
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	68
	(+100～+300℃)	80
Thermal Conductivity	k (W/m·K)	0.902

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	962
Rigidity Modulus	G (10^8N/m^2)	378
Poisson's Ratio	σ	0.273
Knoop Hardness	Hk	560[6]
Abrasion	Aa	127
Photoelastic Constant (nm/cm/10^5Pa)	β	2.12

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7660
$\theta_{C,A'}$	0.3338
$\theta_{d,C}$	0.2990
$\theta_{e,C}$	0.5367
$\theta_{g,d}$	1.2638
$\theta_{g,F}$	0.5627
$\theta_{h,g}$	0.4775
$\theta_{i,g}$	1.3161
$\theta'_{C',t}$	0.8041
$\theta'_{e,C'}$	0.4841
$\theta'_{F',e}$	0.5159
$\theta'_{i,F'}$	1.8003

Coloring

λ 80／λ 5	39/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.01
350	0.19
360	0.48
370	0.70
380	0.83
390	0.902
400	0.939
420	0.969
440	0.979
460	0.984
480	0.989
500	0.993
550	0.997
600	0.996
650	0.996
700	0.997
800	0.998
900	0.997
1000	0.997
1200	0.998
1400	0.996
1600	0.996
1800	0.991
2000	0.981
2200	0.949
2400	0.85

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.4	3.9	3.9	4.1	4.3	4.8	5.3
−20 ～ 0	3.5	3.9	4.0	4.1	4.4	4.9	5.5
0 ～ 20	3.5	4.0	4.1	4.2	4.5	5.0	5.6
20 ～ 40	3.6	4.1	4.1	4.3	4.6	5.2	5.7
40 ～ 60	3.6	4.2	4.2	4.4	4.7	5.3	5.9
60 ～ 80	3.7	4.2	4.3	4.5	4.8	5.4	6.0

S–BAH11

667483
670480

Refractive Index	n_d	**1.66672** 1.666718	Abbe Number	ν_d	**48.3** 48.32	Dispersion	$n_F - n_C$ **0.01380** 0.013797
Refractive Index	n_e	1.670000	Abbe Number	ν_e	48.04	Dispersion	$n_{F'} - n_{C'}$ 0.013948

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.63328
n_{1970}	1.97009	1.63866
n_{1530}	1.52958	1.64456
n_{1129}	1.12864	1.65008
n_t	1.01398	1.65201
n_s	0.85211	1.65551
$n_{A'}$	0.76819	1.65798
n_r	0.70652	1.66027
n_C	0.65627	**1.66259**
$n_{C'}$	0.64385	1.66324
n_{He-Ne}	0.6328	1.66385
n_D	0.58929	1.66660
n_d	0.58756	**1.66672**
n_e	0.54607	1.67000
n_F	0.48613	**1.67639**
$n_{F'}$	0.47999	1.67719
n_{He-Cd}	0.44157	1.68309
n_g	0.435835	**1.68412**
n_h	0.404656	1.69067
n_i	0.365015	1.70213

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0069
$\Delta\theta_{C,A'}$	−0.0002
$\Delta\theta_{g,d}$	−0.0027
$\Delta\theta_{g,F}$	−0.0024
$\Delta\theta_{i,g}$	−0.0156

Constants of Dispersion Formula

A_1	1.57138860
A_2	$1.47869313 \cdot 10^{-1}$
A_3	1.28092846
B_1	$9.10807936 \cdot 10^{-3}$
B_2	$4.02401684 \cdot 10^{-2}$
B_3	$1.30399367 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.59
Remarks		

Partial Dispersions

$n_C - n_t$	0.010576
$n_C - n_{A'}$	0.004611
$n_d - n_C$	0.004129
$n_e - n_C$	0.007411
$n_g - n_d$	0.017407
$n_g - n_F$	0.007739
$n_h - n_g$	0.006549
$n_i - n_g$	0.018002
$n_{C'} - n_t$	0.011228
$n_e - n_{C'}$	0.006759
$n_{F'} - n_e$	0.007189
$n_i - n_{F'}$	0.024938

Thermal Properties

Strain Point	StP (℃)	593
Annealing Point	AP (℃)	617
Transformation Temperature	Tg (℃)	629
Yield Point	At (℃)	675
Softening Point	SP (℃)	738
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	69
	(+100～+300℃)	82
Thermal Conductivity	k (W/m·K)	0.858

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	929
Rigidity Modulus	G (10^8N/m^2)	365
Poisson's Ratio	σ	0.274
Knoop Hardness	Hk	560[6]
Abrasion	Aa	154
Photoelastic Constant (nm/cm/10^5Pa)	β	2.06

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7665
$\theta_{C,A'}$	0.3342
$\theta_{d,C}$	0.2993
$\theta_{e,C}$	0.5371
$\theta_{g,d}$	1.2617
$\theta_{g,F}$	0.5609
$\theta_{h,g}$	0.4747
$\theta_{i,g}$	1.3048
$\theta'_{C',t}$	0.8050
$\theta'_{e,C'}$	0.4846
$\theta'_{F',e}$	0.5154
$\theta'_{i,F'}$	1.7879

Coloring

λ 80／λ 5	39/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.04
350	0.27
360	0.56
370	0.75
380	0.86
390	0.922
400	0.952
420	0.975
440	0.982
460	0.987
480	0.991
500	0.994
550	0.997
600	0.995
650	0.995
700	0.996
800	0.997
900	0.997
1000	0.997
1200	0.998
1400	0.994
1600	0.995
1800	0.988
2000	0.976
2200	0.936
2400	0.84

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.3	3.7	3.7	3.9	4.1	4.6	5.1
−20 ～ 0	3.3	3.8	3.8	4.0	4.2	4.7	5.2
0 ～ 20	3.3	3.8	3.9	4.1	4.3	4.8	5.4
20 ～ 40	3.3	3.9	3.9	4.1	4.4	4.9	5.5
40 ～ 60	3.4	4.0	4.0	4.2	4.5	5.0	5.6
60 ～ 80	3.4	4.0	4.1	4.3	4.6	5.1	5.8

S–BAH27

702412
706410

Refractive Index	n_d	**1.70154** 1.701536	Abbe Number	ν_d	**41.2** 41.24	Dispersion	$n_F - n_C$ **0.01701** 0.017012
Refractive Index	n_e	1.705571	Abbe Number	ν_e	40.95	Dispersion	$n_{F'} - n_{C'}$ 0.017228

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.66253
n_{1970}	1.97009	1.66858
n_{1530}	1.52958	1.67526
n_{1129}	1.12864	1.68160
n_t	1.01398	1.68386
n_s	0.85211	1.68800
$n_{A'}$	0.76819	1.69094
n_r	0.70652	1.69370
n_C	0.65627	**1.69650**
$n_{C'}$	0.64385	1.69729
n_{He-Ne}	0.6328	1.69804
n_D	0.58929	1.70139
n_d	0.58756	**1.70154**
n_e	0.54607	1.70557
n_F	0.48613	**1.71351**
$n_{F'}$	0.47999	1.71452
n_{He-Cd}	0.44157	1.72200
n_g	0.435835	**1.72332**
n_h	0.404656	1.73180
n_i	0.365015	1.74712

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0029
$\Delta\theta_{C,A'}$	0.0011
$\Delta\theta_{g,d}$	0.0016
$\Delta\theta_{g,F}$	0.0018
$\Delta\theta_{i,g}$	0.0191

Constants of Dispersion Formula

A_1	1.68939052
A_2	$1.33081013 \cdot 10^{-1}$
A_3	1.41165515
B_1	$1.03598193 \cdot 10^{-2}$
B_2	$5.33982239 \cdot 10^{-2}$
B_3	$1.26515503 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.67
Remarks		

Partial Dispersions

$n_C - n_t$	0.012641
$n_C - n_{A'}$	0.005561
$n_d - n_C$	0.005033
$n_e - n_C$	0.009068
$n_g - n_d$	0.021787
$n_g - n_F$	0.009808
$n_h - n_g$	0.008480
$n_i - n_g$	0.023797
$n_{C'} - n_t$	0.013433
$n_e - n_{C'}$	0.008276
$n_{F'} - n_e$	0.008952
$n_i - n_{F'}$	0.032597

Thermal Properties

Strain Point	StP (℃)	611
Annealing Point	AP (℃)	636
Transformation Temperature	Tg (℃)	647
Yield Point	At (℃)	682
Softening Point	SP (℃)	749
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	64
	(+100～+300℃)	75
Thermal Conductivity	k (W/m·K)	0.869

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	936
Rigidity Modulus	G (10^8N/m^2)	368
Poisson's Ratio	σ	0.272
Knoop Hardness	Hk	580[6]
Abrasion	Aa	129
Photoelastic Constant (nm/cm/10^5Pa)	β	2.18

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	4.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7431
$\theta_{C,A'}$	0.3269
$\theta_{d,C}$	0.2958
$\theta_{e,C}$	0.5330
$\theta_{g,d}$	1.2807
$\theta_{g,F}$	0.5765
$\theta_{h,g}$	0.4985
$\theta_{i,g}$	1.3988
$\theta'_{C',t}$	0.7797
$\theta'_{e,C'}$	0.4804
$\theta'_{F',e}$	0.5196
$\theta'_{i,F'}$	1.8921

Coloring

λ 80／λ 5	41/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.16
370	0.47
380	0.70
390	0.83
400	0.89
420	0.955
440	0.971
460	0.979
480	0.985
500	0.989
550	0.995
600	0.994
650	0.994
700	0.996
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.993
1600	0.994
1800	0.987
2000	0.974
2200	0.921
2400	0.81

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.2	3.7	3.7	4.0	4.2	4.8	5.5
−20 ～ 0	3.3	3.8	3.9	4.1	4.4	5.0	5.7
0 ～ 20	3.4	4.0	4.0	4.2	4.5	5.2	5.9
20 ～ 40	3.5	4.1	4.1	4.4	4.7	5.4	6.2
40 ～ 60	3.5	4.2	4.3	4.5	4.8	5.6	6.4
60 ～ 80	3.7	4.4	4.4	4.6	5.0	5.8	6.6

S–BAH28

723380
728377

Refractive Index	n_d	**1.72342** 1.723420	Abbe Number	ν_d	**38.0** 37.95	Dispersion	$n_F - n_C$ **0.01906** 0.019060
Refractive Index	n_e	1.727935	Abbe Number	ν_e	37.68	Dispersion	$n_{F'} - n_{C'}$ 0.019320

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.68198
n_{1970}	1.97009	1.68808
n_{1530}	1.52958	1.69490
n_{1129}	1.12864	1.70154
n_t	1.01398	1.70396
n_s	0.85211	1.70844
$n_{A'}$	0.76819	1.71167
n_r	0.70652	1.71471
n_C	0.65627	**1.71782**
$n_{C'}$	0.64385	1.71870
$n_{He\text{-}Ne}$	0.6328	1.71952
n_D	0.58929	1.72325
n_d	0.58756	**1.72342**
n_e	0.54607	1.72794
n_F	0.48613	**1.73688**
$n_{F'}$	0.47999	1.73802
$n_{He\text{-}Cd}$	0.44157	1.74649
n_g	0.435835	**1.74800**
n_h	0.404656	1.75769
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0023
$\Delta\theta_{C,A'}$	0.0006
$\Delta\theta_{g,d}$	0.0037
$\Delta\theta_{g,F}$	0.0035
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.69493484
A_2	$1.92890298 \cdot 10^{-1}$
A_3	1.56385948
B_1	$1.02723190 \cdot 10^{-2}$
B_2	$5.21187640 \cdot 10^{-2}$
B_3	$1.37818035 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.67
Remarks		

Partial Dispersions

$n_C - n_t$	0.013857
$n_C - n_{A'}$	0.006146
$n_d - n_C$	0.005604
$n_e - n_C$	0.010119
$n_g - n_d$	0.024580
$n_g - n_F$	0.011124
$n_h - n_g$	0.009689
$n_i - n_g$	—
$n_{C'} - n_t$	0.014736
$n_e - n_{C'}$	0.009240
$n_{F'} - n_e$	0.010080
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	599
Annealing Point	AP (℃)	626
Transformation Temperature	Tg (℃)	643
Yield Point	At (℃)	676
Softening Point	SP (℃)	739
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	66
	(+100～+300℃)	73
Thermal Conductivity	k (W/m·K)	0.889

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	911
Rigidity Modulus	G (10^8N/m^2)	375
Poisson's Ratio	σ	0.213
Knoop Hardness	Hk	600[6]
Abrasion	Aa	138
Photoelastic Constant (nm/cm/10^5Pa)	β	2.31

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	4.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7270
$\theta_{C,A'}$	0.3225
$\theta_{d,C}$	0.2940
$\theta_{e,C}$	0.5309
$\theta_{g,d}$	1.2896
$\theta_{g,F}$	0.5836
$\theta_{h,g}$	0.5083
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7627
$\theta'_{e,C'}$	0.4783
$\theta'_{F',e}$	0.5217
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	42/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.06
370	0.32
380	0.58
390	0.75
400	0.85
420	0.934
440	0.963
460	0.975
480	0.982
500	0.987
550	0.994
600	0.995
650	0.995
700	0.996
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.994
1600	0.995
1800	0.990
2000	0.979
2200	0.938
2400	0.84

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.8	4.5	4.5	4.8	5.1	5.8	6.6
−20 ～ 0	3.9	4.6	4.7	4.9	5.3	6.0	6.9
0 ～ 20	4.0	4.8	4.8	5.1	5.4	6.2	7.1
20 ～ 40	4.1	4.9	5.0	5.2	5.6	6.5	7.4
40 ～ 60	4.2	5.1	5.1	5.4	5.8	6.7	7.7
60 ～ 80	4.3	5.2	5.3	5.6	6.0	6.9	7.9

S–BAH32

670393
674390

Refractive Index	n_d	**1.66998** 1.669979	Abbe Number ν_d	**39.3** 39.27	Dispersion $n_F - n_C$	**0.01706** 0.017061
Refractive Index	n_e	1.674022	Abbe Number ν_e	38.99	Dispersion $n_{F'} - n_{C'}$	0.017287

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.63134
n_{1970}	1.97009	1.63728
n_{1530}	1.52958	1.64386
n_{1129}	1.12864	1.65013
n_t	1.01398	1.65237
n_s	0.85211	1.65648
$n_{A'}$	0.76819	1.65941
n_r	0.70652	1.66216
n_C	0.65627	**1.66495**
$n_{C'}$	0.64385	1.66574
$n_{He\text{-}Ne}$	0.6328	1.66648
n_D	0.58929	1.66983
n_d	0.58756	**1.66998**
n_e	0.54607	1.67402
n_F	0.48613	**1.68201**
$n_{F'}$	0.47999	1.68303
$n_{He\text{-}Cd}$	0.44157	1.69059
n_g	0.435835	**1.69193**
n_h	0.404656	1.70056
n_i	0.365015	1.71630

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0063
$\Delta\theta_{C,A'}$	0.0013
$\Delta\theta_{g,d}$	0.0034
$\Delta\theta_{g,F}$	0.0035
$\Delta\theta_{i,g}$	0.0322

Constants of Dispersion Formula

A_1	1.58023630
A_2	$1.37504632 \cdot 10^{-1}$
A_3	1.60603298
B_1	$1.03578062 \cdot 10^{-2}$
B_2	$5.48393088 \cdot 10^{-2}$
B_3	$1.47982885 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.26
Remarks		

Partial Dispersions

$n_C - n_t$	0.012577
$n_C - n_{A'}$	0.005542
$n_d - n_C$	0.005030
$n_e - n_C$	0.009073
$n_g - n_d$	0.021950
$n_g - n_F$	0.009919
$n_h - n_g$	0.008632
$n_i - n_g$	0.024370
$n_{C'} - n_t$	0.013368
$n_e - n_{C'}$	0.008282
$n_{F'} - n_e$	0.009005
$n_i - n_{F'}$	0.033272

Thermal Properties

Strain Point	StP (℃)	546
Annealing Point	AP (℃)	563
Transformation Temperature	Tg (℃)	608
Yield Point	At (℃)	657
Softening Point	SP (℃)	726
Expansion Coefficients (α (10^{-7}/℃)	(−30～+70℃)	69
	(+100～+300℃)	78
Thermal Conductivity	k (W/m·K)	0.921

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	904
Rigidity Modulus G	(10^8N/m^2)	359
Poisson's Ratio	σ	0.260
Knoop Hardness	Hk	580[6]
Abrasion	Aa	138
Photoelastic Constant (nm/cm/10^5Pa)	β	2.74

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7372
$\theta_{C,A'}$	0.3248
$\theta_{d,C}$	0.2948
$\theta_{e,C}$	0.5318
$\theta_{g,d}$	1.2866
$\theta_{g,F}$	0.5814
$\theta_{h,g}$	0.5059
$\theta_{i,g}$	1.4284
$\theta'_{C',t}$	0.7733
$\theta'_{e,C'}$	0.4791
$\theta'_{F',e}$	0.5209
$\theta'_{i,F'}$	1.9247

Coloring

λ 80／λ 5	40/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.16
370	0.51
380	0.74
390	0.85
400	0.910
420	0.955
440	0.971
460	0.978
480	0.984
500	0.988
550	0.994
600	0.994
650	0.994
700	0.996
800	0.998
900	0.997
1000	0.997
1200	0.996
1400	0.992
1600	0.993
1800	0.988
2000	0.980
2200	0.948
2400	0.88

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	3.7	4.3	4.3	4.6	4.8	5.4	6.2
−20 ~ 0	3.7	4.4	4.4	4.7	4.9	5.6	6.4
0 ~ 20	3.7	4.4	4.5	4.7	5.0	5.7	6.5
20 ~ 40	3.8	4.5	4.6	4.8	5.1	5.9	6.7
40 ~ 60	3.8	4.6	4.7	4.9	5.3	6.0	6.9
60 ~ 80	3.8	4.7	4.8	5.0	5.4	6.2	7.1

S–PHM52

618634
620630

Refractive Index	n_d	**1.61800** 1.618000	Abbe Number	ν_d	**63.4** 63.33	Dispersion	$n_F - n_C$ **0.00975** 0.009758
Refractive Index	n_e	1.620327	Abbe Number	ν_e	63.02	Dispersion	$n_{F'} - n_{C'}$ 0.009844

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.59108
n_{1970}	1.97009	1.59587
n_{1530}	1.52958	1.60103
n_{1129}	1.12864	1.60561
n_t	1.01398	1.60714
n_s	0.85211	1.60983
$n_{A'}$	0.76819	1.61167
n_r	0.70652	1.61335
n_C	0.65627	**1.61504**
$n_{C'}$	0.64385	1.61551
n_{He-Ne}	0.6328	1.61595
n_D	0.58929	1.61791
n_d	0.58756	**1.61800**
n_e	0.54607	1.62033
n_F	0.48613	**1.62479**
$n_{F'}$	0.47999	1.62535
n_{He-Cd}	0.44157	1.62940
n_g	0.435835	**1.63010**
n_h	0.404656	1.63451
n_i	0.365015	1.64199

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0349
$\Delta\theta_{C,A'}$	−0.0072
$\Delta\theta_{g,d}$	0.0071
$\Delta\theta_{g,F}$	0.0051
$\Delta\theta_{i,g}$	0.0239

Constants of Dispersion Formula

A_1	1.09966550
A_2	$4.78125422 \cdot 10^{-1}$
A_3	1.13214074
B_1	$1.32718559 \cdot 10^{-2}$
B_2	$-6.01649685 \cdot 10^{-4}$
B_3	$1.30595472 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.67
Remarks		

Partial Dispersions

$n_C - n_t$	0.007893
$n_C - n_{A'}$	0.003370
$n_d - n_C$	0.002964
$n_e - n_C$	0.005291
$n_g - n_d$	0.012103
$n_g - n_F$	0.005309
$n_h - n_g$	0.004403
$n_i - n_g$	0.011891
$n_{C'} - n_t$	0.008364
$n_e - n_{C'}$	0.004820
$n_{F'} - n_e$	0.005024
$n_i - n_{F'}$	0.016643

Thermal Properties

Strain Point	StP (℃)	—
Annealing Point	AP (℃)	—
Transformation Temperature	Tg (℃)	587
Yield Point	At (℃)	617
Softening Point	SP (℃)	—
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	101
	(+100～+300℃)	120
Thermal Conductivity	k (W/m·K)	0.599

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	715
Rigidity Modulus	G (10^8N/m^2)	277
Poisson's Ratio	σ	0.292
Knoop Hardness	Hk	390[4]
Abrasion	Aa	434
Photoelastic Constant (nm/cm/10^5Pa)	β	1.00

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	5.0
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8089
$\theta_{C,A'}$	0.3454
$\theta_{d,C}$	0.3038
$\theta_{e,C}$	0.5422
$\theta_{g,d}$	1.2403
$\theta_{g,F}$	0.5441
$\theta_{h,g}$	0.4512
$\theta_{i,g}$	1.2186
$\theta'_{C',t}$	0.8497
$\theta'_{e,C'}$	0.4896
$\theta'_{F',e}$	0.5104
$\theta'_{i,F'}$	1.6907

Coloring

λ 80／λ 5	37/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.05
340	0.25
350	0.51
360	0.72
370	0.85
380	0.923
390	0.957
400	0.974
420	0.986
440	0.990
460	0.992
480	0.994
500	0.996
550	0.998
600	0.998
650	0.998
700	0.998
800	0.997
900	0.996
1000	0.996
1200	0.996
1400	0.996
1600	0.991
1800	0.979
2000	0.961
2200	0.926
2400	0.89

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	−3.7	−3.6	−3.6	−3.6	−3.4	−3.2	−3.0
−20 ~ 0	−3.8	−3.7	−3.7	−3.6	−3.5	−3.2	−3.0
0 ~ 20	−4.0	−3.7	−3.7	−3.6	−3.5	−3.2	−3.0
20 ~ 40	−4.1	−3.7	−3.7	−3.6	−3.5	−3.2	−3.0
40 ~ 60	−4.2	−3.8	−3.8	−3.6	−3.5	−3.2	−3.0
60 ~ 80	−4.2	−3.8	−3.8	−3.7	−3.6	−3.3	−3.0

S–PHM53

603655
605651

Refractive Index	n_d	**1.60300** 1.603001	Abbe Number	ν_d	**65.5** 65.44	Dispersion	$n_F - n_C$ **0.00921** 0.009215
Refractive Index	n_e	1.605200	Abbe Number	ν_e	65.15	Dispersion	$n_{F'} - n_{C'}$ 0.009289

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.57583
n_{1970}	1.97009	1.58092
n_{1530}	1.52958	1.58634
n_{1129}	1.12864	1.59103
n_t	1.01398	1.59256
n_s	0.85211	1.59519
$n_{A'}$	0.76819	1.59697
n_r	0.70652	1.59858
n_C	0.65627	**1.60019**
$n_{C'}$	0.64385	1.60064
$n_{He\text{-}Ne}$	0.6328	1.60106
n_D	0.58929	1.60292
n_d	0.58756	**1.60300**
n_e	0.54607	1.60520
n_F	0.48613	**1.60940**
$n_{F'}$	0.47999	1.60993
$n_{He\text{-}Cd}$	0.44157	1.61372
n_g	0.435835	**1.61438**
n_h	0.404656	1.61850
n_i	0.365015	1.62547

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0257
$\Delta\theta_{C,A'}$	−0.0054
$\Delta\theta_{g,d}$	0.0061
$\Delta\theta_{g,F}$	0.0045
$\Delta\theta_{i,g}$	0.0265

Constants of Dispersion Formula

A_1	1.09775423
A_2	$4.34816432 \cdot 10^{-1}$
A_3	1.13894976
B_1	$1.23369400 \cdot 10^{-2}$
B_2	$-3.72522903 \cdot 10^{-4}$
B_3	$1.24276984 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.51
Remarks		

Partial Dispersions

$n_C - n_t$	0.007630
$n_C - n_{A'}$	0.003223
$n_d - n_C$	0.002812
$n_e - n_C$	0.005011
$n_g - n_d$	0.011380
$n_g - n_F$	0.004977
$n_h - n_g$	0.004114
$n_i - n_g$	0.011090
$n_{C'} - n_t$	0.008078
$n_e - n_{C'}$	0.004563
$n_{F'} - n_e$	0.004726
$n_i - n_{F'}$	0.015545

Thermal Properties

Strain Point	StP (℃)	
Annealing Point	AP (℃)	
Transformation Temperature	Tg (℃)	610
Yield Point	At (℃)	644
Softening Point	SP (℃)	681
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	93
	(+100～+300℃)	109
Thermal Conductivity	k (W/m·K)	0.615

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	708
Rigidity Modulus G	(10^8N/m^2)	275
Poisson's Ratio	σ	0.285
Knoop Hardness	Hk	390[4]
Abrasion	Aa	378
Photoelastic Constant (nm/cm/10^5Pa)	β	1.21

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	51.0
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8280
$\theta_{C,A'}$	0.3498
$\theta_{d,C}$	0.3052
$\theta_{e,C}$	0.5438
$\theta_{g,d}$	1.2349
$\theta_{g,F}$	0.5401
$\theta_{h,g}$	0.4464
$\theta_{i,g}$	1.2035
$\theta'_{C',t}$	0.8696
$\theta'_{e,C'}$	0.4912
$\theta'_{F',e}$	0.5088
$\theta'_{i,F'}$	1.6735

Coloring

λ 80／λ 5	37/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.03
320	0.10
330	0.25
340	0.45
350	0.64
360	0.78
370	0.88
380	0.935
390	0.963
400	0.977
420	0.986
440	0.987
460	0.989
480	0.992
500	0.994
550	0.998
600	0.997
650	0.996
700	0.996
800	0.997
900	0.997
1000	0.996
1200	0.997
1400	0.993
1600	0.987
1800	0.967
2000	0.941
2200	0.87
2400	0.83

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−3.1	−2.8	−2.8	−2.7	−2.6	−2.4	−2.2
−20 ～ 0	−3.0	−2.8	−2.8	−2.7	−2.6	−2.4	−2.1
0 ～ 20	−3.0	−2.7	−2.7	−2.6	−2.5	−2.3	−2.0
20 ～ 40	−2.9	−2.6	−2.6	−2.5	−2.4	−2.1	−1.9
40 ～ 60	−2.9	−2.5	−2.5	−2.4	−2.2	−1.9	−1.7
60 ～ 80	−2.7	−2.3	−2.3	−2.2	−2.0	−1.7	−1.5

S–TIL 1

548458
551455

Refractive Index	n_d	**1.54814** 1.548141	Abbe Number	ν_d	**45.8** 45.79	Dispersion	$n_F - n_C$ **0.01197** 0.011972
Refractive Index	n_e	1.550984	Abbe Number	ν_e	45.49	Dispersion	$n_{F'} - n_{C'}$ 0.012112

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.51797
n_{1970}	1.97009	1.52307
n_{1530}	1.52958	1.52861
n_{1129}	1.12864	1.53365
n_t	1.01398	1.53537
n_s	0.85211	1.53844
$n_{A'}$	0.76819	1.54058
n_r	0.70652	1.54257
n_C	0.65627	**1.54457**
$n_{C'}$	0.64385	1.54514
$n_{He\text{-}Ne}$	0.6328	1.54566
n_D	0.58929	1.54804
n_d	0.58756	**1.54814**
n_e	0.54607	1.55098
n_F	0.48613	**1.55654**
$n_{F'}$	0.47999	1.55725
$n_{He\text{-}Cd}$	0.44157	1.56244
n_g	0.435835	**1.56335**
n_h	0.404656	1.56918
n_i	0.365015	1.57959

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0071
$\Delta\theta_{C,A'}$	0.0017
$\Delta\theta_{g,d}$	0.0009
$\Delta\theta_{g,F}$	0.0012
$\Delta\theta_{i,g}$	0.0146

Constants of Dispersion Formula

A_1	1.25088944
A_2	$9.97973327 \cdot 10^{-2}$
A_3	1.20583504
B_1	$8.83921279 \cdot 10^{-3}$
B_2	$4.82685052 \cdot 10^{-2}$
B_3	$1.37414953 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.54
Remarks		

Partial Dispersions

$n_C - n_t$	0.009202
$n_C - n_{A'}$	0.003988
$n_d - n_C$	0.003569
$n_e - n_C$	0.006412
$n_g - n_d$	0.015210
$n_g - n_F$	0.006807
$n_h - n_g$	0.005833
$n_i - n_g$	0.016236
$n_{C'} - n_t$	0.009765
$n_e - n_{C'}$	0.005849
$n_{F'} - n_e$	0.006263
$n_i - n_{F'}$	0.022340

Thermal Properties

Strain Point	StP (℃)	452
Annealing Point	AP (℃)	487
Transformation Temperature	Tg (℃)	501
Yield Point	At (℃)	542
Softening Point	SP (℃)	654
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	86
	(+100～+300℃)	101
Thermal Conductivity	k (W/m·K)	1.039

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	705
Rigidity Modulus G	(10^8N/m^2)	288
Poisson's Ratio	σ	0.222
Knoop Hardness	Hk	490[5]
Abrasion	Aa	128
Photoelastic Constant (nm/cm/10^5Pa)	β	2.68

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7686
$\theta_{C,A'}$	0.3331
$\theta_{d,C}$	0.2981
$\theta_{e,C}$	0.5356
$\theta_{g,d}$	1.2705
$\theta_{g,F}$	0.5686
$\theta_{h,g}$	0.4872
$\theta_{i,g}$	1.3562
$\theta'_{C',t}$	0.8062
$\theta'_{e,C'}$	0.4829
$\theta'_{F',e}$	0.5171
$\theta'_{i,F'}$	1.8445

Coloring

λ 80／λ 5	37/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.01
350	0.29
360	0.69
370	0.87
380	0.944
390	0.972
400	0.984
420	0.992
440	0.994
460	0.995
480	0.996
500	0.997
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.996
1600	0.993
1800	0.977
2000	0.948
2200	0.89
2400	0.85

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.1	1.5	1.5	1.7	1.9	2.3	2.8
−20 ～ 0	1.1	1.5	1.6	1.7	1.9	2.4	2.9
0 ～ 20	1.1	1.5	1.6	1.7	2.0	2.4	3.0
20 ～ 40	1.1	1.6	1.6	1.8	2.0	2.5	3.1
40 ～ 60	1.1	1.6	1.6	1.8	2.0	2.6	3.1
60 ～ 80	1.1	1.6	1.6	1.8	2.1	2.6	3.2

S–TIL 2

541472
543469

Refractive Index	n_d	**1.54072** 1.540720	Abbe Number ν_d	**47.2** 47.23	Dispersion $n_F - n_C$	**0.01145** 0.011449
Refractive Index	n_e	1.543440	Abbe Number ν_e	46.94	Dispersion $n_{F'} - n_{C'}$	0.011577

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.51118
n_{1970}	1.97009	1.51626
n_{1530}	1.52958	1.52176
n_{1129}	1.12864	1.52672
n_t	1.01398	1.52841
n_s	0.85211	1.53139
$n_{A'}$	0.76819	1.53346
n_r	0.70652	1.53537
n_C	0.65627	**1.53730**
$n_{C'}$	0.64385	1.53784
n_{He-Ne}	0.6328	1.53835
n_D	0.58929	1.54062
n_d	0.58756	**1.54072**
n_e	0.54607	1.54344
n_F	0.48613	**1.54875**
$n_{F'}$	0.47999	1.54942
n_{He-Cd}	0.44157	1.55435
n_g	0.435835	**1.55522**
n_h	0.404656	1.56074
n_i	0.365015	1.57052

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0083
$\Delta\theta_{C,A'}$	0.0022
$\Delta\theta_{g,d}$	−0.0005
$\Delta\theta_{g,F}$	0.0000
$\Delta\theta_{i,g}$	0.0076

Constants of Dispersion Formula

A_1	1.23401499
A_2	$9.59796833 \cdot 10^{-2}$
A_3	1.20503991
B_1	$8.69507801 \cdot 10^{-3}$
B_2	$4.65611429 \cdot 10^{-2}$
B_3	$1.37953301 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.52
Remarks		

Partial Dispersions

$n_C - n_t$	0.008891
$n_C - n_{A'}$	0.003839
$n_d - n_C$	0.003423
$n_e - n_C$	0.006143
$n_g - n_d$	0.014496
$n_g - n_F$	0.006470
$n_h - n_g$	0.005521
$n_i - n_g$	0.015308
$n_{C'} - n_t$	0.009432
$n_e - n_{C'}$	0.005602
$n_{F'} - n_e$	0.005975
$n_i - n_{F'}$	0.021109

Thermal Properties

Strain Point	StP (℃)	448
Annealing Point	AP (℃)	484
Transformation Temperature	Tg (℃)	496
Yield Point	At (℃)	538
Softening Point	SP (℃)	658
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	82
	(+100～+300℃)	98
Thermal Conductivity	k (W/m·K)	1.051

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	699
Rigidity Modulus G	(10^8N/m^2)	286
Poisson's Ratio	σ	0.220
Knoop Hardness	Hk	500[5]
Abrasion	Aa	121
Photoelastic Constant (nm/cm/10^5Pa)	β	2.74

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7766
$\theta_{C,A'}$	0.3353
$\theta_{d,C}$	0.2990
$\theta_{e,C}$	0.5366
$\theta_{g,d}$	1.2661
$\theta_{g,F}$	0.5651
$\theta_{h,g}$	0.4822
$\theta_{i,g}$	1.3371
$\theta'_{C',t}$	0.8147
$\theta'_{e,C'}$	0.4839
$\theta'_{F',e}$	0.5161
$\theta'_{i,F'}$	1.8234

Coloring

λ 80／λ 5	37/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.04
350	0.32
360	0.66
370	0.84
380	0.925
390	0.962
400	0.979
420	0.990
440	0.994
460	0.995
480	0.996
500	0.997
550	0.998
600	0.998
650	0.997
700	0.998
800	0.999
900	0.998
1000	0.997
1200	0.997
1400	0.997
1600	0.995
1800	0.987
2000	0.970
2200	0.942
2400	0.917

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.3	1.7	1.7	1.9	2.0	2.5	2.9
−20 ～ 0	1.3	1.7	1.8	1.9	2.1	2.6	3.0
0 ～ 20	1.4	1.8	1.8	2.0	2.2	2.6	3.1
20 ～ 40	1.5	1.9	1.9	2.1	2.3	2.7	3.3
40 ～ 60	1.5	1.9	1.9	2.1	2.3	2.8	3.4
60 ～ 80	1.5	2.0	2.0	2.2	2.4	2.9	3.5

S–TIL 6

532489
534485

Refractive Index	n_d	**1.53172** 1.531717	Abbe Number	ν_d	**48.9** 48.84	Dispersion	$n_F - n_C$ **0.01088** 0.010887
Refractive Index	n_e	1.534304	Abbe Number	ν_e	48.55	Dispersion	$n_{F'} - n_{C'}$ 0.011006

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.50292
n_{1970}	1.97009	1.50797
n_{1530}	1.52958	1.51342
n_{1129}	1.12864	1.51829
n_t	1.01398	1.51993
n_s	0.85211	1.52280
$n_{A'}$	0.76819	1.52479
n_r	0.70652	1.52662
n_C	0.65627	**1.52846**
$n_{C'}$	0.64385	1.52897
$n_{He\text{-}Ne}$	0.6328	1.52946
n_D	0.58929	1.53162
n_d	0.58756	**1.53172**
n_e	0.54607	1.53430
n_F	0.48613	**1.53934**
$n_{F'}$	0.47999	1.53998
$n_{He\text{-}Cd}$	0.44157	1.54465
n_g	0.435835	**1.54547**
n_h	0.404656	1.55069
n_i	0.365015	1.55989

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0076
$\Delta\theta_{C,A'}$	0.0017
$\Delta\theta_{g,d}$	0.0002
$\Delta\theta_{g,F}$	0.0007
$\Delta\theta_{i,g}$	0.0082

Constants of Dispersion Formula

A_1	1.17701777
A_2	$1.27958030 \cdot 10^{-1}$
A_3	1.34740124
B_1	$7.71087686 \cdot 10^{-3}$
B_2	$4.11325328 \cdot 10^{-2}$
B_3	$1.54531692 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.50
Remarks		

Partial Dispersions

$n_C - n_t$	0.008529
$n_C - n_{A'}$	0.003667
$n_d - n_C$	0.003261
$n_e - n_C$	0.005848
$n_g - n_d$	0.013756
$n_g - n_F$	0.006130
$n_h - n_g$	0.005216
$n_i - n_g$	0.014418
$n_{C'} - n_t$	0.009045
$n_e - n_{C'}$	0.005332
$n_{F'} - n_e$	0.005674
$n_i - n_{F'}$	0.019913

Thermal Properties

Strain Point	StP (℃)	438
Annealing Point	AP (℃)	468
Transformation Temperature	Tg (℃)	479
Yield Point	At (℃)	528
Softening Point	SP (℃)	648
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	82
	(+100～+300℃)	96
Thermal Conductivity	k (W/m·K)	1.059

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	648
Rigidity Modulus	G (10^8N/m^2)	283
Poisson's Ratio	σ	0.146
Knoop Hardness	Hk	490[5]
Abrasion	Aa	114
Photoelastic Constant (nm/cm/10^5Pa)	β	2.81

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7834
$\theta_{C,A'}$	0.3368
$\theta_{d,C}$	0.2995
$\theta_{e,C}$	0.5372
$\theta_{g,d}$	1.2635
$\theta_{g,F}$	0.5631
$\theta_{h,g}$	0.4791
$\theta_{i,g}$	1.3243
$\theta'_{C',t}$	0.8218
$\theta'_{e,C'}$	0.4845
$\theta'_{F',e}$	0.5155
$\theta'_{i,F'}$	1.8093

Coloring

λ 80／λ 5	37/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.07
350	0.44
360	0.74
370	0.88
380	0.948
390	0.973
400	0.985
420	0.990
440	0.989
460	0.990
480	0.991
500	0.993
550	0.994
600	0.994
650	0.992
700	0.996
800	0.998
900	0.997
1000	0.997
1200	0.996
1400	0.995
1600	0.993
1800	0.977
2000	0.947
2200	0.89
2400	0.85

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.4	1.8	1.8	1.9	2.2	2.5	3.0
−20 ～ 0	1.4	1.8	1.8	1.9	2.2	2.6	3.0
0 ～ 20	1.4	1.8	1.8	1.9	2.2	2.6	3.1
20 ～ 40	1.4	1.8	1.8	1.9	2.2	2.7	3.1
40 ～ 60	1.4	1.8	1.9	1.9	2.2	2.7	3.2
60 ～ 80	1.4	1.8	1.9	1.9	2.2	2.7	3.3

S–TIL25

581407
585405

Refractive Index	n_d	**1.58144** 1.581439	Abbe Number	ν_d	**40.7** 40.75	Dispersion	$n_F - n_C$ **0.01427** 0.014270
Refractive Index	n_e	1.584822	Abbe Number	ν_e	40.47	Dispersion	$n_{F'} - n_{C'}$ 0.014451

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.54741
n_{1970}	1.97009	1.55292
n_{1530}	1.52958	1.55895
n_{1129}	1.12864	1.56456
n_t	1.01398	1.56651
n_s	0.85211	1.57005
$n_{A'}$	0.76819	1.57254
n_r	0.70652	1.57486
n_C	0.65627	**1.57722**
$n_{C'}$	0.64385	1.57788
$n_{He\text{-}Ne}$	0.6328	1.57850
n_D	0.58929	1.58131
n_d	0.58756	**1.58144**
n_e	0.54607	1.58482
n_F	0.48613	**1.59149**
$n_{F'}$	0.47999	1.59233
$n_{He\text{-}Cd}$	0.44157	1.59861
n_g	0.435835	**1.59973**
n_h	0.404656	1.60687
n_i	0.365015	1.61979

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0121
$\Delta\theta_{C,A'}$	0.0027
$\Delta\theta_{g,d}$	0.0014
$\Delta\theta_{g,F}$	0.0019
$\Delta\theta_{i,g}$	0.0224

Constants of Dispersion Formula

A_1	1.32122534
A_2	$1.23824976 \cdot 10^{-1}$
A_3	1.43685254
B_1	$9.52091436 \cdot 10^{-3}$
B_2	$5.16062665 \cdot 10^{-2}$
B_3	$1.49064883 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.59
Remarks		

Partial Dispersions

$n_C - n_t$	0.010703
$n_C - n_{A'}$	0.004679
$n_d - n_C$	0.004223
$n_e - n_C$	0.007606
$n_g - n_d$	0.018287
$n_g - n_F$	0.008240
$n_h - n_g$	0.007140
$n_i - n_g$	0.020066
$n_{C'} - n_t$	0.011368
$n_e - n_{C'}$	0.006941
$n_{F'} - n_e$	0.007510
$n_i - n_{F'}$	0.027460

Thermal Properties

Strain Point	StP (℃)	536
Annealing Point	AP (℃)	564
Transformation Temperature	Tg (℃)	588
Yield Point	At (℃)	630
Softening Point	SP (℃)	715
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	74
	(+100～+300℃)	88
Thermal Conductivity	k (W/m·K)	1.054

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	753
Rigidity Modulus G	(10^8N/m^2)	309
Poisson's Ratio	σ	0.220
Knoop Hardness	Hk	540[5]
Abrasion	Aa	117
Photoelastic Constant (nm/cm/10^5Pa)	β	2.84

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7500
$\theta_{C,A'}$	0.3279
$\theta_{d,C}$	0.2959
$\theta_{e,C}$	0.5330
$\theta_{g,d}$	1.2815
$\theta_{g,F}$	0.5774
$\theta_{h,g}$	0.5004
$\theta_{i,g}$	1.4062
$\theta'_{C',t}$	0.7867
$\theta'_{e,C'}$	0.4803
$\theta'_{F',e}$	0.5197
$\theta'_{i,F'}$	1.9002

Coloring

λ 80／λ 5	38/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.01
360	0.28
370	0.65
380	0.85
390	0.929
400	0.964
420	0.986
440	0.991
460	0.993
480	0.994
500	0.995
550	0.998
600	0.998
650	0.997
700	0.998
800	0.999
900	0.999
1000	0.998
1200	0.998
1400	0.994
1600	0.994
1800	0.981
2000	0.963
2200	0.911
2400	0.89

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.4	3.0	3.0	3.2	3.4	4.0	4.6
−20 ～ 0	2.5	3.0	3.1	3.3	3.5	4.1	4.7
0 ～ 20	2.6	3.1	3.2	3.4	3.6	4.2	4.9
20 ～ 40	2.7	3.2	3.3	3.5	3.7	4.4	5.1
40 ～ 60	2.7	3.3	3.3	3.5	3.8	4.5	5.2
60 ～ 80	2.8	3.4	3.4	3.6	3.9	4.6	5.4

S-TIL26

567428
570425

Refractive Index	n_d	**1.56732** 1.567322	Abbe Number ν_d	**42.8** 42.82	Dispersion $n_F - n_C$	**0.01325** 0.013250
Refractive Index	n_e	1.570466	Abbe Number ν_e	42.54	Dispersion $n_{F'} - n_{C'}$	0.013411

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.53493
n_{1970}	1.97009	1.54028
n_{1530}	1.52958	1.54611
n_{1129}	1.12864	1.55148
n_t	1.01398	1.55333
n_s	0.85211	1.55667
$n_{A'}$	0.76819	1.55901
n_r	0.70652	1.56119
n_C	0.65627	**1.56339**
$n_{C'}$	0.64385	1.56401
n_{He-Ne}	0.6328	1.56459
n_D	0.58929	1.56721
n_d	0.58756	**1.56732**
n_e	0.54607	1.57047
n_F	0.48613	**1.57664**
$n_{F'}$	0.47999	1.57742
n_{He-Cd}	0.44157	1.58321
n_g	0.435835	**1.58423**
n_h	0.404656	1.59077
n_i	0.365015	1.60256

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0113
$\Delta\theta_{C,A'}$	0.0027
$\Delta\theta_{g,d}$	0.0002
$\Delta\theta_{g,F}$	0.0009
$\Delta\theta_{i,g}$	0.0168

Constants of Dispersion Formula

A_1	1.31066488
A_2	$9.41903094 \cdot 10^{-2}$
A_3	1.23292644
B_1	$9.68897812 \cdot 10^{-3}$
B_2	$5.27763106 \cdot 10^{-2}$
B_3	$1.33296422 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.57
Remarks		

Partial Dispersions

$n_C - n_t$	0.010055
$n_C - n_{A'}$	0.004379
$n_d - n_C$	0.003936
$n_e - n_C$	0.007080
$n_g - n_d$	0.016907
$n_g - n_F$	0.007593
$n_h - n_g$	0.006546
$n_i - n_g$	0.018329
$n_{C'} - n_t$	0.010676
$n_e - n_{C'}$	0.006459
$n_{F'} - n_e$	0.006952
$n_i - n_{F'}$	0.025140

Thermal Properties

Strain Point	StP (℃)	495
Annealing Point	AP (℃)	533
Transformation Temperature	Tg (℃)	552
Yield Point	At (℃)	599
Softening Point	SP (℃)	694
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	79
	(+100～+300℃)	90
Thermal Conductivity	k (W/m·K)	1.054

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	739
Rigidity Modulus G	(10^8N/m^2)	302
Poisson's Ratio	σ	0.222
Knoop Hardness	Hk	500[5]
Abrasion	Aa	123
Photoelastic Constant (nm/cm/10^5Pa)	β	2.75

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7589
$\theta_{C,A'}$	0.3305
$\theta_{d,C}$	0.2971
$\theta_{e,C}$	0.5343
$\theta_{g,d}$	1.2760
$\theta_{g,F}$	0.5731
$\theta_{h,g}$	0.4940
$\theta_{i,g}$	1.3833
$\theta'_{C',t}$	0.7961
$\theta'_{e,C'}$	0.4816
$\theta'_{F',e}$	0.5184
$\theta'_{i,F'}$	1.8746

Coloring

λ 80／λ 5	38/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.07
360	0.44
370	0.74
380	0.88
390	0.945
400	0.971
420	0.989
440	0.993
460	0.995
480	0.995
500	0.997
550	0.998
600	0.998
650	0.997
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.995
1600	0.993
1800	0.977
2000	0.950
2200	0.89
2400	0.86

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.0	2.4	2.4	2.6	2.8	3.3	3.9
−20 ~ 0	2.0	2.5	2.5	2.7	2.9	3.4	4.0
0 ~ 20	2.0	2.6	2.6	2.8	3.0	3.5	4.2
20 ~ 40	2.0	2.6	2.7	2.8	3.1	3.6	4.3
40 ~ 60	2.1	2.7	2.7	2.9	3.2	3.7	4.4
60 ~ 80	2.2	2.8	2.8	3.0	3.3	3.8	4.6

S-TIL27

575415
578412

Refractive Index	n_d	**1.57501** 1.575006	Abbe Number	ν_d	**41.5** 41.50	Dispersion	$n_F - n_C$ **0.01386** 0.013854
Refractive Index	n_e	1.578291	Abbe Number	ν_e	41.22	Dispersion	$n_{F'} - n_{C'}$ 0.014028

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.54162
n_{1970}	1.97009	1.54707
n_{1530}	1.52958	1.55304
n_{1129}	1.12864	1.55855
n_t	1.01398	1.56047
n_s	0.85211	1.56392
$n_{A'}$	0.76819	1.56635
n_r	0.70652	1.56861
n_C	0.65627	**1.57090**
$n_{C'}$	0.64385	1.57155
n_{He-Ne}	0.6328	1.57216
n_D	0.58929	1.57488
n_d	0.58756	**1.57501**
n_e	0.54607	1.57829
n_F	0.48613	**1.58476**
$n_{F'}$	0.47999	1.58558
n_{He-Cd}	0.44157	1.59167
n_g	0.435835	**1.59275**
n_h	0.404656	1.59966
n_i	0.365015	1.61218

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0117
$\Delta\theta_{C,A'}$	0.0024
$\Delta\theta_{g,d}$	0.0019
$\Delta\theta_{g,F}$	0.0024
$\Delta\theta_{i,g}$	0.0257

Constants of Dispersion Formula

A_1	1.31433154
A_2	$1.12300168 \cdot 10^{-1}$
A_3	1.41390100
B_1	$9.50404477 \cdot 10^{-3}$
B_2	$5.24112772 \cdot 10^{-2}$
B_3	$1.48429972 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.58
Remarks		

Partial Dispersions

$n_C - n_t$	0.010433
$n_C - n_{A'}$	0.004553
$n_d - n_C$	0.004104
$n_e - n_C$	0.007389
$n_g - n_d$	0.017739
$n_g - n_F$	0.007989
$n_h - n_g$	0.006918
$n_i - n_g$	0.019440
$n_{C'} - n_t$	0.011080
$n_e - n_{C'}$	0.006742
$n_{F'} - n_e$	0.007286
$n_i - n_{F'}$	0.026608

Thermal Properties

Strain Point	StP (℃)	511
Annealing Point	AP (℃)	547
Transformation Temperature	Tg (℃)	562
Yield Point	At (℃)	599
Softening Point	SP (℃)	700
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	74
	(+100～+300℃)	89
Thermal Conductivity	k (W/m·K)	1.070

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	749
Rigidity Modulus G	(10^8N/m^2)	308
Poisson's Ratio	σ	0.217
Knoop Hardness	Hk	540[5]
Abrasion	Aa	120
Photoelastic Constant (nm/cm/10^5Pa)	β	2.81

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7531
$\theta_{C,A'}$	0.3286
$\theta_{d,C}$	0.2962
$\theta_{e,C}$	0.5333
$\theta_{g,d}$	1.2804
$\theta_{g,F}$	0.5767
$\theta_{h,g}$	0.4994
$\theta_{i,g}$	1.4032
$\theta'_{C',t}$	0.7898
$\theta'_{e,C'}$	0.4806
$\theta'_{F',e}$	0.5194
$\theta'_{i,F'}$	1.8968

Coloring

λ 80／λ 5	38/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.05
360	0.44
370	0.78
380	0.913
390	0.961
400	0.979
420	0.990
440	0.993
460	0.994
480	0.995
500	0.996
550	0.998
600	0.998
650	0.998
700	0.998
800	0.999
900	0.999
1000	0.998
1200	0.998
1400	0.994
1600	0.993
1800	0.978
2000	0.955
2200	0.89
2400	0.87

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.4	2.9	3.0	3.1	3.3	3.9	4.5
−20 ~ 0	2.4	2.9	3.0	3.2	3.4	4.0	4.6
0 ~ 20	2.5	3.0	3.0	3.2	3.5	4.0	4.7
20 ~ 40	2.5	3.0	3.1	3.3	3.5	4.1	4.8
40 ~ 60	2.5	3.0	3.1	3.3	3.6	4.2	4.9
60 ~ 80	2.5	3.1	3.1	3.3	3.6	4.3	5.0

S–TIM 1

626357
630354

Refractive Index	n_d	**1.62588** 1.625882	Abbe Number	ν_d	**35.7** 35.70	Dispersion	$n_F - n_C$ **0.01754** 0.017532
Refractive Index	n_e	1.630031	Abbe Number	ν_e	35.43	Dispersion	$n_{F'} - n_{C'}$ 0.017780

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.58769
n_{1970}	1.97009	1.59337
n_{1530}	1.52958	1.59970
n_{1129}	1.12864	1.60583
n_t	1.01398	1.60805
n_s	0.85211	1.61216
$n_{A'}$	0.76819	1.61511
n_r	0.70652	1.61790
n_C	0.65627	**1.62074**
$n_{C'}$	0.64385	1.62155
n_{He-Ne}	0.6328	1.62231
n_D	0.58929	1.62573
n_d	0.58756	**1.62588**
n_e	0.54607	1.63003
n_F	0.48613	**1.63828**
$n_{F'}$	0.47999	1.63933
n_{He-Cd}	0.44157	1.64720
n_g	0.435835	**1.64861**
n_h	0.404656	1.65769
n_i	0.365015	1.67454

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0098
$\Delta\theta_{C,A'}$	0.0019
$\Delta\theta_{g,d}$	0.0056
$\Delta\theta_{g,F}$	0.0056
$\Delta\theta_{i,g}$	0.0530

Constants of Dispersion Formula

A_1	1.44963830
A_2	$1.22986408 \cdot 10^{-1}$
A_3	1.38066723
B_1	$1.12094282 \cdot 10^{-2}$
B_2	$5.96265770 \cdot 10^{-2}$
B_3	$1.38178326 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.71
Remarks		

Partial Dispersions

$n_C - n_t$	0.012693
$n_C - n_{A'}$	0.005628
$n_d - n_C$	0.005139
$n_e - n_C$	0.009288
$n_g - n_d$	0.022725
$n_g - n_F$	0.010332
$n_h - n_g$	0.009086
$n_i - n_g$	0.025932
$n_{C'} - n_t$	0.013499
$n_e - n_{C'}$	0.008482
$n_{F'} - n_e$	0.009298
$n_i - n_{F'}$	0.035210

Thermal Properties

Strain Point	StP (℃)	544
Annealing Point	AP (℃)	571
Transformation Temperature	Tg (℃)	602
Yield Point	At (℃)	630
Softening Point	SP (℃)	699
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	81
	(+100～+300℃)	96
Thermal Conductivity	k (W/m·K)	1.043

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	786
Rigidity Modulus G	(10^8N/m^2)	319
Poisson's Ratio	σ	0.234
Knoop Hardness	Hk	530[5]
Abrasion	Aa	136
Photoelastic Constant (nm/cm/10^5Pa)	β	2.82

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7240
$\theta_{C,A'}$	0.3210
$\theta_{d,C}$	0.2931
$\theta_{e,C}$	0.5298
$\theta_{g,d}$	1.2962
$\theta_{g,F}$	0.5893
$\theta_{h,g}$	0.5183
$\theta_{i,g}$	1.4791
$\theta'_{C',t}$	0.7592
$\theta'_{e,C'}$	0.4771
$\theta'_{F',e}$	0.5229
$\theta'_{i,F'}$	1.9803

Coloring

λ 80／λ 5	39/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.09
370	0.47
380	0.76
390	0.89
400	0.945
420	0.977
440	0.984
460	0.987
480	0.990
500	0.992
550	0.997
600	0.997
650	0.996
700	0.997
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.993
1600	0.993
1800	0.980
2000	0.965
2200	0.917
2400	0.89

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.4	2.1	2.1	2.3	2.6	3.3	4.1
−20 ～ 0	1.5	2.2	2.2	2.4	2.7	3.5	4.3
0 ～ 20	1.6	2.3	2.3	2.6	2.9	3.6	4.5
20 ～ 40	1.7	2.4	2.4	2.7	3.0	3.8	4.7
40 ～ 60	1.8	2.5	2.5	2.8	3.1	3.9	4.9
60 ～ 80	1.9	2.6	2.6	2.9	3.2	4.1	5.1

S–TIM 2

620363
624360

Refractive Index	n_d	**1.62004** 1.620041	Abbe Number	ν_d	**36.3** 36.26	Dispersion	$n_F - n_C$ **0.01710** 0.017099
Refractive Index	n_e	1.624088	Abbe Number	ν_e	35.99	Dispersion	$n_{F'} - n_{C'}$ 0.017339

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.58240
n_{1970}	1.97009	1.58806
n_{1530}	1.52958	1.59435
n_{1129}	1.12864	1.60041
n_t	1.01398	1.60260
n_s	0.85211	1.60663
$n_{A'}$	0.76819	1.60952
n_r	0.70652	1.61225
n_C	0.65627	**1.61502**
$n_{C'}$	0.64385	1.61581
$n_{He\text{-}Ne}$	0.6328	1.61655
n_D	0.58929	1.61989
n_d	0.58756	**1.62004**
n_e	0.54607	1.62409
n_F	0.48613	**1.63212**
$n_{F'}$	0.47999	1.63315
$n_{He\text{-}Cd}$	0.44157	1.64081
n_g	0.435835	**1.64218**
n_h	0.404656	1.65100
n_i	0.365015	1.66728

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0099
$\Delta\theta_{C,A'}$	0.0019
$\Delta\theta_{g,d}$	0.0051
$\Delta\theta_{g,F}$	0.0051
$\Delta\theta_{i,g}$	0.0468

Constants of Dispersion Formula

A_1	1.42193846
A_2	$1.33827968 \cdot 10^{-1}$
A_3	1.45060574
B_1	$1.07291511 \cdot 10^{-2}$
B_2	$5.72587546 \cdot 10^{-2}$
B_3	$1.45381805 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.69
Remarks		

Partial Dispersions

$n_C - n_t$	0.012426
$n_C - n_{A'}$	0.005500
$n_d - n_C$	0.005017
$n_e - n_C$	0.009064
$n_g - n_d$	0.022135
$n_g - n_F$	0.010053
$n_h - n_g$	0.008822
$n_i - n_g$	0.025105
$n_{C'} - n_t$	0.013213
$n_e - n_{C'}$	0.008277
$n_{F'} - n_e$	0.009062
$n_i - n_{F'}$	0.034131

Thermal Properties

Strain Point	StP (℃)	551
Annealing Point	AP (℃)	576
Transformation Temperature	Tg (℃)	598
Yield Point	At (℃)	634
Softening Point	SP (℃)	703
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	81
	(+100～+300℃)	95
Thermal Conductivity	k (W/m·K)	1.394

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	776
Rigidity Modulus G	(10^8N/m^2)	315
Poisson's Ratio	σ	0.230
Knoop Hardness	Hk	550[6]
Abrasion	Aa	150
Photoelastic Constant (nm/cm/10^5Pa)	β	2.86

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7267
$\theta_{C,A'}$	0.3217
$\theta_{d,C}$	0.2934
$\theta_{e,C}$	0.5301
$\theta_{g,d}$	1.2945
$\theta_{g,F}$	0.5879
$\theta_{h,g}$	0.5159
$\theta_{i,g}$	1.4682
$\theta'_{C',t}$	0.7620
$\theta'_{e,C'}$	0.4774
$\theta'_{F',e}$	0.5226
$\theta'_{i,F'}$	1.9685

Coloring

λ 80／λ 5	39/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.08
370	0.44
380	0.73
390	0.87
400	0.942
420	0.978
440	0.987
460	0.990
480	0.992
500	0.994
550	0.997
600	0.997
650	0.996
700	0.997
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.995
1600	0.995
1800	0.984
2000	0.971
2200	0.930
2400	0.914

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.7	2.3	2.3	2.5	2.8	3.4	4.2
−20 ～ 0	1.8	2.3	2.4	2.6	2.9	3.6	4.4
0 ～ 20	1.8	2.4	2.5	2.7	3.0	3.7	4.6
20 ～ 40	1.9	2.5	2.6	2.8	3.1	3.9	4.8
40 ～ 60	1.9	2.6	2.6	2.9	3.2	4.1	5.0
60 ～ 80	2.0	2.7	2.7	3.0	3.4	4.2	5.2

S–TIM3

613370
617367

Refractive Index	n_d	**1.61293** 1.612929	Abbe Number	ν_d	**37.0** 37.00	Dispersion	$n_F - n_C$ **0.01657** 0.016564
Refractive Index	n_e	1.616851	Abbe Number	ν_e	36.73	Dispersion	$n_{F'} - n_{C'}$ 0.016792

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.57589
n_{1970}	1.97009	1.58154
n_{1530}	1.52958	1.58781
n_{1129}	1.12864	1.59381
n_t	1.01398	1.59595
n_s	0.85211	1.59990
$n_{A'}$	0.76819	1.60272
n_r	0.70652	1.60537
n_C	0.65627	**1.60806**
$n_{C'}$	0.64385	1.60883
n_{He-Ne}	0.6328	1.60954
n_D	0.58929	1.61278
n_d	0.58756	**1.61293**
n_e	0.54607	1.61685
n_F	0.48613	**1.62463**
$n_{F'}$	0.47999	1.62562
n_{He-Cd}	0.44157	1.63302
n_g	0.435835	**1.63434**
n_h	0.404656	1.64284
n_i	0.365015	1.65850

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0107
$\Delta\theta_{C,A'}$	0.0021
$\Delta\theta_{g,d}$	0.0045
$\Delta\theta_{g,F}$	0.0046
$\Delta\theta_{i,g}$	0.0438

Constants of Dispersion Formula

A_1	1.40691144
A_2	$1.28369745 \cdot 10^{-1}$
A_3	1.51826191
B_1	$1.05633641 \cdot 10^{-2}$
B_2	$5.68483105 \cdot 10^{-2}$
B_3	$1.52107924 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.67
Remarks		

Partial Dispersions

$n_C - n_t$	0.012109
$n_C - n_{A'}$	0.005347
$n_d - n_C$	0.004867
$n_e - n_C$	0.008789
$n_g - n_d$	0.021407
$n_g - n_F$	0.009710
$n_h - n_g$	0.008506
$n_i - n_g$	0.024167
$n_{C'} - n_t$	0.012873
$n_e - n_{C'}$	0.008025
$n_{F'} - n_e$	0.008767
$n_i - n_{F'}$	0.032885

Thermal Properties

Strain Point	StP (℃)	548
Annealing Point	AP (℃)	577
Transformation Temperature	Tg (℃)	597
Yield Point	At (℃)	633
Softening Point	SP (℃)	708
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	77
	(+100～+300℃)	91
Thermal Conductivity	k (W/m·K)	1.044

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	779
Rigidity Modulus G	(10^8N/m^2)	317
Poisson's Ratio	σ	0.229
Knoop Hardness	Hk	510[5]
Abrasion	Aa	129
Photoelastic Constant (nm/cm/10^5Pa)	β	2.91

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7310
$\theta_{C,A'}$	0.3228
$\theta_{d,C}$	0.2938
$\theta_{e,C}$	0.5306
$\theta_{g,d}$	1.2924
$\theta_{g,F}$	0.5862
$\theta_{h,g}$	0.5135
$\theta_{i,g}$	1.4590
$\theta'_{C',t}$	0.7666
$\theta'_{e,C'}$	0.4779
$\theta'_{F',e}$	0.5221
$\theta'_{i,F'}$	1.9584

Coloring

λ 80／λ 5	39/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.13
370	0.53
380	0.79
390	0.907
400	0.950
420	0.976
440	0.984
460	0.986
480	0.989
500	0.992
550	0.996
600	0.996
650	0.995
700	0.997
800	0.999
900	0.998
1000	0.996
1200	0.996
1400	0.994
1600	0.994
1800	0.983
2000	0.971
2200	0.929
2400	0.913

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.8	2.4	2.5	2.7	3.0	3.6	4.3
−20 ~ 0	1.8	2.5	2.6	2.8	3.1	3.8	4.5
0 ~ 20	2.0	2.6	2.7	3.0	3.2	3.9	4.7
20 ~ 40	2.1	2.8	2.8	3.1	3.4	4.1	5.0
40 ~ 60	2.2	2.9	2.9	3.2	3.5	4.3	5.2
60 ~ 80	2.3	3.0	3.0	3.3	3.6	4.4	5.4

S–TIM 5

603380
607378

Refractive Index	n_d	**1.60342** 1.603420	Abbe Number	ν_d	**38.0** 38.03	Dispersion	$n_F - n_C$ **0.01587** 0.015868
Refractive Index	n_e	1.607179	Abbe Number	ν_e	37.76	Dispersion	$n_{F'} - n_{C'}$ 0.016082

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.56753
n_{1970}	1.97009	1.57306
n_{1530}	1.52958	1.57918
n_{1129}	1.12864	1.58500
n_t	1.01398	1.58708
n_s	0.85211	1.59089
$n_{A'}$	0.76819	1.59360
n_r	0.70652	1.59615
n_C	0.65627	**1.59875**
$n_{C'}$	0.64385	1.59948
$n_{He\text{-}Ne}$	0.6328	1.60017
n_D	0.58929	1.60328
n_d	0.58756	**1.60342**
n_e	0.54607	1.60718
n_F	0.48613	**1.61462**
$n_{F'}$	0.47999	1.61556
$n_{He\text{-}Cd}$	0.44157	1.62262
n_g	0.435835	**1.62388**
n_h	0.404656	1.63196
n_i	0.365015	1.64676

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0102
$\Delta\theta_{C,A'}$	0.0022
$\Delta\theta_{g,d}$	0.0034
$\Delta\theta_{g,F}$	0.0036
$\Delta\theta_{i,g}$	0.0353

Constants of Dispersion Formula

A_1	1.38531342
A_2	$1.22372945 \cdot 10^{-1}$
A_3	1.40508326
B_1	$1.04074567 \cdot 10^{-2}$
B_2	$5.57440088 \cdot 10^{-2}$
B_3	$1.44878733 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.63
Remarks		

Partial Dispersions

$n_C - n_t$	0.011667
$n_C - n_{A'}$	0.005143
$n_d - n_C$	0.004672
$n_e - n_C$	0.008431
$n_g - n_d$	0.020455
$n_g - n_F$	0.009259
$n_h - n_g$	0.008081
$n_i - n_g$	0.022880
$n_{C'} - n_t$	0.012401
$n_e - n_{C'}$	0.007697
$n_{F'} - n_e$	0.008385
$n_i - n_{F'}$	0.031191

Thermal Properties

Strain Point	StP (℃)	535
Annealing Point	AP (℃)	565
Transformation Temperature	Tg (℃)	588
Yield Point	At (℃)	624
Softening Point	SP (℃)	700
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	83
	(+100～+300℃)	96
Thermal Conductivity	k (W/m·K)	1.040

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	763
Rigidity Modulus G	(10^8N/m^2)	309
Poisson's Ratio	σ	0.233
Knoop Hardness	Hk	540[5]
Abrasion	Aa	128
Photoelastic Constant (nm/cm/10^5Pa)	β	2.84

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.2

Relative Partial Dispersions

$\theta_{C,t}$	0.7353
$\theta_{C,A'}$	0.3241
$\theta_{d,C}$	0.2944
$\theta_{e,C}$	0.5313
$\theta_{g,d}$	1.2891
$\theta_{g,F}$	0.5835
$\theta_{h,g}$	0.5093
$\theta_{i,g}$	1.4419
$\theta'_{C',t}$	0.7711
$\theta'_{e,C'}$	0.4786
$\theta'_{F',e}$	0.5214
$\theta'_{i,F'}$	1.9395

Coloring

λ 80／λ 5	39/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.19
370	0.60
380	0.84
390	0.931
400	0.963
420	0.984
440	0.989
460	0.991
480	0.993
500	0.995
550	0.997
600	0.997
650	0.997
700	0.997
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.994
1600	0.994
1800	0.982
2000	0.966
2200	0.923
2400	0.902

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.4	1.9	1.9	2.1	2.4	3.0	3.7
−20 ～ 0	1.4	2.0	2.1	2.3	2.5	3.2	3.9
0 ～ 20	1.4	2.1	2.2	2.4	2.7	3.4	4.1
20 ～ 40	1.6	2.3	2.3	2.5	2.8	3.6	4.4
40 ～ 60	1.7	2.4	2.4	2.7	3.0	3.7	4.6
60 ～ 80	1.7	2.5	2.6	2.8	3.1	3.9	4.8

S–TIM 8

596392
599390

Refractive Index	n_d	**1.59551** 1.595509	Abbe Number	ν_d	**39.2** 39.24	Dispersion	$n_F - n_C$ **0.01518** 0.015176
Refractive Index	n_e	1.599106	Abbe Number	ν_e	38.97	Dispersion	$n_{F'} - n_{C'}$ 0.015375

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.56075
n_{1970}	1.97009	1.56615
n_{1530}	1.52958	1.57212
n_{1129}	1.12864	1.57778
n_t	1.01398	1.57980
n_s	0.85211	1.58347
$n_{A'}$	0.76819	1.58609
n_r	0.70652	1.58854
n_C	0.65627	**1.59103**
$n_{C'}$	0.64385	1.59173
n_{He-Ne}	0.6328	1.59240
n_D	0.58929	**1.59538**
n_d	0.58756	1.59551
n_e	0.54607	1.59911
n_F	0.48613	**1.60621**
$n_{F'}$	0.47999	1.60711
n_{He-Cd}	0.44157	1.61382
n_g	0.435835	**1.61501**
n_h	0.404656	1.62267
n_i	0.365015	1.63661

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0094
$\Delta\theta_{C,A'}$	0.0022
$\Delta\theta_{g,d}$	0.0020
$\Delta\theta_{g,F}$	0.0023
$\Delta\theta_{i,g}$	0.0269

Constants of Dispersion Formula

A_1	1.37262713
A_2	$1.12636276 \cdot 10^{-1}$
A_3	1.39786421
B_1	$1.03220068 \cdot 10^{-2}$
B_2	$5.50195044 \cdot 10^{-2}$
B_3	$1.47735609 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.63
Remarks		

Partial Dispersions

$n_C - n_t$	0.011234
$n_C - n_{A'}$	0.004942
$n_d - n_C$	0.004479
$n_e - n_C$	0.008076
$n_g - n_d$	0.019504
$n_g - n_F$	0.008807
$n_h - n_g$	0.007657
$n_i - n_g$	0.021600
$n_{C'} - n_t$	0.011938
$n_e - n_{C'}$	0.007372
$n_{F'} - n_e$	0.008003
$n_i - n_{F'}$	0.029504

Thermal Properties

Strain Point	StP (℃)	529
Annealing Point	AP (℃)	560
Transformation Temperature	Tg (℃)	585
Yield Point	At (℃)	610
Softening Point	SP (℃)	695
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	84
	(+100～+300℃)	104
Thermal Conductivity	k (W/m·K)	1.034

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	750
Rigidity Modulus G	(10^8N/m^2)	305
Poisson's Ratio	σ	0.231
Knoop Hardness	Hk	530[5]
Abrasion	Aa	133
Photoelastic Constant (nm/cm/10^5Pa)	β	2.79

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7402
$\theta_{C,A'}$	0.3256
$\theta_{d,C}$	0.2951
$\theta_{e,C}$	0.5322
$\theta_{g,d}$	1.2852
$\theta_{g,F}$	0.5803
$\theta_{h,g}$	0.5045
$\theta_{i,g}$	1.4233
$\theta'_{C',t}$	0.7765
$\theta'_{e,C'}$	0.4795
$\theta'_{F',e}$	0.5205
$\theta'_{i,F'}$	1.9190

Coloring

λ 80／λ 5	38/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.02
360	0.27
370	0.64
380	0.84
390	0.928
400	0.962
420	0.982
440	0.988
460	0.990
480	0.992
500	0.994
550	0.997
600	0.997
650	0.996
700	0.997
800	0.998
900	0.997
1000	0.996
1200	0.996
1400	0.994
1600	0.993
1800	0.983
2000	0.968
2200	0.935
2400	0.915

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.3	1.7	1.7	1.9	2.2	2.8	3.4
−20 ～ 0	1.3	1.8	1.8	2.0	2.3	2.9	3.5
0 ～ 20	1.3	1.8	1.9	2.1	2.3	3.0	3.7
20 ～ 40	1.4	1.9	1.9	2.1	2.4	3.1	3.8
40 ～ 60	1.4	1.9	2.0	2.2	2.5	3.2	4.0
60 ～ 80	1.5	2.0	2.0	2.3	2.6	3.3	4.1

S–TIM22

648338
652335

Refractive Index	n_d	**1.64769** 1.647689	Abbe Number	ν_d	**33.8** 33.79	Dispersion	$n_F - n_C$ **0.01916** 0.019167
Refractive Index	n_e	1.652221	Abbe Number	ν_e	33.53	Dispersion	$n_{F'} - n_{C'}$ 0.019451

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.60753
n_{1970}	1.97009	1.61325
n_{1530}	1.52958	1.61971
n_{1129}	1.12864	1.62609
n_t	1.01398	1.62844
n_s	0.85211	1.63283
$n_{A'}$	0.76819	1.63600
n_r	0.70652	1.63901
n_C	0.65627	**1.64210**
$n_{C'}$	0.64385	1.64297
$n_{He\text{-}Ne}$	0.6328	1.64379
n_D	0.58929	1.64752
n_d	0.58756	**1.64769**
n_e	0.54607	1.65222
n_F	0.48613	**1.66126**
$n_{F'}$	0.47999	1.66242
$n_{He\text{-}Cd}$	0.44157	1.67109
n_g	0.435835	**1.67265**
n_h	0.404656	1.68269
n_i	0.365015	—

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0074
$\Delta\theta_{C,A'}$	0.0010
$\Delta\theta_{g,d}$	0.0075
$\Delta\theta_{g,F}$	0.0070
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.44222294
A_2	$1.94432265 \cdot 10^{-1}$
A_3	1.74092482
B_1	$1.04249404 \cdot 10^{-2}$
B_2	$5.50235257 \cdot 10^{-2}$
B_3	$1.69710769 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.79
Remarks		

Partial Dispersions

$n_C - n_t$	0.013658
$n_C - n_{A'}$	0.006092
$n_d - n_C$	0.005593
$n_e - n_C$	0.010125
$n_g - n_d$	0.024956
$n_g - n_F$	0.011382
$n_h - n_g$	0.010042
$n_i - n_g$	—
$n_{C'} - n_t$	0.014533
$n_e - n_{C'}$	0.009250
$n_{F'} - n_e$	0.010201
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	545
Annealing Point	AP (℃)	572
Transformation Temperature	Tg (℃)	593
Yield Point	At (℃)	624
Softening Point	SP (℃)	692
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	83
	(+100～+300℃)	98
Thermal Conductivity	k (W/m·K)	1.024

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	798
Rigidity Modulus	G (10^8N/m^2)	322
Poisson's Ratio	σ	0.238
Knoop Hardness	Hk	560[6]
Abrasion	Aa	149
Photoelastic Constant (nm/cm/10^5Pa)	β	2.82

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7126
$\theta_{C,A'}$	0.3178
$\theta_{d,C}$	0.2918
$\theta_{e,C}$	0.5283
$\theta_{g,d}$	1.3020
$\theta_{g,F}$	0.5938
$\theta_{h,g}$	0.5239
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7472
$\theta'_{e,C'}$	0.4756
$\theta'_{F',e}$	0.5244
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	40/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.04
370	0.37
380	0.70
390	0.86
400	0.928
420	0.970
440	0.981
460	0.986
480	0.989
500	0.991
550	0.996
600	0.996
650	0.995
700	0.996
800	0.998
900	0.997
1000	0.997
1200	0.996
1400	0.993
1600	0.991
1800	0.981
2000	0.970
2200	0.934
2400	0.916

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.8	1.5	1.6	1.8	2.1	2.9	3.7
−20 ～ 0	1.0	1.7	1.7	1.9	2.3	3.1	4.0
0 ～ 20	1.1	1.8	1.8	2.1	2.4	3.3	4.3
20 ～ 40	1.1	1.9	2.0	2.3	2.6	3.5	4.5
40 ～ 60	1.3	2.1	2.1	2.4	2.8	3.7	4.8
60 ～ 80	1.4	2.2	2.3	2.6	2.9	3.9	5.0

S–TIM25

673321
678318

Refractive Index	n_d	**1.67270** 1.672700	Abbe Number ν_d	**32.1** 32.10	Dispersion $n_F - n_C$	**0.02095** 0.020957
Refractive Index	n_e	1.677651	Abbe Number ν_e	31.84	Dispersion $n_{F'} - n_{C'}$	0.021280

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.62988
n_{1970}	1.97009	1.63583
n_{1530}	1.52958	1.64258
n_{1129}	1.12864	1.64933
n_t	1.01398	1.65184
n_s	0.85211	1.65656
$n_{A'}$	0.76819	1.66000
n_r	0.70652	1.66326
n_C	0.65627	**1.66661**
$n_{C'}$	0.64385	1.66756
$n_{He\text{-}Ne}$	0.6328	1.66846
n_D	0.58929	1.67252
n_d	0.58756	**1.67270**
n_e	0.54607	1.67765
n_F	0.48613	**1.68756**
$n_{F'}$	0.47999	1.68884
$n_{He\text{-}Cd}$	0.44157	1.69840
n_g	0.435835	**1.70011**
n_h	0.404656	1.71126
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0073
$\Delta\theta_{C,A'}$	0.0007
$\Delta\theta_{g,d}$	0.0101
$\Delta\theta_{g,F}$	0.0093
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.50659233
A_2	$2.04786135 \cdot 10^{-1}$
A_3	1.92036668
B_1	$1.09501562 \cdot 10^{-2}$
B_2	$5.74980285 \cdot 10^{-2}$
B_3	$1.78128535 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.91
Remarks		

Partial Dispersions

$n_C - n_t$	0.014766
$n_C - n_{A'}$	0.006611
$n_d - n_C$	0.006093
$n_e - n_C$	0.011044
$n_g - n_d$	0.027414
$n_g - n_F$	0.012550
$n_h - n_g$	0.011144
$n_i - n_g$	—
$n_{C'} - n_t$	0.015718
$n_e - n_{C'}$	0.010092
$n_{F'} - n_e$	0.011188
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	556
Annealing Point	AP (℃)	585
Transformation Temperature	Tg (℃)	608
Yield Point	At (℃)	640
Softening Point	SP (℃)	700
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	79
	(+100～+300℃)	95
Thermal Conductivity	k (W/m·K)	1.046

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	841
Rigidity Modulus	G (10^8N/m^2)	340
Poisson's Ratio	σ	0.236
Knoop Hardness	Hk	570[6]
Abrasion	Aa	140
Photoelastic Constant (nm/cm/10^5Pa)	β	2.81

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.2

Relative Partial Dispersions

$\theta_{C,t}$	0.7046
$\theta_{C,A'}$	0.3155
$\theta_{d,C}$	0.2907
$\theta_{e,C}$	0.5270
$\theta_{g,d}$	1.3081
$\theta_{g,F}$	0.5988
$\theta_{h,g}$	0.5318
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7386
$\theta'_{e,C'}$	0.4742
$\theta'_{F',e}$	0.5258
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	40/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.01
370	0.24
380	0.60
390	0.80
400	0.89
420	0.957
440	0.974
460	0.981
480	0.986
500	0.989
550	0.995
600	0.996
650	0.995
700	0.996
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.995
1600	0.995
1800	0.987
2000	0.977
2200	0.944
2400	0.930

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.5	2.2	2.3	2.6	2.9	3.7	4.7
−20 ～ 0	1.7	2.4	2.4	2.7	3.0	3.9	5.0
0 ～ 20	1.7	2.5	2.5	2.8	3.2	4.1	5.2
20 ～ 40	1.7	2.6	2.7	2.9	3.4	4.4	5.5
40 ～ 60	1.8	2.7	2.8	3.1	3.6	4.6	5.8
60 ～ 80	1.9	2.8	2.9	3.3	3.7	4.8	6.1

S–TIM27

640345
644342

Refractive Index	n_d	**1.63980** 1.639799	Abbe Number	ν_d	**34.5** 34.46	Dispersion	$n_F - n_C$ **0.01856** 0.018564
Refractive Index	n_e	1.644189	Abbe Number	ν_e	34.20	Dispersion	$n_{F'} - n_{C'}$ 0.018835

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.60036
n_{1970}	1.97009	1.60608
n_{1530}	1.52958	1.61249
n_{1129}	1.12864	1.61878
n_t	1.01398	1.62108
n_s	0.85211	1.62537
$n_{A'}$	0.76819	1.62846
n_r	0.70652	1.63138
n_C	0.65627	**1.63438**
$n_{C'}$	0.64385	1.63522
n_{He-Ne}	0.6328	1.63602
n_D	0.58929	1.63964
n_d	0.58756	**1.63980**
n_e	0.54607	1.64419
n_F	0.48613	**1.65294**
$n_{F'}$	0.47999	1.65406
n_{He-Cd}	0.44157	1.66244
n_g	0.435835	**1.66393**
n_h	0.404656	1.67361
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0076
$\Delta\theta_{C,A'}$	0.0011
$\Delta\theta_{g,d}$	0.0069
$\Delta\theta_{g,F}$	0.0065
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.41680470
A_2	$1.96785057 \cdot 10^{-1}$
A_3	1.68001322
B_1	$1.00732158 \cdot 10^{-2}$
B_2	$5.37616908 \cdot 10^{-2}$
B_3	$1.64672436 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.76
Remarks		

Partial Dispersions

$n_C - n_t$	0.013292
$n_C - n_{A'}$	0.005916
$n_d - n_C$	0.005424
$n_e - n_C$	0.009814
$n_g - n_d$	0.024134
$n_g - n_F$	0.010994
$n_h - n_g$	0.009680
$n_i - n_g$	—
$n_{C'} - n_t$	0.014141
$n_e - n_{C'}$	0.008965
$n_{F'} - n_e$	0.009870
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	543
Annealing Point	AP (℃)	572
Transformation Temperature	Tg (℃)	594
Yield Point	At (℃)	629
Softening Point	SP (℃)	696
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	80
	(+100～+300℃)	99
Thermal Conductivity	k (W/m·K)	1.035

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	793
Rigidity Modulus	G (10^8N/m^2)	321
Poisson's Ratio	σ	0.236
Knoop Hardness	Hk	560[6]
Abrasion	Aa	141
Photoelastic Constant (nm/cm/10^5Pa)	β	2.83

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7160
$\theta_{C,A'}$	0.3187
$\theta_{d,C}$	0.2922
$\theta_{e,C}$	0.5287
$\theta_{g,d}$	1.3000
$\theta_{g,F}$	0.5922
$\theta_{h,g}$	0.5214
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7508
$\theta'_{e,C'}$	0.4760
$\theta'_{F',e}$	0.5240
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	39/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.05
370	0.41
380	0.73
390	0.87
400	0.935
420	0.973
440	0.983
460	0.987
480	0.990
500	0.992
550	0.997
600	0.997
650	0.996
700	0.997
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.995
1600	0.994
1800	0.984
2000	0.973
2200	0.936
2400	0.919

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.2	1.9	1.9	2.2	2.5	3.2	4.0
−20 ~ 0	1.3	2.0	2.0	2.3	2.6	3.3	4.2
0 ~ 20	1.3	2.1	2.1	2.4	2.7	3.5	4.4
20 ~ 40	1.4	2.1	2.2	2.5	2.8	3.7	4.6
40 ~ 60	1.4	2.2	2.3	2.6	2.9	3.8	4.8
60 ~ 80	1.5	2.3	2.4	2.7	3.0	4.0	5.1

S–TIM28

689311
694308

Refractive Index	n_d	**1.68893** 1.688931	Abbe Number	ν_d	**31.1** 31.07	Dispersion	$n_F - n_C$ **0.02217** 0.022170
Refractive Index	n_e	1.694167	Abbe Number	ν_e	30.83	Dispersion	$n_{F'} - n_{C'}$ 0.022516

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.64463
n_{1970}	1.97009	1.65062
n_{1530}	1.52958	1.65745
n_{1129}	1.12864	1.66438
n_t	1.01398	1.66699
n_s	0.85211	1.67192
$n_{A'}$	0.76819	1.67553
n_r	0.70652	1.67896
n_C	0.65627	**1.68250**
$n_{C'}$	0.64385	1.68350
n_{He-Ne}	0.6328	1.68445
n_D	0.58929	1.68874
n_d	0.58756	**1.68893**
n_e	0.54607	1.69417
n_F	0.48613	**1.70467**
$n_{F'}$	0.47999	1.70602
n_{He-Cd}	0.44157	1.71615
n_g	0.435835	**1.71797**
n_h	0.404656	1.72981
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0071
$\Delta\theta_{C,A'}$	0.0007
$\Delta\theta_{g,d}$	0.0099
$\Delta\theta_{g,F}$	0.0092
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.54270810
A_2	$2.17113891 \cdot 10^{-1}$
A_3	1.81904459
B_1	$1.13925005 \cdot 10^{-2}$
B_2	$5.79224572 \cdot 10^{-2}$
B_3	$1.67697189 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.98
Remarks		

Partial Dispersions

$n_C - n_t$	0.015507
$n_C - n_{A'}$	0.006966
$n_d - n_C$	0.006436
$n_e - n_C$	0.011672
$n_g - n_d$	0.029044
$n_g - n_F$	0.013310
$n_h - n_g$	0.011834
$n_i - n_g$	—
$n_{C'} - n_t$	0.016512
$n_e - n_{C'}$	0.010667
$n_{F'} - n_e$	0.011849
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	560
Annealing Point	AP (℃)	588
Transformation Temperature	Tg (℃)	611
Yield Point	At (℃)	637
Softening Point	SP (℃)	701
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	82
	(+100～+300℃)	98
Thermal Conductivity	k (W/m·K)	1.006

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	855
Rigidity Modulus	G (10^8N/m^2)	344
Poisson's Ratio	σ	0.242
Knoop Hardness	Hk	550[6]
Abrasion	Aa	155
Photoelastic Constant (nm/cm/10^5Pa)	β	2.77

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6995
$\theta_{C,A'}$	0.3142
$\theta_{d,C}$	0.2903
$\theta_{e,C}$	0.5265
$\theta_{g,d}$	1.3101
$\theta_{g,F}$	0.6004
$\theta_{h,g}$	0.5338
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7333
$\theta'_{e,C'}$	0.4738
$\theta'_{F',e}$	0.5262
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	41/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.01
370	0.23
380	0.58
390	0.79
400	0.88
420	0.951
440	0.970
460	0.978
480	0.983
500	0.987
550	0.994
600	0.995
650	0.994
700	0.995
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.996
1600	0.996
1800	0.989
2000	0.983
2200	0.961
2400	0.948

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.3	1.9	2.0	2.2	2.6	3.4	4.5
−20 ～ 0	1.3	2.0	2.1	2.3	2.7	3.6	4.7
0 ～ 20	1.3	2.1	2.2	2.5	2.9	3.8	5.0
20 ～ 40	1.4	2.2	2.3	2.6	3.0	4.0	5.2
40 ～ 60	1.4	2.3	2.4	2.7	3.1	4.2	5.5
60 ～ 80	1.4	2.4	2.5	2.8	3.3	4.4	5.7

S–TIM35

699301
704299

Refractive Index	n_d	**1.69895** 1.698947	Abbe Number	ν_d	**30.1** 30.13	Dispersion	$n_F - n_C$ **0.02320** 0.023199
Refractive Index	n_e	1.704424	Abbe Number	ν_e	29.89	Dispersion	$n_{F'} - n_{C'}$ 0.023567

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.65283
n_{1970}	1.97009	1.65905
n_{1530}	1.52958	1.66615
n_{1129}	1.12864	1.67335
n_t	1.01398	1.67606
n_s	0.85211	1.68120
$n_{A'}$	0.76819	1.68496
n_r	0.70652	1.68854
n_C	0.65627	**1.69222**
$n_{C'}$	0.64385	1.69327
n_{He-Ne}	0.6328	1.69426
n_D	0.58929	1.69875
n_d	0.58756	**1.69895**
n_e	0.54607	1.70442
n_F	0.48613	**1.71542**
$n_{F'}$	0.47999	1.71684
n_{He-Cd}	0.44157	1.72750
n_g	0.435835	**1.72941**
n_h	0.404656	1.74189
n_i	0.365015	—

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0086
$\Delta\theta_{C,A'}$	0.0008
$\Delta\theta_{g,d}$	0.0111
$\Delta\theta_{g,F}$	0.0103
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.55849775
A_2	$2.30767007 \cdot 10^{-1}$
A_3	1.84436099
B_1	$1.15367235 \cdot 10^{-2}$
B_2	$5.86095947 \cdot 10^{-2}$
B_3	$1.62981888 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.96
Remarks		

Partial Dispersions

$n_C - n_t$	0.016161
$n_C - n_{A'}$	0.007266
$n_d - n_C$	0.006722
$n_e - n_C$	0.012199
$n_g - n_d$	0.030465
$n_g - n_F$	0.013988
$n_h - n_g$	0.012478
$n_i - n_g$	—
$n_{C'} - n_t$	0.017210
$n_e - n_{C'}$	0.011150
$n_{F'} - n_e$	0.012417
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	579
Annealing Point	AP (℃)	603
Transformation Temperature	Tg (℃)	622
Yield Point	At (℃)	648
Softening Point	SP (℃)	716
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	75
	(+100～+300℃)	89
Thermal Conductivity	k (W/m·K)	1.049

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	875
Rigidity Modulus	G (10^8N/m^2)	353
Poisson's Ratio	σ	0.238
Knoop Hardness	Hk	500[5]
Abrasion	Aa	136
Photoelastic Constant (nm/cm/10^5Pa)	β	3.04

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6966
$\theta_{C,A'}$	0.3132
$\theta_{d,C}$	0.2898
$\theta_{e,C}$	0.5258
$\theta_{g,d}$	1.3132
$\theta_{g,F}$	0.6030
$\theta_{h,g}$	0.5379
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7303
$\theta'_{e,C'}$	0.4731
$\theta'_{F',e}$	0.5269
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	41/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.14
380	0.48
390	0.72
400	0.84
420	0.939
440	0.964
460	0.974
480	0.981
500	0.986
550	0.994
600	0.994
650	0.993
700	0.995
800	0.998
900	0.999
1000	0.999
1200	0.999
1400	0.995
1600	0.995
1800	0.988
2000	0.980
2200	0.942
2400	0.931

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.0	2.8	2.8	3.1	3.5	4.4	5.5
−20 ～ 0	2.1	2.9	3.0	3.3	3.7	4.6	5.8
0 ～ 20	2.1	3.0	3.1	3.4	3.8	4.9	6.1
20 ～ 40	2.3	3.2	3.2	3.6	4.0	5.1	6.4
40 ～ 60	2.4	3.3	3.4	3.7	4.2	5.3	6.7
60 ～ 80	2.4	3.4	3.5	3.9	4.4	5.6	7.0

S–TIM39

667330
672328

Refractive Index	n_d	**1.66680** 1.666800	Abbe Number ν_d	**33.0** 33.05	Dispersion $n_F - n_C$	**0.02018** 0.020173
Refractive Index	n_e	1.671568	Abbe Number ν_e	32.80	Dispersion $n_{F'} - n_{C'}$	0.020477

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.62567
n_{1970}	1.97009	1.63132
n_{1530}	1.52958	1.63776
n_{1129}	1.12864	1.64425
n_t	1.01398	1.64667
n_s	0.85211	1.65123
$n_{A'}$	0.76819	1.65454
n_r	0.70652	1.65769
n_C	0.65627	**1.66092**
$n_{C'}$	0.64385	1.66184
$n_{He\text{-}Ne}$	0.6328	1.66271
n_D	0.58929	1.66662
n_d	0.58756	**1.66680**
n_e	0.54607	1.67157
n_F	0.48613	**1.68110**
$n_{F'}$	0.47999	1.68232
$n_{He\text{-}Cd}$	0.44157	1.69148
n_g	0.435835	**1.69311**
n_h	0.404656	1.70373
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0048
$\Delta\theta_{C,A'}$	0.0004
$\Delta\theta_{g,d}$	0.0084
$\Delta\theta_{g,F}$	0.0077
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.47008105
A_2	$2.24752746 \cdot 10^{-1}$
A_3	2.44968592
B_1	$1.02900432 \cdot 10^{-2}$
B_2	$5.41276904 \cdot 10^{-2}$
B_3	$2.37434940 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.92
Remarks		

Partial Dispersions

$n_C - n_t$	0.014252
$n_C - n_{A'}$	0.006381
$n_d - n_C$	0.005875
$n_e - n_C$	0.010643
$n_g - n_d$	0.026315
$n_g - n_F$	0.012017
$n_h - n_g$	0.010616
$n_i - n_g$	—
$n_{C'} - n_t$	0.015170
$n_e - n_{C'}$	0.009725
$n_{F'} - n_e$	0.010752
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	544
Annealing Point	AP (℃)	569
Transformation Temperature	Tg (℃)	591
Yield Point	At (℃)	621
Softening Point	SP (℃)	682
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	87
	(+100～+300℃)	104
Thermal Conductivity	k (W/m·K)	0.988

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	817
Rigidity Modulus G	(10^8N/m^2)	328
Poisson's Ratio	σ	0.246
Knoop Hardness	Hk	550[6]
Abrasion	Aa	160
Photoelastic Constant (nm/cm/10^5Pa)	β	2.64

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7065
$\theta_{C,A'}$	0.3163
$\theta_{d,C}$	0.2912
$\theta_{e,C}$	0.5276
$\theta_{g,d}$	1.3045
$\theta_{g,F}$	0.5957
$\theta_{h,g}$	0.5262
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7408
$\theta'_{e,C'}$	0.4749
$\theta'_{F',e}$	0.5251
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	40/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.03
370	0.33
380	0.66
390	0.82
400	0.906
420	0.962
440	0.973
460	0.980
480	0.985
500	0.989
550	0.994
600	0.995
650	0.994
700	0.995
800	0.998
900	0.999
1000	0.998
1200	0.998
1400	0.995
1600	0.994
1800	0.983
2000	0.971
2200	0.937
2400	0.913

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.4	1.1	1.2	1.3	1.7	2.5	3.4
−20 ～ 0	0.5	1.3	1.3	1.4	1.8	2.7	3.6
0 ～ 20	0.7	1.4	1.4	1.5	2.0	2.8	3.9
20 ～ 40	0.7	1.5	1.5	1.7	2.1	3.0	4.1
40 ～ 60	0.8	1.5	1.5	1.8	2.2	3.2	4.3
60 ～ 80	0.8	1.6	1.6	1.9	2.3	3.3	4.5

S–TIH1

717295
723293

Refractive Index	n_d	**1.71736** 1.717362	Abbe Number ν_d	**29.5** 29.52	Dispersion $n_F - n_C$	**0.02430** 0.024303
Refractive Index	n_e	1.723098	Abbe Number ν_e	29.28	Dispersion $n_{F'} - n_{C'}$	0.024694

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.67018
n_{1970}	1.97009	1.67636
n_{1530}	1.52958	1.68344
n_{1129}	1.12864	1.69075
n_t	1.01398	1.69353
n_s	0.85211	1.69885
$n_{A'}$	0.76819	1.70275
n_r	0.70652	1.70649
n_C	0.65627	1.71033
$n_{C'}$	0.64385	1.71143
n_{He-Ne}	0.6328	1.71246
n_D	0.58929	1.71715
n_d	0.58756	1.71736
n_e	0.54607	1.72310
n_F	0.48613	1.73463
$n_{F'}$	0.47999	1.73612
n_{He-Cd}	0.44157	1.74732
n_g	0.435835	1.74933
n_h	0.404656	1.76247
n_i	0.365015	—

Partial Dispersions

$n_C - n_t$	0.016798
$n_C - n_{A'}$	0.007579
$n_d - n_C$	0.007030
$n_e - n_C$	0.012766
$n_g - n_d$	0.031970
$n_g - n_F$	0.014697
$n_h - n_g$	0.013136
$n_i - n_g$	—
$n_{C'} - n_t$	0.017894
$n_e - n_{C'}$	0.011670
$n_{F'} - n_e$	0.013024
$n_i - n_{F'}$	—

Relative Partial Dispersions

$\theta_{C,t}$	0.6912
$\theta_{C,A'}$	0.3119
$\theta_{d,C}$	0.2893
$\theta_{e,C}$	0.5253
$\theta_{g,d}$	1.3155
$\theta_{g,F}$	0.6047
$\theta_{h,g}$	0.5405
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7246
$\theta'_{e,C'}$	0.4726
$\theta'_{F',e}$	0.5274
$\theta'_{i,F'}$	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0060
$\Delta\theta_{C,A'}$	0.0003
$\Delta\theta_{g,d}$	0.0121
$\Delta\theta_{g,F}$	0.0110
$\Delta\theta_{i,g}$	—

Thermal Properties

Strain Point	StP (℃)	569
Annealing Point	AP (℃)	597
Transformation Temperature	Tg (℃)	622
Yield Point	At (℃)	653
Softening Point	SP (℃)	703
Expansion Coefficients (−30～+70℃)		82
α (10^{-7}/℃) (+100～+300℃)		96
Thermal Conductivity	k (W/m·K)	1.018

Coloring

λ 80／λ 5	41/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.19
380	0.56
390	0.78
400	0.88
420	0.952
440	0.971
460	0.978
480	0.982
500	0.987
550	0.994
600	0.994
650	0.991
700	0.993
800	0.998
900	0.999
1000	0.998
1200	0.998
1400	0.996
1600	0.995
1800	0.988
2000	0.981
2200	0.957
2400	0.941

Constants of Dispersion Formula

A_1	1.60326759
A_2	$2.42980935 \cdot 10^{-1}$
A_3	1.81313592
B_1	$1.18019139 \cdot 10^{-2}$
B_2	$5.91363658 \cdot 10^{-2}$
B_3	$1.61218747 \cdot 10^{2}$

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	884
Rigidity Modulus G	(10^8N/m^2)	355
Poisson's Ratio	σ	0.247
Knoop Hardness	Hk	550[6]
Abrasion	Aa	161
Photoelastic Constant (nm/cm/10^5Pa)	β	2.85

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.06
Remarks		

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20		3.2	3.3	3.6	4.0	5.1	6.2
−20 ～ 0		3.4	3.5	3.8	4.3	5.4	6.7
0 ～ 20		3.7	3.7	4.1	4.6	5.7	7.1
20 ～ 40		3.9	4.0	4.3	4.8	6.0	7.5
40 ～ 60		4.1	4.2	4.6	5.1	6.4	7.9
60 ～ 80		4.3	4.4	4.8	5.3	6.7	8.3

S–TIH3

740283
746281

Refractive Index	n_d	**1.74000** 1.739998	Abbe Number	ν_d	**28.3** 28.30	Dispersion	$n_F - n_C$ **0.02616** 0.026152
Refractive Index	n_e	1.746167	Abbe Number	ν_e	28.07	Dispersion	$n_{F'} - n_{C'}$ 0.026584

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.69065
n_{1970}	1.97009	1.69685
n_{1530}	1.52958	1.70405
n_{1129}	1.12864	1.71162
n_t	1.01398	1.71455
n_s	0.85211	1.72018
$n_{A'}$	0.76819	1.72434
n_r	0.70652	1.72833
n_C	0.65627	**1.73245**
$n_{C'}$	0.64385	1.73363
$n_{He\text{-}Ne}$	0.6328	1.73474
n_D	0.58929	1.73977
n_d	0.58756	**1.74000**
n_e	0.54607	1.74617
n_F	0.48613	**1.75861**
$n_{F'}$	0.47999	1.76021
$n_{He\text{-}Cd}$	0.44157	1.77232
n_g	0.435835	**1.77450**
n_h	0.404656	1.78876
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0051
$\Delta\theta_{C,A'}$	-0.0001
$\Delta\theta_{g,d}$	0.0135
$\Delta\theta_{g,F}$	0.0122
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.64797648
A_2	$2.67261917 \cdot 10^{-1}$
A_3	2.19772845
B_1	$1.21917693 \cdot 10^{-2}$
B_2	$5.97893039 \cdot 10^{-2}$
B_3	$1.92158340 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.11
Remarks		

Partial Dispersions

$n_C - n_t$	0.017900
$n_C - n_{A'}$	0.008108
$n_d - n_C$	0.007545
$n_e - n_C$	0.013714
$n_g - n_d$	0.034504
$n_g - n_F$	0.015897
$n_h - n_g$	0.014254
$n_i - n_g$	—
$n_{C'} - n_t$	0.019075
$n_e - n_{C'}$	0.012539
$n_{F'} - n_e$	0.014045
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	566
Annealing Point	AP (℃)	591
Transformation Temperature	Tg (℃)	615
Yield Point	At (℃)	644
Softening Point	SP (℃)	723
Expansion Coefficients (−30～+70℃)		85
α (10^{-7}/℃) (+100～+300℃)		100
Thermal Conductivity	k (W/m·K)	1.027

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	908
Rigidity Modulus G	(10^8N/m^2)	362
Poisson's Ratio	σ	0.254
Knoop Hardness	Hk	560[6]
Abrasion	Aa	165
Photoelastic Constant (nm/cm/10^5Pa)	β	2.81

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.6	1.5	1.6	1.9	2.3	3.4	4.6
−20 ～ 0	0.9	1.7	1.7	2.1	2.5	3.6	4.9
0 ～ 20	0.9	1.8	1.9	2.2	2.7	3.8	5.2
20 ～ 40	0.9	1.9	2.0	2.4	2.8	4.1	5.5
40 ～ 60	1.0	2.0	2.1	2.5	3.0	4.3	5.9
60 ～ 80	1.2	2.2	2.2	2.7	3.2	4.5	6.2

Relative Partial Dispersions

$\theta_{C,t}$	0.6845
$\theta_{C,A'}$	0.3100
$\theta_{d,C}$	0.2885
$\theta_{e,C}$	0.5244
$\theta_{g,d}$	1.3194
$\theta_{g,F}$	0.6079
$\theta_{h,g}$	0.5450
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7175
$\theta'_{e,C'}$	0.4717
$\theta'_{F',e}$	0.5283
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	42/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.16
380	0.51
390	0.74
400	0.85
420	0.940
440	0.964
460	0.975
480	0.981
500	0.986
550	0.994
600	0.994
650	0.993
700	0.995
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.997
1600	0.996
1800	0.988
2000	0.980
2200	0.955
2400	0.933

S–TIH 4

755275
762273

Refractive Index	n_d	**1.75520** 1.755199	Abbe Number	ν_d	**27.5** 27.51	Dispersion	$n_F - n_C$ **0.02745** 0.027450
Refractive Index	n_e	1.761671	Abbe Number	ν_e	27.29	Dispersion	$n_{F'} - n_{C'}$ 0.027911

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.70430
n_{1970}	1.97009	1.71054
n_{1530}	1.52958	1.71784
n_{1129}	1.12864	1.72561
n_t	1.01398	1.72864
n_s	0.85211	1.73448
$n_{A'}$	0.76819	1.73882
n_r	0.70652	1.74299
n_C	0.65627	**1.74730**
$n_{C'}$	0.64385	1.74853
n_{He-Ne}	0.6328	1.74968
n_D	0.58929	1.75496
n_d	0.58756	**1.75520**
n_e	0.54607	1.76167
n_F	0.48613	**1.77475**
$n_{F'}$	0.47999	1.77644
n_{He-Cd}	0.44157	1.78920
n_g	0.435835	**1.79150**
n_h	0.404656	1.80656
n_i	0.365015	—

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0040
$\Delta\theta_{C,A'}$	−0.0005
$\Delta\theta_{g,d}$	0.0147
$\Delta\theta_{g,F}$	0.0133
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.66755531
A_2	$2.94411865 \cdot 10^{-1}$
A_3	2.49422119
B_1	$1.22052137 \cdot 10^{-2}$
B_2	$5.97775329 \cdot 10^{-2}$
B_3	$2.14869618 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.15
Remarks		

Partial Dispersions

$n_C - n_t$	0.018659
$n_C - n_{A'}$	0.008473
$n_d - n_C$	0.007904
$n_e - n_C$	0.014376
$n_g - n_d$	0.036298
$n_g - n_F$	0.016752
$n_h - n_g$	0.015059
$n_i - n_g$	—
$n_{C'} - n_t$	0.019889
$n_e - n_{C'}$	0.013146
$n_{F'} - n_e$	0.014765
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	565
Annealing Point	AP (℃)	591
Transformation Temperature	Tg (℃)	613
Yield Point	At (℃)	640
Softening Point	SP (℃)	694
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	85
	(+100～+300℃)	100
Thermal Conductivity	k (W/m·K)	1.010

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	919
Rigidity Modulus	G (10^8N/m^2)	367
Poisson's Ratio	σ	0.254
Knoop Hardness	Hk	570[6]
Abrasion	Aa	168
Photoelastic Constant (nm/cm/10^5Pa)	β	2.76

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6797
$\theta_{C,A'}$	0.3087
$\theta_{d,C}$	0.2879
$\theta_{e,C}$	0.5237
$\theta_{g,d}$	1.3223
$\theta_{g,F}$	0.6103
$\theta_{h,g}$	0.5486
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7126
$\theta'_{e,C'}$	0.4710
$\theta'_{F',e}$	0.5290
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	42/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.12
380	0.45
390	0.70
400	0.82
420	0.929
440	0.962
460	0.973
480	0.980
500	0.986
550	0.995
600	0.994
650	0.993
700	0.995
800	0.999
900	0.999
1000	0.999
1200	0.997
1400	0.995
1600	0.994
1800	0.987
2000	0.981
2200	0.961
2400	0.942

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.5	1.2	1.2	1.6	2.0	3.1	4.4
−20 ～ 0	0.6	1.3	1.4	1.8	2.2	3.3	4.7
0 ～ 20	0.6	1.4	1.5	1.9	2.4	3.6	5.1
20 ～ 40	0.7	1.6	1.7	2.1	2.6	3.9	5.4
40 ～ 60	0.7	1.7	1.8	2.3	2.7	4.1	5.8
60 ～ 80	0.7	1.8	1.9	2.4	2.9	4.4	6.1

S–TIH 6

805254
813252

Refractive Index	n_d	**1.80518** 1.805181	Abbe Number	ν_d	**25.4** 25.42	Dispersion	$n_F - n_C$ **0.03166** 0.031669
Refractive Index	n_e	1.812641	Abbe Number	ν_e	25.22	Dispersion	$n_{F'} - n_{C'}$ 0.032223

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.74917
n_{1970}	1.97009	1.75558
n_{1530}	1.52958	1.76321
n_{1129}	1.12864	1.77160
n_t	1.01398	1.77495
n_s	0.85211	1.78151
$n_{A'}$	0.76819	1.78643
n_r	0.70652	1.79118
n_C	0.65627	**1.79611**
$n_{C'}$	0.64385	1.79752
$n_{He\text{-}Ne}$	0.6328	1.79885
n_D	0.58929	1.80491
n_d	0.58756	**1.80518**
n_e	0.54607	1.81264
n_F	0.48613	**1.82777**
$n_{F'}$	0.47999	1.82974
$n_{He\text{-}Cd}$	0.44157	1.84460
n_g	0.435835	**1.84729**
n_h	0.404656	1.86494
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0021
$\Delta\theta_{C,A'}$	−0.0012
$\Delta\theta_{g,d}$	0.0176
$\Delta\theta_{g,F}$	0.0158
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.77227611
A_2	$3.45691250 \cdot 10^{-1}$
A_3	2.40788501
B_1	$1.31182633 \cdot 10^{-2}$
B_2	$6.14479619 \cdot 10^{-2}$
B_3	$2.00753254 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.37
Remarks		

Partial Dispersions

$n_C - n_t$	0.021155
$n_C - n_{A'}$	0.009673
$n_d - n_C$	0.009075
$n_e - n_C$	0.016535
$n_g - n_d$	0.042105
$n_g - n_F$	0.019511
$n_h - n_g$	0.017653
$n_i - n_g$	—
$n_{C'} - n_t$	0.022564
$n_e - n_{C'}$	0.015126
$n_{F'} - n_e$	0.017097
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	571
Annealing Point	AP (℃)	587
Transformation Temperature	Tg (℃)	604
Yield Point	At (℃)	630
Softening Point	SP (℃)	690
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	89
	(+100～+300℃)	107
Thermal Conductivity	k (W/m·K)	1.011

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	931
Rigidity Modulus	G (10^8N/m^2)	369
Poisson's Ratio	σ	0.261
Knoop Hardness	Hk	540[5]
Abrasion	Aa	191
Photoelastic Constant (nm/cm/10^5Pa)	β	2.81

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6680
$\theta_{C,A'}$	0.3054
$\theta_{d,C}$	0.2866
$\theta_{e,C}$	0.5221
$\theta_{g,d}$	1.3295
$\theta_{g,F}$	0.6161
$\theta_{h,g}$	0.5574
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7002
$\theta'_{e,C'}$	0.4694
$\theta'_{F',e}$	0.5306
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	44/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.12
380	0.48
390	0.70
400	0.82
420	0.919
440	0.955
460	0.970
480	0.978
500	0.984
550	0.993
600	0.995
650	0.994
700	0.996
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.997
1600	0.995
1800	0.986
2000	0.978
2200	0.958
2400	0.928

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−0.6	0.3	0.4	0.7	1.3	2.6	4.1
−20 ～ 0	−0.6	0.4	0.5	0.9	1.5	2.8	4.4
0 ～ 20	−0.5	0.5	0.6	1.0	1.6	3.0	4.8
20 ～ 40	−0.4	0.7	0.8	1.2	1.8	3.3	5.1
40 ～ 60	−0.4	0.8	0.9	1.3	2.0	3.5	5.5
60 ～ 80	−0.3	0.9	1.0	1.5	2.1	3.8	5.8

S–TIH10

728285
734282

Refractive Index	n_d	**1.72825** 1.728250	Abbe Number	ν_d	**28.5** 28.46	Dispersion	$n_F - n_C$ **0.02559** 0.025588
Refractive Index	n_e	1.734286	Abbe Number	ν_e	28.23	Dispersion	$n_{F'} - n_{C'}$ 0.026009

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.67934
n_{1970}	1.97009	1.68562
n_{1530}	1.52958	1.69286
n_{1129}	1.12864	1.70040
n_t	1.01398	1.70330
n_s	0.85211	1.70884
$n_{A'}$	0.76819	1.71292
n_r	0.70652	1.71683
n_C	0.65627	**1.72086**
$n_{C'}$	0.64385	1.72202
n_{He-Ne}	0.6328	1.72310
n_D	0.58929	1.72803
n_d	0.58756	**1.72825**
n_e	0.54607	1.73429
n_F	0.48613	**1.74645**
$n_{F'}$	0.47999	1.74802
n_{He-Cd}	0.44157	1.75987
n_g	0.435835	**1.76200**
n_h	0.404656	1.77595
n_i	0.365015	—

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0064
$\Delta\theta_{C,A'}$	0.0002
$\Delta\theta_{g,d}$	0.0135
$\Delta\theta_{g,F}$	0.0123
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.61549392
A_2	$2.62433239 \cdot 10^{-1}$
A_3	2.09426189
B_1	$1.19830897 \cdot 10^{-2}$
B_2	$5.96510240 \cdot 10^{-2}$
B_3	$1.81657554 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.06
Remarks		

Partial Dispersions

$n_C - n_t$	0.017568
$n_C - n_{A'}$	0.007944
$n_d - n_C$	0.007385
$n_e - n_C$	0.013421
$n_g - n_d$	0.033752
$n_g - n_F$	0.015549
$n_h - n_g$	0.013943
$n_i - n_g$	—
$n_{C'} - n_t$	0.018718
$n_e - n_{C'}$	0.012271
$n_{F'} - n_e$	0.013738
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	569
Annealing Point	AP (℃)	596
Transformation Temperature	Tg (℃)	617
Yield Point	At (℃)	642
Softening Point	SP (℃)	703
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	80
	(+100～+300℃)	97
Thermal Conductivity	k (W/m·K)	1.043

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1024
Rigidity Modulus	G (10^8N/m^2)	412
Poisson's Ratio	σ	0.243
Knoop Hardness	Hk	570[6]
Abrasion	Aa	133
Photoelastic Constant (nm/cm/10^5Pa)	β	2.88

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6866
$\theta_{C,A'}$	0.3105
$\theta_{d,C}$	0.2886
$\theta_{e,C}$	0.5245
$\theta_{g,d}$	1.3191
$\theta_{g,F}$	0.6077
$\theta_{h,g}$	0.5449
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7197
$\theta'_{e,C'}$	0.4718
$\theta'_{F',e}$	0.5282
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	42/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.09
380	0.41
390	0.67
400	0.81
420	0.931
440	0.963
460	0.975
480	0.982
500	0.987
550	0.994
600	0.995
650	0.993
700	0.994
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.994
1600	0.993
1800	0.985
2000	0.977
2200	0.947
2400	0.929

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.1	2.0	2.1	2.3	2.8	3.8	5.0
−20 ～ 0	1.3	2.1	2.2	2.5	3.0	4.0	5.3
0 ～ 20	1.4	2.3	2.3	2.7	3.1	4.3	5.7
20 ～ 40	1.5	2.4	2.5	2.8	3.3	4.5	6.0
40 ～ 60	1.5	2.5	2.6	3.0	3.5	4.8	6.3
60 ～ 80	1.5	2.6	2.7	3.1	3.7	5.0	6.6

S–TIH11

785257
792255

Refractive Index	n_d	**1.78472** 1.784723	Abbe Number	ν_d	**25.7** 25.68	Dispersion	$n_F - n_C$ **0.03056** 0.030554
Refractive Index	n_e	1.791920	Abbe Number	ν_e	25.47	Dispersion	$n_{F'} - n_{C'}$ 0.031088

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.72998
n_{1970}	1.97009	1.73639
n_{1530}	1.52958	1.74397
n_{1129}	1.12864	1.75222
n_t	1.01398	1.75549
n_s	0.85211	1.76186
$n_{A'}$	0.76819	1.76662
n_r	0.70652	1.77121
n_C	0.65627	**1.77596**
$n_{C'}$	0.64385	1.77733
$n_{He\text{-}Ne}$	0.6328	1.77861
n_D	0.58929	1.78446
n_d	0.58756	**1.78472**
n_e	0.54607	1.79192
n_F	0.48613	**1.80652**
$n_{F'}$	0.47999	1.80841
$n_{He\text{-}Cd}$	0.44157	1.82275
n_g	0.435835	**1.82534**
n_h	0.404656	1.84239
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0030
$\Delta\theta_{C,A'}$	−0.0011
$\Delta\theta_{g,d}$	0.0181
$\Delta\theta_{g,F}$	0.0162
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.72677471
A_2	$3.24568628 \cdot 10^{-1}$
A_3	2.65816809
B_1	$1.29369958 \cdot 10^{-2}$
B_2	$6.18255245 \cdot 10^{-2}$
B_3	$2.21904637 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.24
Remarks		

Partial Dispersions

$n_C - n_t$	0.020476
$n_C - n_{A'}$	0.009346
$n_d - n_C$	0.008758
$n_e - n_C$	0.015955
$n_g - n_d$	0.040621
$n_g - n_F$	0.018825
$n_h - n_g$	0.017044
$n_i - n_g$	—
$n_{C'} - n_t$	0.021836
$n_e - n_{C'}$	0.014595
$n_{F'} - n_e$	0.016493
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	569
Annealing Point	AP (℃)	588
Transformation Temperature	Tg (℃)	602
Yield Point	At (℃)	633
Softening Point	SP (℃)	686
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	89
	(+100～+300℃)	103
Thermal Conductivity	k (W/m·K)	1.017

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	912
Rigidity Modulus	G (10^8N/m^2)	363
Poisson's Ratio	σ	0.255
Knoop Hardness	Hk	550[6]
Abrasion	Aa	147
Photoelastic Constant (nm/cm/10^5Pa)	β	2.81

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6702
$\theta_{C,A'}$	0.3059
$\theta_{d,C}$	0.2866
$\theta_{e,C}$	0.5222
$\theta_{g,d}$	1.3295
$\theta_{g,F}$	0.6161
$\theta_{h,g}$	0.5578
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7024
$\theta'_{e,C'}$	0.4695
$\theta'_{F',e}$	0.5305
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	43/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.08
380	0.40
390	0.66
400	0.80
420	0.915
440	0.948
460	0.964
480	0.973
500	0.980
550	0.992
600	0.992
650	0.990
700	0.992
800	0.998
900	0.998
1000	0.999
1200	0.999
1400	0.997
1600	0.996
1800	0.989
2000	0.982
2200	0.964
2400	0.942

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−0.3	0.5	0.6	0.9	1.4	2.6	4.1
−20 ～ 0	−0.2	0.7	0.7	1.1	1.6	2.9	4.5
0 ～ 20	−0.1	0.8	0.9	1.3	1.9	3.2	4.9
20 ～ 40	0.0	1.0	1.1	1.5	2.1	3.5	5.3
40 ～ 60	0.0	1.1	1.2	1.7	2.3	3.8	5.7
60 ～ 80	0.1	1.3	1.4	1.9	2.5	4.1	6.1

S–TIH13

741278
747276

Refractive Index	n_d	**1.74077** 1.740769	Abbe Number	ν_d	**27.8** 27.79	Dispersion	$n_F - n_C$ **0.02666** 0.026657
Refractive Index	n_e	1.747055	Abbe Number	ν_e	27.56	Dispersion	$n_{F'} - n_{C'}$ 0.027102

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.69062
n_{1970}	1.97009	1.69693
n_{1530}	1.52958	1.70425
n_{1129}	1.12864	1.71193
n_t	1.01398	1.71490
n_s	0.85211	1.72062
$n_{A'}$	0.76819	1.72485
n_r	0.70652	1.72890
n_C	0.65627	**1.73309**
$n_{C'}$	0.64385	1.73428
$n_{He\text{-}Ne}$	0.6328	1.73541
n_D	0.58929	1.74054
n_d	0.58756	**1.74077**
n_e	0.54607	1.74705
n_F	0.48613	**1.75975**
$n_{F'}$	0.47999	1.76139
$n_{He\text{-}Cd}$	0.44157	1.77376
n_g	0.435835	**1.77599**
n_h	0.404656	1.79059
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0051
$\Delta\theta_{C,A'}$	−0.0002
$\Delta\theta_{g,d}$	0.0144
$\Delta\theta_{g,F}$	0.0130
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.62224674
A_2	$2.93844589 \cdot 10^{-1}$
A_3	1.99225164
B_1	$1.18368386 \cdot 10^{-2}$
B_2	$5.90208025 \cdot 10^{-2}$
B_3	$1.71959976 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.10
Remarks		

Partial Dispersions

$n_C - n_t$	0.018185
$n_C - n_{A'}$	0.008244
$n_d - n_C$	0.007680
$n_e - n_C$	0.013966
$n_g - n_d$	0.035225
$n_g - n_F$	0.016248
$n_h - n_g$	0.014593
$n_i - n_g$	—
$n_{C'} - n_t$	0.019380
$n_e - n_{C'}$	0.012771
$n_{F'} - n_e$	0.014331
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	573
Annealing Point	AP (℃)	595
Transformation Temperature	Tg (℃)	616
Yield Point	At (℃)	642
Softening Point	SP (℃)	700
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	83
	(+100～+300℃)	96
Thermal Conductivity	k (W/m·K)	1.034

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	899
Rigidity Modulus G	(10^8N/m^2)	360
Poisson's Ratio	σ	0.249
Knoop Hardness	Hk	510[5]
Abrasion	Aa	148
Photoelastic Constant (nm/cm/10^5Pa)	β	2.83

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6822
$\theta_{C,A'}$	0.3093
$\theta_{d,C}$	0.2881
$\theta_{e,C}$	0.5239
$\theta_{g,d}$	1.3214
$\theta_{g,F}$	0.6095
$\theta_{h,g}$	0.5474
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7151
$\theta'_{e,C'}$	0.4712
$\theta'_{F',e}$	0.5288
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	42/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.08
380	0.38
390	0.64
400	0.80
420	0.921
440	0.957
460	0.970
480	0.978
500	0.984
550	0.993
600	0.993
650	0.991
700	0.994
800	0.997
900	0.998
1000	0.997
1200	0.998
1400	0.994
1600	0.993
1800	0.983
2000	0.974
2200	0.944
2400	0.920

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.0	1.8	1.8	2.1	2.6	3.6	4.9
−20 ～ 0	1.0	1.9	1.9	2.3	2.7	3.9	5.2
0 ～ 20	1.1	2.0	2.1	2.4	2.9	4.1	5.5
20 ～ 40	1.1	2.1	2.2	2.5	3.0	4.3	5.8
40 ～ 60	1.2	2.2	2.3	2.7	3.2	4.5	6.1
60 ～ 80	1.3	2.3	2.4	2.8	3.4	4.7	6.4

S–TIH14

762265
769263

Refractive Index	n_d	**1.76182** 1.761821	Abbe Number	ν_d	**26.5** 26.52	Dispersion	$n_F - n_C$ **0.02873** 0.028729
Refractive Index	n_e	1.768591	Abbe Number	ν_e	26.30	Dispersion	$n_{F'} - n_{C'}$ 0.029221

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.70916
n_{1970}	1.97009	1.71554
n_{1530}	1.52958	1.72302
n_{1129}	1.12864	1.73102
n_t	1.01398	1.73415
n_s	0.85211	1.74022
$n_{A'}$	0.76819	1.74474
n_r	0.70652	1.74908
n_C	0.65627	**1.75357**
$n_{C'}$	0.64385	1.75485
$n_{He\text{-}Ne}$	0.6328	1.75606
n_D	0.58929	1.76157
n_d	0.58756	**1.76182**
n_e	0.54607	1.76859
n_F	0.48613	**1.78230**
$n_{F'}$	0.47999	1.78407
$n_{He\text{-}Cd}$	0.44157	1.79750
n_g	0.435835	**1.79992**
n_h	0.404656	1.81584
n_i	0.365015	—

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0046
$\Delta\theta_{C,A'}$	−0.0006
$\Delta\theta_{g,d}$	0.0167
$\Delta\theta_{g,F}$	0.0150
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.68915108
A_2	$2.90462024 \cdot 10^{-1}$
A_3	2.37971516
B_1	$1.28202514 \cdot 10^{-2}$
B_2	$6.18090841 \cdot 10^{-2}$
B_3	$2.01094352 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.17
Remarks		

Partial Dispersions

$n_C - n_t$	0.019413
$n_C - n_{A'}$	0.008831
$n_d - n_C$	0.008254
$n_e - n_C$	0.015024
$n_g - n_d$	0.038102
$n_g - n_F$	0.017627
$n_h - n_g$	0.015917
$n_i - n_g$	—
$n_{C'} - n_t$	0.020697
$n_e - n_{C'}$	0.013740
$n_{F'} - n_e$	0.015481
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	565
Annealing Point	AP (℃)	590
Transformation Temperature	Tg (℃)	609
Yield Point	At (℃)	634
Softening Point	SP (℃)	693
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	87
	(+100～+300℃)	100
Thermal Conductivity	k (W/m·K)	1.027

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	888
Rigidity Modulus	G (10^8N/m^2)	354
Poisson's Ratio	σ	0.254
Knoop Hardness	Hk	550[6]
Abrasion	Aa	163
Photoelastic Constant (nm/cm/10^5Pa)	β	2.86

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6757
$\theta_{C,A'}$	0.3074
$\theta_{d,C}$	0.2873
$\theta_{e,C}$	0.5230
$\theta_{g,d}$	1.3263
$\theta_{g,F}$	0.6136
$\theta_{h,g}$	0.5540
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7083
$\theta'_{e,C'}$	0.4702
$\theta'_{F',e}$	0.5298
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	42/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.10
380	0.43
390	0.70
400	0.84
420	0.934
440	0.960
460	0.971
480	0.977
500	0.983
550	0.993
600	0.993
650	0.990
700	0.992
800	0.997
900	0.999
1000	0.999
1200	0.999
1400	0.997
1600	0.996
1800	0.988
2000	0.982
2200	0.961
2400	0.942

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.2	0.9	1.0	1.4	1.8	2.9	4.3
−20 ～ 0	0.3	1.1	1.2	1.6	2.0	3.2	4.7
0 ～ 20	0.4	1.2	1.3	1.7	2.2	3.5	5.1
20 ～ 40	0.5	1.4	1.5	2.0	2.4	3.8	5.5
40 ～ 60	0.6	1.6	1.7	2.2	2.7	4.1	5.9
60 ～ 80	0.7	1.7	1.8	2.4	2.9	4.4	6.2

S–TIH18

722292
727290

Refractive Index	n_d	**1.72151** 1.721507	Abbe Number	ν_d	**29.2** 29.23	Dispersion	$n_F - n_C$ **0.02468** 0.024683
Refractive Index	n_e	1.727331	Abbe Number	ν_e	29.00	Dispersion	$n_{F'} - n_{C'}$ 0.025081

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.67384
n_{1970}	1.97009	1.68002
n_{1530}	1.52958	1.68715
n_{1129}	1.12864	1.69453
n_t	1.01398	1.69734
n_s	0.85211	1.70272
$n_{A'}$	0.76819	1.70668
n_r	0.70652	1.71047
n_C	0.65627	**1.71437**
$n_{C'}$	0.64385	1.71548
n_{He-Ne}	0.6328	1.71653
n_D	0.58929	1.72129
n_d	0.58756	**1.72151**
n_e	0.54607	1.72733
n_F	0.48613	**1.73905**
$n_{F'}$	0.47999	1.74057
n_{He-Cd}	0.44157	1.75195
n_g	0.435835	**1.75399**
n_h	0.404656	1.76735
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0061
$\Delta\theta_{C,A'}$	0.0001
$\Delta\theta_{g,d}$	0.0122
$\Delta\theta_{g,F}$	0.0111
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.59921608
A_2	$2.59532164 \cdot 10^{-1}$
A_3	2.12454543
B_1	$1.16469304 \cdot 10^{-2}$
B_2	$5.84824883 \cdot 10^{-2}$
B_3	$1.86927779 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.07
Remarks		

Partial Dispersions

$n_C - n_t$	0.017028
$n_C - n_{A'}$	0.007687
$n_d - n_C$	0.007136
$n_e - n_C$	0.012960
$n_g - n_d$	0.032488
$n_g - n_F$	0.014941
$n_h - n_g$	0.013358
$n_i - n_g$	—
$n_{C'} - n_t$	0.018141
$n_e - n_{C'}$	0.011847
$n_{F'} - n_e$	0.013234
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	570
Annealing Point	AP (℃)	596
Transformation Temperature	Tg (℃)	616
Yield Point	At (℃)	644
Softening Point	SP (℃)	703
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	83
	(+100～+300℃)	98
Thermal Conductivity	k (W/m·K)	1.029

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	891
Rigidity Modulus	G (10^8N/m^2)	357
Poisson's Ratio	σ	0.248
Knoop Hardness	Hk	560[6]
Abrasion	Aa	154
Photoelastic Constant (nm/cm/10^5Pa)	β	2.87

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6899
$\theta_{C,A'}$	0.3114
$\theta_{d,C}$	0.2891
$\theta_{e,C}$	0.5251
$\theta_{g,d}$	1.3162
$\theta_{g,F}$	0.6053
$\theta_{h,g}$	0.5412
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7233
$\theta'_{e,C'}$	0.4723
$\theta'_{F',e}$	0.5277
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	41/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.18
380	0.54
390	0.77
400	0.87
420	0.951
440	0.971
460	0.979
480	0.984
500	0.988
550	0.995
600	0.995
650	0.993
700	0.995
800	0.998
900	0.999
1000	0.999
1200	0.999
1400	0.996
1600	0.995
1800	0.986
2000	0.978
2200	0.948
2400	0.928

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.1	1.8	1.8	2.2	2.5	3.5	4.7
−20 ～ 0	1.2	1.9	2.0	2.3	2.7	3.8	5.0
0 ～ 20	1.3	2.0	2.2	2.5	2.9	4.0	5.3
20 ～ 40	1.4	2.2	2.3	2.7	3.1	4.3	5.7
40 ～ 60	1.5	2.3	2.5	2.8	3.3	4.5	6.0
60 ～ 80	1.6	2.4	2.6	3.0	3.5	4.8	6.3

S–TIH23

785263
792261

Refractive Index	n_d	**1.78470** 1.784696	Abbe Number	ν_d	**26.3** 26.29	Dispersion	$n_F - n_C$ **0.02984** 0.029847
Refractive Index	n_e	1.791730	Abbe Number	ν_e	26.08	Dispersion	$n_{F'} - n_{C'}$ 0.030359

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.73102
n_{1970}	1.97009	1.73732
n_{1530}	1.52958	1.74475
n_{1129}	1.12864	1.75284
n_t	1.01398	1.75605
n_s	0.85211	1.76230
$n_{A'}$	0.76819	1.76697
n_r	0.70652	1.77147
n_C	0.65627	**1.77613**
$n_{C'}$	0.64385	1.77746
$n_{He\text{-}Ne}$	0.6328	1.77871
n_D	0.58929	1.78444
n_d	0.58756	**1.78470**
n_e	0.54607	1.79173
n_F	0.48613	**1.80597**
$n_{F'}$	0.47999	1.80782
$n_{He\text{-}Cd}$	0.44157	1.82176
n_g	0.435835	**1.82428**
n_h	0.404656	1.84081
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0026
$\Delta\theta_{C,A'}$	−0.0009
$\Delta\theta_{g,d}$	0.0163
$\Delta\theta_{g,F}$	0.0146
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.73986485
A_2	$3.13894918 \cdot 10^{-1}$
A_3	2.31093206
B_1	$1.29441300 \cdot 10^{-2}$
B_2	$6.12116868 \cdot 10^{-2}$
B_3	$1.97420482 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.30
Remarks		

Partial Dispersions

$n_C - n_t$	0.020074
$n_C - n_{A'}$	0.009156
$n_d - n_C$	0.008571
$n_e - n_C$	0.015605
$n_g - n_d$	0.039588
$n_g - n_F$	0.018312
$n_h - n_g$	0.016524
$n_i - n_g$	—
$n_{C'} - n_t$	0.021407
$n_e - n_{C'}$	0.014272
$n_{F'} - n_e$	0.016087
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	561
Annealing Point	AP (℃)	586
Transformation Temperature	Tg (℃)	604
Yield Point	At (℃)	635
Softening Point	SP (℃)	684
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	88
	(+100～+300℃)	106
Thermal Conductivity	k (W/m·K)	0.992

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	922
Rigidity Modulus G	(10^8N/m^2)	366
Poisson's Ratio	σ	0.260
Knoop Hardness	Hk	540 [5]
Abrasion	Aa	180
Photoelastic Constant (nm/cm/10^5Pa)	β	2.69

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6726
$\theta_{C,A'}$	0.3068
$\theta_{d,C}$	0.2872
$\theta_{e,C}$	0.5228
$\theta_{g,d}$	1.3264
$\theta_{g,F}$	0.6135
$\theta_{h,g}$	0.5536
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7051
$\theta'_{e,C'}$	0.4701
$\theta'_{F',e}$	0.5299
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	43/37

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.12
380	0.44
390	0.67
400	0.80
420	0.906
440	0.947
460	0.962
480	0.972
500	0.979
550	0.992
600	0.992
650	0.991
700	0.993
800	0.998
900	0.998
1000	0.998
1200	0.999
1400	0.997
1600	0.996
1800	0.988
2000	0.981
2200	0.962
2400	0.937

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	−0.3	0.5	0.6	1.0	1.4	2.6	4.1
−20 ~ 0	−0.2	0.7	0.7	1.1	1.6	2.9	4.4
0 ~ 20	−0.1	0.8	0.9	1.3	1.8	3.1	4.8
20 ~ 40	−0.1	0.9	1.0	1.4	2.0	3.4	5.1
40 ~ 60	0.0	1.0	1.1	1.5	2.2	3.7	5.5
60 ~ 80	0.1	1.2	1.2	1.7	2.3	3.9	5.8

S–TIH53

847238
855236

Refractive Index	n_d	**1.84666** 1.846660	Abbe Number ν_d	**23.8** 23.78	Dispersion $n_F - n_C$	**0.03561** 0.035608
Refractive Index	n_e	1.855041	Abbe Number ν_e	23.59	Dispersion $n_{F'} - n_{C'}$	0.036247

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.78519
n_{1970}	1.97009	1.79199
n_{1530}	1.52958	1.80013
n_{1129}	1.12864	1.80925
n_t	1.01398	1.81294
n_s	0.85211	1.82021
$n_{A'}$	0.76819	1.82568
n_r	0.70652	1.83098
n_C	0.65627	**1.83649**
$n_{C'}$	0.64385	1.83807
$n_{He\text{-}Ne}$	0.6328	1.83956
n_D	0.58929	1.84635
n_d	0.58756	**1.84666**
n_e	0.54607	1.85504
n_F	0.48613	**1.87210**
$n_{F'}$	0.47999	1.87431
$n_{He\text{-}Cd}$	0.44157	1.89114
n_g	0.435835	**1.89419**
n_h	0.404656	1.91429
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0032
$\Delta\theta_{C,A'}$	−0.0012
$\Delta\theta_{g,d}$	0.0195
$\Delta\theta_{g,F}$	0.0175
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula	
A_1	1.87904886
A_2	$3.69719775 \cdot 10^{-1}$
A_3	2.33730863
B_1	$1.44121770 \cdot 10^{-2}$
B_2	$6.38817990 \cdot 10^{-2}$
B_3	$1.82668180 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	B
Specific Gravity	d	3.54
Remarks		

Partial Dispersions	
$n_C - n_t$	0.023550
$n_C - n_{A'}$	0.010806
$n_d - n_C$	0.010172
$n_e - n_C$	0.018553
$n_g - n_d$	0.047529
$n_g - n_F$	0.022093
$n_h - n_g$	0.020105
$n_i - n_g$	—
$n_{C'} - n_t$	0.025128
$n_e - n_{C'}$	0.016975
$n_{F'} - n_e$	0.019272
$n_i - n_{F'}$	—

Thermal Properties		
Strain Point	StP (℃)	576
Annealing Point	AP (℃)	596
Transformation Temperature	Tg (℃)	624
Yield Point	At (℃)	658
Softening Point	SP (℃)	692
Expansion Coefficients (α (10^{-7}/℃))	(−30～+70℃)	88
	(+100～+300℃)	104
Thermal Conductivity	k (W/m·K)	1.000

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	960
Rigidity Modulus G	(10^8N/m^2)	379
Poisson's Ratio	σ	0.266
Knoop Hardness	Hk	520[5]
Abrasion	Aa	170
Photoelastic Constant (nm/cm/10^5Pa)	β	2.81

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions	
$\theta_{C,t}$	0.6614
$\theta_{C,A'}$	0.3035
$\theta_{d,C}$	0.2857
$\theta_{e,C}$	0.5210
$\theta_{g,d}$	1.3348
$\theta_{g,F}$	0.6205
$\theta_{h,g}$	0.5646
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.6932
$\theta'_{e,C'}$	0.4683
$\theta'_{F',e}$	0.5317
$\theta'_{i,F'}$	—

Coloring	
λ_{70} / λ_5	42/37

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.06
380	0.35
390	0.61
400	0.75
420	0.87
440	0.927
460	0.948
480	0.961
500	0.971
550	0.987
600	0.989
650	0.985
700	0.989
800	0.997
900	0.998
1000	0.999
1200	0.999
1400	0.998
1600	0.997
1800	0.991
2000	0.986
2200	0.974
2400	0.955

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	−0.8	0.4	0.4	0.9	1.4	2.8	4.5
−20 ~ 0	−0.8	0.5	0.6	1.0	1.6	3.1	5.0
0 ~ 20	−0.7	0.6	0.7	1.2	1.8	3.4	5.4
20 ~ 40	−0.7	0.7	0.8	1.3	2.0	3.7	5.8
40 ~ 60	−0.6	0.9	1.0	1.5	2.2	4.0	6.2
60 ~ 80	−0.6	1.0	1.1	1.6	2.4	4.3	6.6

S–LAL 7

652585
654583

Refractive Index	n_d	**1.65160** 1.651597	Abbe Number	ν_d	**58.5** 58.55	Dispersion	$n_F - n_C$ **0.01113** 0.011129
Refractive Index	n_e	1.654251	Abbe Number	ν_e	58.31	Dispersion	$n_{F'} - n_{C'}$ 0.011221

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.61850
n_{1970}	1.97009	1.62479
n_{1530}	1.52958	1.63144
n_{1129}	1.12864	1.63715
n_t	1.01398	1.63900
n_s	0.85211	1.64218
$n_{A'}$	0.76819	1.64432
n_r	0.70652	1.64627
n_C	0.65627	**1.64821**
$n_{C'}$	0.64385	1.64875
$n_{He\text{-}Ne}$	0.6328	1.64925
n_D	0.58929	1.65150
n_d	0.58756	**1.65160**
n_e	0.54607	1.65425
n_F	0.48613	**1.65934**
$n_{F'}$	0.47999	1.65997
$n_{He\text{-}Cd}$	0.44157	1.66457
n_g	0.435835	**1.66537**
n_h	0.404656	1.67038
n_i	0.365015	1.67892

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0056
$\Delta\theta_{C,A'}$	0.0022
$\Delta\theta_{g,d}$	−0.0052
$\Delta\theta_{g,F}$	−0.0042
$\Delta\theta_{i,g}$	−0.0179

Constants of Dispersion Formula

A_1	$9.16121247 \cdot 10^{-1}$
A_2	$7.65948319 \cdot 10^{-1}$
A_3	1.27745023
B_1	$3.95889743 \cdot 10^{-3}$
B_2	$1.67547425 \cdot 10^{-2}$
B_3	$1.10762706 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.73
Remarks		

Partial Dispersions

$n_C - n_t$	0.009204
$n_C - n_{A'}$	0.003884
$n_d - n_C$	0.003390
$n_e - n_C$	0.006044
$n_g - n_d$	0.013777
$n_g - n_F$	0.006038
$n_h - n_g$	0.005010
$n_i - n_g$	0.013542
$n_{C'} - n_t$	0.009744
$n_e - n_{C'}$	0.005504
$n_{F'} - n_e$	0.005717
$n_i - n_{F'}$	0.018948

Thermal Properties

Strain Point	StP (℃)	582
Annealing Point	AP (℃)	603
Transformation Temperature	Tg (℃)	617
Yield Point	At (℃)	658
Softening Point	SP (℃)	694
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	67
	(+100～+300℃)	81
Thermal Conductivity	k (W/m·K)	0.825

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	958
Rigidity Modulus G	(10^8N/m^2)	377
Poisson's Ratio	σ	0.271
Knoop Hardness	Hk	560[6]
Abrasion	Aa	136
Photoelastic Constant (nm/cm/10^5Pa)	β	1.72

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	53.0
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8270
$\theta_{C,A'}$	0.3490
$\theta_{d,C}$	0.3046
$\theta_{e,C}$	0.5431
$\theta_{g,d}$	1.2379
$\theta_{g,F}$	0.5425
$\theta_{h,g}$	0.4502
$\theta_{i,g}$	1.2168
$\theta'_{C',t}$	0.8684
$\theta'_{e,C'}$	0.4905
$\theta'_{F',e}$	0.5095
$\theta'_{i,F'}$	1.6886

Coloring

λ 80／λ 5	35/28

Internal Transmittance

λ (nm)	τ 10mm
280	0.09
290	0.22
300	0.38
310	0.55
320	0.69
330	0.80
340	0.88
350	0.929
360	0.957
370	0.974
380	0.984
390	0.990
400	0.992
420	0.994
440	0.995
460	0.996
480	0.997
500	0.998
550	0.999
600	0.998
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.997
1400	0.991
1600	0.993
1800	0.984
2000	0.968
2200	0.903
2400	0.74

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.5	1.8	1.8	1.9	2.0	2.3	2.6
−20 ～ 0	1.5	1.8	1.9	2.0	2.1	2.4	2.7
0 ～ 20	1.6	1.9	2.0	2.1	2.2	2.5	2.8
20 ～ 40	1.8	2.0	2.0	2.2	2.3	2.6	3.0
40 ～ 60	1.8	2.1	2.1	2.3	2.4	2.8	3.1
60 ～ 80	1.8	2.2	2.2	2.4	2.5	2.9	3.2

S–LAL 8

713539
716536

Refractive Index	n_d	**1.71300** 1.712995	Abbe Number ν_d	**53.9** 53.87	Dispersion $n_F - n_C$	**0.01324** 0.013236
Refractive Index	n_e	1.716150	Abbe Number ν_e	53.64	Dispersion $n_{F'} - n_{C'}$	0.013352

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.67418
n_{1970}	1.97009	1.68155
n_{1530}	1.52958	1.68930
n_{1129}	1.12864	1.69597
n_t	1.01398	1.69813
n_s	0.85211	1.70186
$n_{A'}$	0.76819	1.70438
n_r	0.70652	1.70669
n_C	0.65627	**1.70897**
$n_{C'}$	0.64385	1.70961
n_{He-Ne}	0.6328	1.71021
n_D	0.58929	1.71288
n_d	0.58756	**1.71300**
n_e	0.54607	1.71615
n_F	0.48613	**1.72221**
$n_{F'}$	0.47999	1.72297
n_{He-Cd}	0.44157	1.72848
n_g	0.435835	**1.72943**
n_h	0.404656	1.73545
n_i	0.365015	1.74575

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0200
$\Delta\theta_{C,A'}$	0.0057
$\Delta\theta_{g,d}$	−0.0107
$\Delta\theta_{g,F}$	−0.0084
$\Delta\theta_{i,g}$	−0.0416

Constants of Dispersion Formula

A_1	1.30663291
A_2	$5.71377253 \cdot 10^{-1}$
A_3	1.24303605
B_1	$6.11862448 \cdot 10^{-3}$
B_2	$2.12721470 \cdot 10^{-2}$
B_3	$9.06285686 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.79
Remarks		

Partial Dispersions

$n_C - n_t$	0.010846
$n_C - n_{A'}$	0.004591
$n_d - n_C$	0.004021
$n_e - n_C$	0.007176
$n_g - n_d$	0.016440
$n_g - n_F$	0.007225
$n_h - n_g$	0.006016
$n_i - n_g$	0.016311
$n_{C'} - n_t$	0.011486
$n_e - n_{C'}$	0.006536
$n_{F'} - n_e$	0.006816
$n_i - n_{F'}$	0.022780

Thermal Properties

Strain Point	StP (℃)	590
Annealing Point	AP (℃)	617
Transformation Temperature	Tg (℃)	643
Yield Point	At (℃)	668
Softening Point	SP (℃)	698
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	61
	(+100～+300℃)	74
Thermal Conductivity	k (W/m·K)	0.894

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1140
Rigidity Modulus G	(10^8N/m^2)	442
Poisson's Ratio	σ	0.289
Knoop Hardness	Hk	660[7]
Abrasion	Aa	81
Photoelastic Constant (nm/cm/10^5Pa)	β	1.75

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	52.0
Phosphate Resistance	PR	3.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8194
$\theta_{C,A'}$	0.3469
$\theta_{d,C}$	0.3038
$\theta_{e,C}$	0.5422
$\theta_{g,d}$	1.2421
$\theta_{g,F}$	0.5459
$\theta_{h,g}$	0.4545
$\theta_{i,g}$	1.2323
$\theta'_{C',t}$	0.8602
$\theta'_{e,C'}$	0.4895
$\theta'_{F',e}$	0.5105
$\theta'_{i,F'}$	1.7061

Coloring

λ 80／λ 5	38/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.03
300	0.07
310	0.15
320	0.28
330	0.44
340	0.60
350	0.74
360	0.84
370	0.905
380	0.944
390	0.965
400	0.977
420	0.988
440	0.991
460	0.994
480	0.996
500	0.997
550	0.998
600	0.996
650	0.997
700	0.997
800	0.998
900	0.997
1000	0.997
1200	0.997
1400	0.991
1600	0.991
1800	0.981
2000	0.955
2200	0.87
2400	0.62

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	3.3	3.6	3.6	3.8	4.0	4.3	4.7
−20 ~ 0	3.4	3.7	3.8	3.9	4.1	4.5	4.9
0 ~ 20	3.5	3.9	3.9	4.0	4.2	4.6	5.0
20 ~ 40	3.6	4.0	4.0	4.1	4.3	4.8	5.2
40 ~ 60	3.6	4.1	4.1	4.3	4.5	4.9	5.4
60 ~ 80	3.7	4.2	4.2	4.4	4.6	5.1	5.5

S–LAL 9

691548
694546

Refractive Index	n_d	**1.69100** 1.691002	Abbe Number	ν_d	**54.8** 54.82	Dispersion	$n_F - n_C$ **0.01260** 0.012605
Refractive Index	n_e	1.694007	Abbe Number	ν_e	54.59	Dispersion	$n_{F'} - n_{C'}$ 0.012714

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.65343
n_{1970}	1.97009	1.66064
n_{1530}	1.52958	1.66822
n_{1129}	1.12864	1.67470
n_t	1.01398	1.67678
n_s	0.85211	1.68037
$n_{A'}$	0.76819	1.68279
n_r	0.70652	1.68499
n_C	0.65627	**1.68717**
$n_{C'}$	0.64385	1.68778
$n_{He\text{-}Ne}$	0.6328	1.68835
n_D	0.58929	1.69089
n_d	0.58756	**1.69100**
n_e	0.54607	1.69401
n_F	0.48613	**1.69977**
$n_{F'}$	0.47999	1.70049
$n_{He\text{-}Cd}$	0.44157	1.70573
n_g	0.435835	**1.70664**
n_h	0.404656	1.71236
n_i	0.365015	1.72212

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0199
$\Delta\theta_{C,A'}$	0.0055
$\Delta\theta_{g,d}$	−0.0101
$\Delta\theta_{g,F}$	−0.0079
$\Delta\theta_{i,g}$	−0.0382

Constants of Dispersion Formula

A_1	1.16195687
A_2	$6.44860099 \cdot 10^{-1}$
A_3	1.25062221
B_1	$1.59659509 \cdot 10^{-2}$
B_2	$5.05502467 \cdot 10^{-4}$
B_3	$9.38284169 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.63
Remarks		

Partial Dispersions

$n_C - n_t$	0.010384
$n_C - n_{A'}$	0.004384
$n_d - n_C$	0.003833
$n_e - n_C$	0.006838
$n_g - n_d$	0.015640
$n_g - n_F$	0.006868
$n_h - n_g$	0.005714
$n_i - n_g$	0.015476
$n_{C'} - n_t$	0.010994
$n_e - n_{C'}$	0.006228
$n_{F'} - n_e$	0.006486
$n_i - n_{F'}$	0.021625

Thermal Properties

Strain Point	StP (℃)	606
Annealing Point	AP (℃)	630
Transformation Temperature	Tg (℃)	653
Yield Point	At (℃)	679
Softening Point	SP (℃)	707
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	61
	(+100～+300℃)	74
Thermal Conductivity	k (W/m·K)	0.895

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1075
Rigidity Modulus G	(10^8N/m^2)	418
Poisson's Ratio	σ	0.287
Knoop Hardness	Hk	660[7]
Abrasion	Aa	88
Photoelastic Constant (nm/cm/10^5Pa)	β	1.85

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	52.0
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8238
$\theta_{C,A'}$	0.3478
$\theta_{d,C}$	0.3041
$\theta_{e,C}$	0.5425
$\theta_{g,d}$	1.2408
$\theta_{g,F}$	0.5449
$\theta_{h,g}$	0.4533
$\theta_{i,g}$	1.2278
$\theta'_{C',t}$	0.8647
$\theta'_{e,C'}$	0.4899
$\theta'_{F',e}$	0.5101
$\theta'_{i,F'}$	1.7009

Coloring

λ 80／λ 5	38/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.01
300	0.04
310	0.11
320	0.22
330	0.38
340	0.55
350	0.70
360	0.82
370	0.89
380	0.936
390	0.960
400	0.973
420	0.985
440	0.988
460	0.992
480	0.994
500	0.995
550	0.997
600	0.996
650	0.997
700	0.998
800	0.998
900	0.997
1000	0.996
1200	0.996
1400	0.992
1600	0.992
1800	0.984
2000	0.963
2200	0.89
2400	0.66

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	3.4	3.8	3.8	3.9	4.1	4.4	4.8
−20 ~ 0	3.4	3.8	3.8	4.0	4.1	4.5	4.9
0 ~ 20	3.5	3.9	3.9	4.0	4.2	4.6	5.0
20 ~ 40	3.5	3.9	3.9	4.1	4.3	4.7	5.1
40 ~ 60	3.6	4.0	4.0	4.2	4.3	4.8	5.2
60 ~ 80	3.7	4.0	4.0	4.2	4.4	4.8	5.3

S–LAL10

720502
723500

Refractive Index	n_d	**1.72000** 1.719995	Abbe Number	ν_d	**50.2** 50.23	Dispersion	$n_F - n_C$ **0.01433** 0.014334
Refractive Index	n_e	1.723409	Abbe Number	ν_e	49.98	Dispersion	$n_{F'} - n_{C'}$ 0.014474

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.68159
n_{1970}	1.97009	1.68841
n_{1530}	1.52958	1.69567
n_{1129}	1.12864	1.70213
n_t	1.01398	1.70430
n_s	0.85211	1.70814
$n_{A'}$	0.76819	1.71079
n_r	0.70652	1.71323
n_C	0.65627	**1.71567**
$n_{C'}$	0.64385	1.71636
$n_{He\text{-}Ne}$	0.6328	1.71700
n_D	0.58929	1.71987
n_d	0.58756	**1.72000**
n_e	0.54607	1.72341
n_F	0.48613	**1.73000**
$n_{F'}$	0.47999	1.73083
$n_{He\text{-}Cd}$	0.44157	1.73686
n_g	0.435835	**1.73792**
n_h	0.404656	1.74455
n_i	0.365015	1.75597

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0107
$\Delta\theta_{C,A'}$	0.0040
$\Delta\theta_{g,d}$	-0.0100
$\Delta\theta_{g,F}$	-0.0081
$\Delta\theta_{i,g}$	-0.0451

Constants of Dispersion Formula

A_1	1.52812575
A_2	$3.67965267 \cdot 10^{-1}$
A_3	1.11751784
B_1	$7.76817644 \cdot 10^{-3}$
B_2	$2.72026548 \cdot 10^{-2}$
B_3	$8.88697400 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.86
Remarks		

Partial Dispersions

$n_C - n_t$	0.011368
$n_C - n_{A'}$	0.004885
$n_d - n_C$	0.004325
$n_e - n_C$	0.007739
$n_g - n_d$	0.017923
$n_g - n_F$	0.007914
$n_h - n_g$	0.006628
$n_i - n_g$	0.018051
$n_{C'} - n_t$	0.012054
$n_e - n_{C'}$	0.007053
$n_{F'} - n_e$	0.007421
$n_i - n_{F'}$	0.025139

Thermal Properties

Strain Point	StP (℃)	582
Annealing Point	AP (℃)	600
Transformation Temperature	Tg (℃)	624
Yield Point	At (℃)	657
Softening Point	SP (℃)	692
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	61
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.850

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1061
Rigidity Modulus G	(10^8N/m^2)	410
Poisson's Ratio	σ	0.294
Knoop Hardness	Hk	650[7]
Abrasion	Aa	86
Photoelastic Constant (nm/cm/10^5Pa)	β	2.17

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	3.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7931
$\theta_{C,A'}$	0.3408
$\theta_{d,C}$	0.3017
$\theta_{e,C}$	0.5399
$\theta_{g,d}$	1.2504
$\theta_{g,F}$	0.5521
$\theta_{h,g}$	0.4624
$\theta_{i,g}$	1.2593
$\theta'_{C',t}$	0.8328
$\theta'_{e,C'}$	0.4873
$\theta'_{F',e}$	0.5127
$\theta'_{i,F'}$	1.7368

Coloring

λ 80／λ 5	38/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.07
320	0.22
330	0.40
340	0.58
350	0.72
360	0.83
370	0.89
380	0.937
390	0.959
400	0.972
420	0.983
440	0.988
460	0.991
480	0.994
500	0.996
550	0.998
600	0.997
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.997
1600	0.996
1800	0.990
2000	0.971
2200	0.922
2400	0.71

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	4.4	5.0	5.0	5.1	5.4	5.8	6.3
−20 ~ 0	4.5	5.0	5.1	5.2	5.5	5.9	6.4
0 ~ 20	4.5	5.1	5.2	5.3	5.5	6.0	6.5
20 ~ 40	4.6	5.2	5.2	5.4	5.6	6.1	6.7
40 ~ 60	4.6	5.2	5.3	5.5	5.7	6.3	6.8
60 ~ 80	4.6	5.3	5.4	5.5	5.8	6.4	6.9

S–LAL12

678553
681551

Refractive Index	n_d	**1.67790** 1.677900	Abbe Number	ν_d	**55.3** 55.34	Dispersion	$n_F - n_C$ **0.01225** 0.012250
Refractive Index	n_e	1.680820	Abbe Number	ν_e	55.08	Dispersion	$n_{F'} - n_{C'}$ 0.012361

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.64414
n_{1970}	1.97009	1.65021
n_{1530}	1.52958	1.65669
n_{1129}	1.12864	1.66242
n_t	1.01398	1.66433
n_s	0.85211	1.66768
$n_{A'}$	0.76819	1.66998
n_r	0.70652	1.67208
n_C	0.65627	**1.67419**
$n_{C'}$	0.64385	1.67478
n_{He-Ne}	0.6328	1.67533
n_D	0.58929	1.67779
n_d	0.58756	**1.67790**
n_e	0.54607	1.68082
n_F	0.48613	**1.68644**
$n_{F'}$	0.47999	1.68714
n_{He-Cd}	0.44157	1.69225
n_g	0.435835	**1.69314**
n_h	0.404656	1.69872
n_i	0.365015	1.70826

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0018
$\Delta\theta_{C,A'}$	0.0008
$\Delta\theta_{g,d}$	−0.0056
$\Delta\theta_{g,F}$	−0.0047
$\Delta\theta_{i,g}$	−0.0274

Constants of Dispersion Formula

A_1	$9.92053895 \cdot 10^{-1}$
A_2	$7.71377731 \cdot 10^{-1}$
A_3	1.18296264
B_1	$1.67095063 \cdot 10^{-2}$
B_2	$2.36750156 \cdot 10^{-3}$
B_3	$1.05901080 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.01
Remarks		

Partial Dispersions

$n_C - n_t$	0.009855
$n_C - n_{A'}$	0.004212
$n_d - n_C$	0.003712
$n_e - n_C$	0.006632
$n_g - n_d$	0.015241
$n_g - n_F$	0.006703
$n_h - n_g$	0.005580
$n_i - n_g$	0.015119
$n_{C'} - n_t$	0.010445
$n_e - n_{C'}$	0.006042
$n_{F'} - n_e$	0.006319
$n_i - n_{F'}$	0.021121

Thermal Properties

Strain Point	StP (℃)	604
Annealing Point	AP (℃)	630
Transformation Temperature	Tg (℃)	652
Yield Point	At (℃)	679
Softening Point	SP (℃)	716
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	72
	(+100～+300℃)	86
Thermal Conductivity	k (W/m·K)	0.717

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	910
Rigidity Modulus G	(10^8N/m^2)	354
Poisson's Ratio	σ	0.284
Knoop Hardness	Hk	560[6]
Abrasion	Aa	166
Photoelastic Constant (nm/cm/10^5Pa)	β	1.61

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	53.0
Phosphate Resistance	PR	4.2

Relative Partial Dispersions

$\theta_{C,t}$	0.8045
$\theta_{C,A'}$	0.3438
$\theta_{d,C}$	0.3030
$\theta_{e,C}$	0.5414
$\theta_{g,d}$	1.2442
$\theta_{g,F}$	0.5472
$\theta_{h,g}$	0.4555
$\theta_{i,g}$	1.2342
$\theta'_{C',t}$	0.8450
$\theta'_{e,C'}$	0.4888
$\theta'_{F',e}$	0.5112
$\theta'_{i,F'}$	1.7087

Coloring

λ 80／λ 5	36/28

Internal Transmittance

λ (nm)	τ 10mm
280	0.06
290	0.15
300	0.29
310	0.45
320	0.61
330	0.73
340	0.83
350	0.89
360	0.938
370	0.962
380	0.976
390	0.984
400	0.988
420	0.992
440	0.994
460	0.995
480	0.997
500	0.998
550	0.999
600	0.998
650	0.998
700	0.998
800	0.999
900	0.997
1000	0.996
1200	0.996
1400	0.991
1600	0.991
1800	0.981
2000	0.963
2200	0.901
2400	0.73

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.4	0.6	0.7	0.8	0.9	1.2	1.5
−20 ～ 0	0.5	0.7	0.7	0.8	1.0	1.3	1.7
0 ～ 20	0.5	0.8	0.8	0.9	1.1	1.4	1.8
20 ～ 40	0.5	0.8	0.9	1.0	1.1	1.5	1.9
40 ～ 60	0.5	0.9	0.9	1.1	1.2	1.6	2.0
60 ～ 80	0.6	1.0	1.0	1.1	1.3	1.7	2.1

S–LAL13

694532
697530

Refractive Index	n_d	**1.69350** 1.693501	Abbe Number	ν_d	**53.2** 53.21	Dispersion	$n_F - n_C$ **0.01303** 0.013034
Refractive Index	n_e	1.696607	Abbe Number	ν_e	52.97	Dispersion	$n_{F'} - n_{C'}$ 0.013152

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.65605
n_{1970}	1.97009	1.66304
n_{1530}	1.52958	1.67044
n_{1129}	1.12864	1.67685
n_t	1.01398	1.67894
n_s	0.85211	1.68258
$n_{A'}$	0.76819	1.68504
n_r	0.70652	1.68730
n_C	0.65627	**1.68955**
$n_{C'}$	0.64385	1.69018
$n_{He\text{-}Ne}$	0.6328	1.69076
n_D	0.58929	1.69339
n_d	0.58756	**1.69350**
n_e	0.54607	1.69661
n_F	0.48613	**1.70258**
$n_{F'}$	0.47999	1.70333
$n_{He\text{-}Cd}$	0.44157	1.70877
n_g	0.435835	**1.70972**
n_h	0.404656	1.71566
n_i	0.365015	1.72585

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0173
$\Delta\theta_{C,A'}$	0.0051
$\Delta\theta_{g,d}$	−0.0102
$\Delta\theta_{g,F}$	−0.0081
$\Delta\theta_{i,g}$	−0.0417

Constants of Dispersion Formula

A_1	$9.80071267 \cdot 10^{-1}$
A_2	$8.32904776 \cdot 10^{-1}$
A_3	1.28111995
B_1	$3.89123698 \cdot 10^{-3}$
B_2	$1.89164592 \cdot 10^{-2}$
B_3	$9.89052676 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.60
Remarks		

Partial Dispersions

$n_C - n_t$	0.010604
$n_C - n_{A'}$	0.004503
$n_d - n_C$	0.003953
$n_e - n_C$	0.007059
$n_g - n_d$	0.016214
$n_g - n_F$	0.007133
$n_h - n_g$	0.005947
$n_i - n_g$	0.016134
$n_{C'} - n_t$	0.011232
$n_e - n_{C'}$	0.006431
$n_{F'} - n_e$	0.006721
$n_i - n_{F'}$	0.022521

Thermal Properties

Strain Point	StP (℃)	591
Annealing Point	AP (℃)	616
Transformation Temperature	Tg (℃)	641
Yield Point	At (℃)	666
Softening Point	SP (℃)	701
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	57
	(+100～+300℃)	72
Thermal Conductivity	k (W/m·K)	0.893

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1073
Rigidity Modulus G	(10^8N/m^2)	416
Poisson's Ratio	σ	0.290
Knoop Hardness	Hk	650[7]
Abrasion	Aa	87
Photoelastic Constant (nm/cm/10^5Pa)	β	2.13

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	52.0
Phosphate Resistance	PR	3.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8136
$\theta_{C,A'}$	0.3455
$\theta_{d,C}$	0.3033
$\theta_{e,C}$	0.5416
$\theta_{g,d}$	1.2440
$\theta_{g,F}$	0.5473
$\theta_{h,g}$	0.4563
$\theta_{i,g}$	1.2378
$\theta'_{C',t}$	0.8540
$\theta'_{e,C'}$	0.4890
$\theta'_{F',e}$	0.5110
$\theta'_{i,F'}$	1.7124

Coloring

λ 80／λ 5	38/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.01
300	0.03
310	0.08
320	0.19
330	0.34
340	0.52
350	0.68
360	0.80
370	0.88
380	0.932
390	0.958
400	0.972
420	0.986
440	0.990
460	0.993
480	0.995
500	0.996
550	0.997
600	0.995
650	0.995
700	0.996
800	0.997
900	0.996
1000	0.995
1200	0.995
1400	0.990
1600	0.990
1800	0.981
2000	0.958
2200	0.88
2400	0.66

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	4.6	4.8	4.8	4.9	5.1	5.5	5.9
−20 ～ 0	4.7	4.9	5.0	5.1	5.3	5.7	6.1
0 ～ 20	4.8	5.1	5.1	5.3	5.5	5.9	6.4
20 ～ 40	4.9	5.3	5.3	5.5	5.7	6.1	6.6
40 ～ 60	5.0	5.4	5.5	5.6	5.8	6.3	6.8
60 ～ 80	5.1	5.6	5.6	5.8	6.0	6.5	7.0

S–LAL14

697555
700553

Refractive Index	n_d	**1.69680** 1.696797	Abbe Number	ν_d	**55.5** 55.53	Dispersion	$n_F - n_C$ **0.01255** 0.012548
Refractive Index	n_e	1.699788	Abbe Number	ν_e	55.31	Dispersion	$n_{F'} - n_{C'}$ 0.012653

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.65820
n_{1970}	1.97009	1.66578
n_{1530}	1.52958	1.67369
n_{1129}	1.12864	1.68039
n_t	1.01398	1.68252
n_s	0.85211	1.68615
$n_{A'}$	0.76819	1.68858
n_r	0.70652	1.69079
n_C	0.65627	**1.69297**
$n_{C'}$	0.64385	1.69358
$n_{He\text{-}Ne}$	0.6328	1.69415
n_D	0.58929	1.69669
n_d	0.58756	**1.69680**
n_e	0.54607	1.69979
n_F	0.48613	**1.70552**
$n_{F'}$	0.47999	1.70624
$n_{He\text{-}Cd}$	0.44157	1.71144
n_g	0.435835	**1.71234**
n_h	0.404656	1.71800
n_i	0.365015	1.72767

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0258
$\Delta\theta_{C,A'}$	0.0066
$\Delta\theta_{g,d}$	−0.0107
$\Delta\theta_{g,F}$	−0.0082
$\Delta\theta_{i,g}$	−0.0381

Constants of Dispersion Formula

A_1	1.23720970
A_2	$5.89722623 \cdot 10^{-1}$
A_3	1.31921880
B_1	$1.53551320 \cdot 10^{-2}$
B_2	$-3.07896250 \cdot 10^{-4}$
B_3	$9.37202947 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.70
Remarks		

Partial Dispersions

$n_C - n_t$	0.010452
$n_C - n_{A'}$	0.004389
$n_d - n_C$	0.003823
$n_e - n_C$	0.006814
$n_g - n_d$	0.015543
$n_g - n_F$	0.006818
$n_h - n_g$	0.005665
$n_i - n_g$	0.015333
$n_{C'} - n_t$	0.011061
$n_e - n_{C'}$	0.006205
$n_{F'} - n_e$	0.006448
$n_i - n_{F'}$	0.021437

Thermal Properties

Strain Point	StP (℃)	
Annealing Point	AP (℃)	
Transformation Temperature	Tg (℃)	650
Yield Point	At (℃)	668
Softening Point	SP (℃)	700
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	57
	(+100～+300℃)	71
Thermal Conductivity	k (W/m·K)	0.908

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1118
Rigidity Modulus	G (10^8N/m^2)	435
Poisson's Ratio	σ	0.284
Knoop Hardness	Hk	660[7]
Abrasion	Aa	81
Photoelastic Constant (nm/cm/10^5Pa)	β	1.86

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	3.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8330
$\theta_{C,A'}$	0.3498
$\theta_{d,C}$	0.3047
$\theta_{e,C}$	0.5430
$\theta_{g,d}$	1.2387
$\theta_{g,F}$	0.5434
$\theta_{h,g}$	0.4515
$\theta_{i,g}$	1.2219
$\theta'_{C',t}$	0.8742
$\theta'_{e,C'}$	0.4904
$\theta'_{F',e}$	0.5096
$\theta'_{i,F'}$	1.6942

Coloring

λ 80／λ 5	37/29

Internal Transmittance

λ (nm)	τ 10mm
280	0.03
290	0.07
300	0.15
310	0.27
320	0.41
330	0.56
340	0.70
350	0.81
360	0.88
370	0.931
380	0.959
390	0.974
400	0.982
420	0.990
440	0.993
460	0.995
480	0.997
500	0.998
550	0.998
600	0.997
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.991
1600	0.992
1800	0.982
2000	0.954
2200	0.86
2400	0.59

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.5	3.7	3.8	3.9	4.0	4.2	4.7
−20 ～ 0	3.4	3.7	3.8	3.9	4.0	4.3	4.7
0 ～ 20	3.4	3.7	3.8	4.0	4.1	4.4	4.8
20 ～ 40	3.4	3.8	3.9	4.1	4.2	4.6	4.9
40 ～ 60	3.5	4.0	4.0	4.2	4.3	4.8	5.1
60 ～ 80	3.7	4.2	4.2	4.4	4.5	5.0	5.4

S–LAL18

729547
732544

Refractive Index	n_d	**1.72916** 1.729157	Abbe Number	ν_d	**54.7** 54.68	Dispersion	$n_F - n_C$ **0.01334** 0.013335
Refractive Index	n_e	1.732336	Abbe Number	ν_e	54.45	Dispersion	$n_{F'} - n_{C'}$ 0.013449

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.68936
n_{1970}	1.97009	1.69701
n_{1530}	1.52958	1.70504
n_{1129}	1.12864	1.71190
n_t	1.01398	1.71411
n_s	0.85211	1.71790
$n_{A'}$	0.76819	1.72046
n_r	0.70652	1.72279
n_C	0.65627	**1.72510**
$n_{C'}$	0.64385	1.72575
$n_{He\text{-}Ne}$	0.6328	1.72635
n_D	0.58929	1.72904
n_d	0.58756	**1.72916**
n_e	0.54607	1.73234
n_F	0.48613	**1.73844**
$n_{F'}$	0.47999	1.73920
$n_{He\text{-}Cd}$	0.44157	1.74473
n_g	0.435835	**1.74570**
n_h	0.404656	1.75173
n_i	0.365015	1.76203

Partial Dispersions

$n_C - n_t$	0.010994
$n_C - n_{A'}$	0.004641
$n_d - n_C$	0.004056
$n_e - n_C$	0.007235
$n_g - n_d$	0.016539
$n_g - n_F$	0.007260
$n_h - n_g$	0.006035
$n_i - n_g$	0.016335
$n_{C'} - n_t$	0.011640
$n_e - n_{C'}$	0.006589
$n_{F'} - n_e$	0.006860
$n_i - n_{F'}$	0.022835

Relative Partial Dispersions

$\theta_{C,t}$	0.8244
$\theta_{C,A'}$	0.3480
$\theta_{d,C}$	0.3042
$\theta_{e,C}$	0.5426
$\theta_{g,d}$	1.2403
$\theta_{g,F}$	0.5444
$\theta_{h,g}$	0.4526
$\theta_{i,g}$	1.2250
$\theta'_{C',t}$	0.8655
$\theta'_{e,C'}$	0.4899
$\theta'_{F',e}$	0.5101
$\theta'_{i,F'}$	1.6979

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0212
$\Delta\theta_{C,A'}$	0.0058
$\Delta\theta_{g,d}$	−0.0109
$\Delta\theta_{g,F}$	−0.0086
$\Delta\theta_{i,g}$	−0.0422

Thermal Properties

Strain Point	StP (℃)	632
Annealing Point	AP (℃)	655
Transformation Temperature	Tg (℃)	685
Yield Point	At (℃)	699
Softening Point	SP (℃)	731
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	59
	(+100～+300℃)	69
Thermal Conductivity	k (W/m·K)	0.871

Coloring

λ 80／λ 5	37/29

Internal Transmittance

λ (nm)	τ 10mm
280	0.04
290	0.21
300	0.30
310	0.32
320	0.55
330	0.68
340	0.78
350	0.86
360	0.912
370	0.946
380	0.967
390	0.978
400	0.984
420	0.991
440	0.994
460	0.996
480	0.997
500	0.998
550	0.999
600	0.998
650	0.999
700	0.999
800	0.998
900	0.998
1000	0.997
1200	0.996
1400	0.991
1600	0.991
1800	0.982
2000	0.956
2200	0.87
2400	0.60

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1204
Rigidity Modulus G	(10^8N/m^2)	467
Poisson's Ratio	σ	0.289
Knoop Hardness	Hk	720[7]
Abrasion	Aa	70
Photoelastic Constant (nm/cm/10^5Pa)	β	1.58

Constants of Dispersion Formula

A_1	1.50276318
A_2	$4.30224497 \cdot 10^{-1}$
A_3	1.34726060
B_1	$1.45462356 \cdot 10^{-2}$
B_2	$-3.32784153 \cdot 10^{-3}$
B_3	$9.33508342 \cdot 10^{1}$

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	2.0

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.18
Remarks		

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20		3.8		3.9	4.1	4.5	4.8
−20 ~ 0		3.8		3.9	4.1	4.5	4.9
0 ~ 20		3.8		4.0	4.2	4.6	4.9
20 ~ 40		3.9		4.1	4.3	4.7	5.1
40 ~ 60		4.0		4.2	4.4	4.9	5.3
60 ~ 80		4.2		4.4	4.6	5.1	5.5

S–LAL54

651562
654559

Refractive Index	n_d	**1.65100** 1.650996	Abbe Number	ν_d	**56.2** 56.16	Dispersion	$n_F - n_C$ **0.01159** 0.011591
Refractive Index	n_e	1.653758	Abbe Number	ν_e	55.89	Dispersion	$n_{F'} - n_{C'}$ 0.011697

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.61893
n_{1970}	1.97009	1.62472
n_{1530}	1.52958	1.63089
n_{1129}	1.12864	1.63634
n_t	1.01398	1.63815
n_s	0.85211	1.64133
$n_{A'}$	0.76819	1.64350
n_r	0.70652	1.64549
n_C	0.65627	**1.64749**
$n_{C'}$	0.64385	1.64804
n_{He-Ne}	0.6328	1.64856
n_D	0.58929	1.65089
n_d	0.58756	**1.65100**
n_e	0.54607	1.65376
n_F	0.48613	**1.65908**
$n_{F'}$	0.47999	1.65974
n_{He-Cd}	0.44157	1.66459
n_g	0.435835	**1.66543**
n_h	0.404656	1.67073
n_i	0.365015	1.67982

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0053
$\Delta\theta_{C,A'}$	−0.0001
$\Delta\theta_{g,d}$	−0.0028
$\Delta\theta_{g,F}$	−0.0024
$\Delta\theta_{i,g}$	−0.0134

Constants of Dispersion Formula

A_1	1.41910189
A_2	$2.58416881 \cdot 10^{-1}$
A_3	1.07385537
B_1	$7.26647428 \cdot 10^{-3}$
B_2	$2.63842499 \cdot 10^{-2}$
B_3	$1.02555463 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.82
Remarks		

Partial Dispersions

$n_C - n_t$	0.009330
$n_C - n_{A'}$	0.003985
$n_d - n_C$	0.003511
$n_e - n_C$	0.006273
$n_g - n_d$	0.014434
$n_g - n_F$	0.006354
$n_h - n_g$	0.005299
$n_i - n_g$	0.014389
$n_{C'} - n_t$	0.009888
$n_e - n_{C'}$	0.005715
$n_{F'} - n_e$	0.005982
$n_i - n_{F'}$	0.020079

Thermal Properties

Strain Point	StP (℃)	604
Annealing Point	AP (℃)	631
Transformation Temperature	Tg (℃)	651
Yield Point	At (℃)	675
Softening Point	SP (℃)	723
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	71
	(+100～+300℃)	83
Thermal Conductivity	k (W/m·K)	0.761

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	877
Rigidity Modulus G	(10^8N/m^2)	343
Poisson's Ratio	σ	0.277
Knoop Hardness	Hk	530[5]
Abrasion	Aa	171
Photoelastic Constant (nm/cm/10^5Pa)	β	1.66

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	53.0
Phosphate Resistance	PR	4.2

Relative Partial Dispersions

$\theta_{C,t}$	0.8049
$\theta_{C,A'}$	0.3438
$\theta_{d,C}$	0.3029
$\theta_{e,C}$	0.5412
$\theta_{g,d}$	1.2453
$\theta_{g,F}$	0.5482
$\theta_{h,g}$	0.4572
$\theta_{i,g}$	1.2414
$\theta'_{C',t}$	0.8453
$\theta'_{e,C'}$	0.4886
$\theta'_{F',e}$	0.5114
$\theta'_{i,F'}$	1.7166

Coloring

λ 80／λ 5	37/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.13
340	0.44
350	0.71
360	0.85
370	0.919
380	0.953
390	0.970
400	0.980
420	0.988
440	0.991
460	0.993
480	0.995
500	0.997
550	0.999
600	0.998
650	0.998
700	0.999
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.993
1600	0.993
1800	0.985
2000	0.969
2200	0.913
2400	0.78

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	0.6	0.8	0.8	0.9	1.0	1.4	1.7
−20 ～ 0	0.7	0.9	0.9	1.0	1.2	1.5	1.8
0 ～ 20	0.7	1.0	1.0	1.1	1.3	1.6	1.9
20 ～ 40	0.7	1.1	1.1	1.2	1.4	1.7	2.1
40 ～ 60	0.8	1.2	1.2	1.3	1.5	1.8	2.2
60 ～ 80	0.9	1.3	1.3	1.4	1.6	2.0	2.4

S–LAL56

678507
681505

Refractive Index	n_d	**1.67790** 1.677898	Abbe Number	ν_d	**50.7** 50.72	Dispersion	$n_F - n_C$ **0.01336** 0.013365
Refractive Index	n_e	1.681080	Abbe Number	ν_e	50.44	Dispersion	$n_{F'} - n_{C'}$ 0.013502

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.64400
n_{1970}	1.97009	1.64968
n_{1530}	1.52958	1.65585
n_{1129}	1.12864	1.66151
n_t	1.01398	1.66346
n_s	0.85211	1.66694
$n_{A'}$	0.76819	1.66937
n_r	0.70652	1.67162
n_C	0.65627	**1.67388**
$n_{C'}$	0.64385	1.67452
$n_{He\text{-}Ne}$	0.6328	1.67511
n_D	0.58929	1.67778
n_d	0.58756	**1.67790**
n_e	0.54607	1.68108
n_F	0.48613	**1.68724**
$n_{F'}$	0.47999	1.68802
$n_{He\text{-}Cd}$	0.44157	1.69368
n_g	0.435835	**1.69467**
n_h	0.404656	1.70092
n_i	0.365015	1.71174

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0047
$\Delta\theta_{C,A'}$	0.0004
$\Delta\theta_{g,d}$	−0.0043
$\Delta\theta_{g,F}$	−0.0037
$\Delta\theta_{i,g}$	−0.0232

Constants of Dispersion Formula

A_1	1.54052000
A_2	$2.17748704 \cdot 10^{-1}$
A_3	1.30456122
B_1	$8.26765101 \cdot 10^{-3}$
B_2	$3.28533726 \cdot 10^{-2}$
B_3	$1.24527479 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.85
Remarks		

Partial Dispersions

$n_C - n_t$	0.010425
$n_C - n_{A'}$	0.004514
$n_d - n_C$	0.004018
$n_e - n_C$	0.007200
$n_g - n_d$	0.016774
$n_g - n_F$	0.007427
$n_h - n_g$	0.006246
$n_i - n_g$	0.017068
$n_{C'} - n_t$	0.011061
$n_e - n_{C'}$	0.006564
$n_{F'} - n_e$	0.006938
$n_i - n_{F'}$	0.023722

Thermal Properties

Strain Point	StP (℃)	615
Annealing Point	AP (℃)	645
Transformation Temperature	Tg (℃)	661
Yield Point	At (℃)	693
Softening Point	SP (℃)	761
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	66
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.778

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	911
Rigidity Modulus G	(10^8N/m^2)	356
Poisson's Ratio	σ	0.280
Knoop Hardness	Hk	540[5]
Abrasion	Aa	147
Photoelastic Constant (nm/cm/10^5Pa)	β	1.92

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	51.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7800
$\theta_{C,A'}$	0.3377
$\theta_{d,C}$	0.3006
$\theta_{e,C}$	0.5387
$\theta_{g,d}$	1.2551
$\theta_{g,F}$	0.5557
$\theta_{h,g}$	0.4673
$\theta_{i,g}$	1.2771
$\theta'_{C',t}$	0.8192
$\theta'_{e,C'}$	0.4862
$\theta'_{F',e}$	0.5138
$\theta'_{i,F'}$	1.7569

Coloring

λ 80／λ 5	38/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.01
340	0.18
350	0.51
360	0.74
370	0.86
380	0.928
390	0.958
400	0.975
420	0.986
440	0.990
460	0.993
480	0.995
500	0.997
550	0.998
600	0.997
650	0.997
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.997
1400	0.993
1600	0.993
1800	0.986
2000	0.973
2200	0.928
2400	0.81

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.8	3.2	3.2	3.3	3.6	4.0	4.4
−20 ~ 0	2.9	3.3	3.4	3.5	3.7	4.1	4.6
0 ~ 20	3.0	3.4	3.5	3.6	3.8	4.3	4.8
20 ~ 40	3.1	3.5	3.6	3.7	4.0	4.4	4.9
40 ~ 60	3.2	3.6	3.7	3.8	4.1	4.6	5.1
60 ~ 80	3.3	3.8	3.8	4.0	4.2	4.7	5.3

S–LAL58

694508
697505

Refractive Index	n_d	**1.69350** 1.693495	Abbe Number	ν_d	**50.8** 50.81	Dispersion	$n_F - n_C$ **0.01365** 0.013649
Refractive Index	n_e	1.696745	Abbe Number	ν_e	50.53	Dispersion	$n_{F'} - n_{C'}$ 0.013789

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.65998
n_{1970}	1.97009	1.66538
n_{1530}	1.52958	1.67133
n_{1129}	1.12864	1.67689
n_t	1.01398	1.67883
n_s	0.85211	1.68233
$n_{A'}$	0.76819	1.68480
n_r	0.70652	1.68709
n_C	0.65627	**1.68939**
$n_{C'}$	0.64385	1.69004
n_{He-Ne}	0.6328	1.69065
n_D	0.58929	1.69337
n_d	0.58756	**1.69350**
n_e	0.54607	1.69675
n_F	0.48613	**1.70304**
$n_{F'}$	0.47999	1.70383
n_{He-Cd}	0.44157	1.70960
n_g	0.435835	**1.71061**
n_h	0.404656	1.71696
n_i	0.365015	1.72788

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	-0.0111
$\Delta\theta_{C,A'}$	-0.0008
$\Delta\theta_{g,d}$	-0.0051
$\Delta\theta_{g,F}$	-0.0047
$\Delta\theta_{i,g}$	-0.0347

Constants of Dispersion Formula

A_1	1.06368789
A_2	$7.44939067 \cdot 10^{-1}$
A_3	1.59178942
B_1	$1.85199640 \cdot 10^{-2}$
B_2	$1.16295862 \cdot 10^{-3}$
B_3	$1.56636025 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.03
Remarks		

Partial Dispersions

$n_C - n_t$	0.010565
$n_C - n_{A'}$	0.004596
$n_d - n_C$	0.004102
$n_e - n_C$	0.007352
$n_g - n_d$	0.017117
$n_g - n_F$	0.007570
$n_h - n_g$	0.006343
$n_i - n_g$	0.017264
$n_{C'} - n_t$	0.011214
$n_e - n_{C'}$	0.006703
$n_{F'} - n_e$	0.007086
$n_i - n_{F'}$	0.024045

Thermal Properties

Strain Point	StP (℃)	633
Annealing Point	AP (℃)	659
Transformation Temperature	Tg (℃)	676
Yield Point	At (℃)	718
Softening Point	SP (℃)	770
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	75
	(+100～+300℃)	86
Thermal Conductivity	k (W/m·K)	0.728

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	928
Rigidity Modulus	G (10^8N/m^2)	361
Poisson's Ratio	σ	0.285
Knoop Hardness	Hk	580[6]
Abrasion	Aa	167
Photoelastic Constant (nm/cm/10^5Pa)	β	1.70

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	2.2

Relative Partial Dispersions

$\theta_{C,t}$	0.7740
$\theta_{C,A'}$	0.3367
$\theta_{d,C}$	0.3005
$\theta_{e,C}$	0.5386
$\theta_{g,d}$	1.2541
$\theta_{g,F}$	0.5546
$\theta_{h,g}$	0.4647
$\theta_{i,g}$	1.2649
$\theta'_{C',t}$	0.8133
$\theta'_{e,C'}$	0.4861
$\theta'_{F',e}$	0.5139
$\theta'_{i,F'}$	1.7438

Coloring

λ 80／λ 5	37/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.02
330	0.22
340	0.53
350	0.75
360	0.87
370	0.935
380	0.962
390	0.977
400	0.986
420	0.991
440	0.992
460	0.994
480	0.996
500	0.997
550	0.998
600	0.997
650	0.997
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.999
1400	0.997
1600	0.996
1800	0.989
2000	0.977
2200	0.942
2400	0.84

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20		2.0	2.1	2.2	2.4	2.9	3.3
−20 ~ 0		2.1	2.1	2.3	2.4	2.9	3.4
0 ~ 20		2.1	2.1	2.3	2.5	2.9	3.4
20 ~ 40		2.1	2.1	2.3	2.5	3.0	3.5
40 ~ 60		2.1	2.1	2.3	2.5	3.0	3.5
60 ~ 80		2.1	2.1	2.3	2.6	3.1	3.6

S–LAL59

734515
737512

Refractive Index	n_d	**1.73400** 1.733997	Abbe Number	ν_d	**51.5** 51.47	Dispersion	$n_F - n_C$ **0.01426** 0.014261
Refractive Index	n_e	1.737395	Abbe Number	ν_e	51.24	Dispersion	$n_{F'} - n_{C'}$ 0.014392

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.69393
n_{1970}	1.97009	1.70130
n_{1530}	1.52958	1.70911
n_{1129}	1.12864	1.71593
n_t	1.01398	1.71817
n_s	0.85211	1.72210
$n_{A'}$	0.76819	1.72477
n_r	0.70652	1.72723
n_C	0.65627	**1.72968**
$n_{C'}$	0.64385	1.73036
n_{He-Ne}	0.6328	1.73101
n_D	0.58929	1.73387
n_d	0.58756	**1.73400**
n_e	0.54607	1.73739
n_F	0.48613	**1.74394**
$n_{F'}$	0.47999	1.74476
n_{He-Cd}	0.44157	1.75072
n_g	0.435835	**1.75176**
n_h	0.404656	1.75829
n_i	0.365015	1.76950

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0185
$\Delta\theta_{C,A'}$	0.0056
$\Delta\theta_{g,d}$	−0.0120
$\Delta\theta_{g,F}$	−0.0096
$\Delta\theta_{i,g}$	−0.0505

Constants of Dispersion Formula

A_1	1.13962742
A_2	$8.05227838 \cdot 10^{-1}$
A_3	1.29488061
B_1	$4.93294862 \cdot 10^{-3}$
B_2	$2.02479960 \cdot 10^{-2}$
B_3	$9.34746507 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.04
Remarks		

Partial Dispersions

$n_C - n_t$	0.011504
$n_C - n_{A'}$	0.004905
$n_d - n_C$	0.004318
$n_e - n_C$	0.007716
$n_g - n_d$	0.017767
$n_g - n_F$	0.007824
$n_h - n_g$	0.006531
$n_i - n_g$	0.017734
$n_{C'} - n_t$	0.012190
$n_e - n_{C'}$	0.007030
$n_{F'} - n_e$	0.007362
$n_i - n_{F'}$	0.024741

Thermal Properties

Strain Point	StP (℃)	591
Annealing Point	AP (℃)	620
Transformation Temperature	Tg (℃)	635
Yield Point	At (℃)	663
Softening Point	SP (℃)	696
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	55
	(+100～+300℃)	68
Thermal Conductivity	k (W/m·K)	0.863

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1137
Rigidity Modulus	G (10^8N/m^2)	440
Poisson's Ratio	σ	0.293
Knoop Hardness	Hk	700[7]
Abrasion	Aa	77
Photoelastic Constant (nm/cm/10^5Pa)	β	1.87

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	4
Weathering Resistance (Surface) Group	W (S)	2
Acid Resistance (Surface) Group	SR	52.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8067
$\theta_{C,A'}$	0.3439
$\theta_{d,C}$	0.3028
$\theta_{e,C}$	0.5411
$\theta_{g,d}$	1.2458
$\theta_{g,F}$	0.5486
$\theta_{h,g}$	0.4580
$\theta_{i,g}$	1.2435
$\theta'_{C',t}$	0.8470
$\theta'_{e,C'}$	0.4885
$\theta'_{F',e}$	0.5115
$\theta'_{i,F'}$	1.7191

Coloring

λ 80／λ 5	37/29

Internal Transmittance

λ (nm)	τ 10mm
280	0.02
290	0.11
300	0.20
310	0.34
320	0.48
330	0.62
340	0.74
350	0.83
360	0.89
370	0.934
380	0.959
390	0.973
400	0.982
420	0.990
440	0.993
460	0.995
480	0.997
500	0.998
550	0.999
600	0.998
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.997
1200	0.997
1400	0.994
1600	0.994
1800	0.986
2000	0.964
2200	0.905
2400	0.65

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20		5.0		5.2	5.4	5.8	6.3
−20 ～ 0		5.2		5.4	5.6	6.0	6.5
0 ～ 20		5.5		5.7	5.9	6.3	6.8
20 ～ 40		5.7		6.0	6.2	6.7	7.2
40 ～ 60		6.1		6.3	6.5	7.1	7.6
60 ～ 80		6.4		6.7	6.9	7.5	8.0

S–LAL61

741527
744524

Refractive Index	n_d	**1.74100** 1.740999	Abbe Number	ν_d	**52.7** 52.64	Dispersion	n_F-n_C **0.01407** 0.014078
Refractive Index	n_e	1.744354	Abbe Number	ν_e	52.41	Dispersion	$n_{F'}-n_{C'}$ 0.014203

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.70016
n_{1970}	1.97009	1.70787
n_{1530}	1.52958	1.71598
n_{1129}	1.12864	1.72297
n_t	1.01398	1.72525
n_s	0.85211	1.72918
$n_{A'}$	0.76819	1.73186
n_r	0.70652	1.73430
n_C	0.65627	**1.73673**
$n_{C'}$	0.64385	1.73741
n_{He-Ne}	0.6328	1.73804
n_D	0.58929	1.74087
n_d	0.58756	**1.74100**
n_e	0.54607	1.74435
n_F	0.48613	**1.75080**
$n_{F'}$	0.47999	1.75161
n_{He-Cd}	0.44157	1.75748
n_g	0.435835	**1.75850**
n_h	0.404656	1.76491
n_i	0.365015	1.77589

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0218
$\Delta\theta_{C,A'}$	0.0063
$\Delta\theta_{g,d}$	−0.0122
$\Delta\theta_{g,F}$	−0.0096
$\Delta\theta_{i,g}$	−0.0487

Constants of Dispersion Formula

A_1	1.11073292
A_2	$8.59347773\cdot10^{-1}$
A_3	1.26707433
B_1	$4.64181248\cdot10^{-3}$
B_2	$1.92989261\cdot10^{-2}$
B_3	$8.73917698\cdot10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.04
Remarks		

Partial Dispersions

n_C-n_t	0.011481
$n_C-n_{A'}$	0.004871
n_d-n_C	0.004272
n_e-n_C	0.007627
n_g-n_d	0.017502
n_g-n_F	0.007696
n_h-n_g	0.006413
n_i-n_g	0.017393
$n_{C'}-n_t$	0.012160
$n_e-n_{C'}$	0.006948
$n_{F'}-n_e$	0.007255
$n_i-n_{F'}$	0.024285

Thermal Properties

Strain Point	StP (℃)	631
Annealing Point	AP (℃)	646
Transformation Temperature	Tg (℃)	653
Yield Point	At (℃)	688
Softening Point	SP (℃)	724
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	57
	(+100～+300℃)	70
Thermal Conductivity	k (W/m·K)	0.861

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1190
Rigidity Modulus G	(10^8N/m^2)	461
Poisson's Ratio	σ	0.291
Knoop Hardness	Hk	720[7]
Abrasion	Aa	65
Photoelastic Constant (nm/cm/10^5Pa)	β	1.55

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	51.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8155
$\theta_{C,A'}$	0.3460
$\theta_{d,C}$	0.3035
$\theta_{e,C}$	0.5418
$\theta_{g,d}$	1.2432
$\theta_{g,F}$	0.5467
$\theta_{h,g}$	0.4555
$\theta_{i,g}$	1.2355
$\theta'_{C',t}$	0.8562
$\theta'_{e,C'}$	0.4892
$\theta'_{F',e}$	0.5108
$\theta'_{i,F'}$	1.7099

Coloring

λ 80／λ 5	37/29

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.02
300	0.07
310	0.15
320	0.27
330	0.43
340	0.59
350	0.72
360	0.82
370	0.89
380	0.935
390	0.958
400	0.971
420	0.982
440	0.988
460	0.991
480	0.994
500	0.996
550	0.997
600	0.997
650	0.997
700	0.998
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.994
1600	0.994
1800	0.985
2000	0.959
2200	0.88
2400	0.62

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.3	3.7	3.7	3.9	4.0	4.4	4.8
−20 ～ 0	3.4	3.8	3.9	4.0	4.2	4.6	5.0
0 ～ 20	3.5	3.9	4.0	4.1	4.3	4.7	5.1
20 ～ 40	3.6	4.1	4.1	4.2	4.4	4.9	5.3
40 ～ 60	3.7	4.2	4.2	4.4	4.6	5.0	5.5
60 ～ 80	3.8	4.3	4.3	4.5	4.7	5.2	5.6

S–LAM 2

744448
748445

Refractive Index	n_d	**1.74400** 1.743997	Abbe Number	ν_d	**44.8** 44.78	Dispersion	$n_F - n_C$ **0.01661** 0.016613
Refractive Index	n_e	1.747946	Abbe Number	ν_e	44.50	Dispersion	$n_{F'} - n_{C'}$ 0.016806

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.70597
n_{1970}	1.97009	1.71177
n_{1530}	1.52958	1.71820
n_{1129}	1.12864	1.72436
n_t	1.01398	1.72658
n_s	0.85211	1.73065
$n_{A'}$	0.76819	1.73356
n_r	0.70652	1.73629
n_C	0.65627	**1.73905**
$n_{C'}$	0.64385	1.73983
n_{He-Ne}	0.6328	1.74056
n_D	0.58929	1.74385
n_d	0.58756	**1.74400**
n_e	0.54607	1.74795
n_F	0.48613	**1.75566**
$n_{F'}$	0.47999	1.75663
n_{He-Cd}	0.44157	1.76380
n_g	0.435835	**1.76506**
n_h	0.404656	1.77304
n_i	0.365015	1.78708

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0061
$\Delta\theta_{C,A'}$	0.0002
$\Delta\theta_{g,d}$	−0.0041
$\Delta\theta_{g,F}$	−0.0035
$\Delta\theta_{i,g}$	−0.0242

Constants of Dispersion Formula

A_1	1.77130000
A_2	$1.95814230 \cdot 10^{-1}$
A_3	1.19487834
B_1	$9.76652444 \cdot 10^{-3}$
B_2	$4.12718628 \cdot 10^{-2}$
B_3	$1.10458122 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.32
Remarks		

Partial Dispersions

$n_C - n_t$	0.012472
$n_C - n_{A'}$	0.005488
$n_d - n_C$	0.004949
$n_e - n_C$	0.008898
$n_g - n_d$	0.021058
$n_g - n_F$	0.009394
$n_h - n_g$	0.007986
$n_i - n_g$	0.022027
$n_{C'} - n_t$	0.013252
$n_e - n_{C'}$	0.008118
$n_{F'} - n_e$	0.008688
$n_i - n_{F'}$	0.030448

Thermal Properties

Strain Point	StP (℃)	590
Annealing Point	AP (℃)	617
Transformation Temperature	Tg (℃)	633
Yield Point	At (℃)	670
Softening Point	SP (℃)	711
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	74
	(+100～+300℃)	87
Thermal Conductivity	k (W/m·K)	0.698

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	935
Rigidity Modulus	G (10^8N/m^2)	361
Poisson's Ratio	σ	0.295
Knoop Hardness	Hk	560[6]
Abrasion	Aa	158
Photoelastic Constant (nm/cm/10^5Pa)	β	1.72

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2～3
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	3.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7507
$\theta_{C,A'}$	0.3303
$\theta_{d,C}$	0.2979
$\theta_{e,C}$	0.5356
$\theta_{g,d}$	1.2676
$\theta_{g,F}$	0.5655
$\theta_{h,g}$	0.4807
$\theta_{i,g}$	1.3259
$\theta'_{C',t}$	0.7885
$\theta'_{e,C'}$	0.4830
$\theta'_{F',e}$	0.5170
$\theta'_{i,F'}$	1.8117

Coloring

λ 80／λ 5	39/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.04
350	0.29
360	0.59
370	0.78
380	0.87
390	0.925
400	0.950
420	0.973
440	0.983
460	0.987
480	0.992
500	0.995
550	0.997
600	0.997
650	0.997
700	0.998
800	0.999
900	0.997
1000	0.997
1200	0.999
1400	0.997
1600	0.996
1800	0.988
2000	0.971
2200	0.928
2400	0.79

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	1.9	2.5	2.5	2.7	3.0	3.5	4.1
−20 ～ 0	2.0	2.6	2.6	2.8	3.1	3.7	4.3
0 ～ 20	2.0	2.6	2.7	2.9	3.2	3.8	4.5
20 ～ 40	2.1	2.7	2.8	3.0	3.3	3.9	4.6
40 ～ 60	2.2	2.8	2.8	3.1	3.4	4.1	4.8
60 ～ 80	2.2	2.9	2.9	3.2	3.5	4.2	4.9

S–LAM 3

717479
721476

Refractive Index	n_d	**1.71700** 1.717004	Abbe Number ν_d	**47.9** 47.92	Dispersion $n_F - n_C$	**0.01496** 0.014961
Refractive Index	n_e	1.720563	Abbe Number ν_e	47.64	Dispersion $n_{F'} - n_{C'}$	0.015124

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.68133
n_{1970}	1.97009	1.68699
n_{1530}	1.52958	1.69320
n_{1129}	1.12864	1.69905
n_t	1.01398	1.70111
n_s	0.85211	1.70488
$n_{A'}$	0.76819	1.70754
n_r	0.70652	1.71002
n_C	0.65627	**1.71253**
$n_{C'}$	0.64385	1.71323
$n_{He\text{-}Ne}$	0.6328	1.71390
n_D	0.58929	1.71687
n_d	0.58756	**1.71700**
n_e	0.54607	1.72056
n_F	0.48613	**1.72749**
$n_{F'}$	0.47999	1.72836
$n_{He\text{-}Cd}$	0.44157	1.73475
n_g	0.435835	**1.73587**
n_h	0.404656	1.74296
n_i	0.365015	1.75531

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0086
$\Delta\theta_{C,A'}$	−0.0004
$\Delta\theta_{g,d}$	−0.0039
$\Delta\theta_{g,F}$	−0.0034
$\Delta\theta_{i,g}$	−0.0249

Constants of Dispersion Formula

A_1	1.64258713
A_2	$2.39634610 \cdot 10^{-1}$
A_3	1.22483026
B_1	$8.68246020 \cdot 10^{-3}$
B_2	$3.51226242 \cdot 10^{-2}$
B_3	$1.16604369 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.25
Remarks		

Partial Dispersions

$n_C - n_t$	0.011413
$n_C - n_{A'}$	0.004990
$n_d - n_C$	0.004476
$n_e - n_C$	0.008035
$n_g - n_d$	0.018871
$n_g - n_F$	0.008386
$n_h - n_g$	0.007085
$n_i - n_g$	0.019433
$n_{C'} - n_t$	0.012120
$n_e - n_{C'}$	0.007328
$n_{F'} - n_e$	0.007796
$n_i - n_{F'}$	0.026949

Thermal Properties

Strain Point	StP (℃)	588
Annealing Point	AP (℃)	614
Transformation Temperature	Tg (℃)	630
Yield Point	At (℃)	661
Softening Point	SP (℃)	701
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	80
	(+100～+300℃)	94
Thermal Conductivity	k (W/m·K)	0.655

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	868
Rigidity Modulus G	(10^8N/m^2)	335
Poisson's Ratio	σ	0.294
Knoop Hardness	Hk	510[5]
Abrasion	Aa	202
Photoelastic Constant (nm/cm/10^5Pa)	β	1.51

Chemical Properties

Water Resistance (Powder) Group	RW(P)	3
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	53.2
Phosphate Resistance	PR	4.2

Relative Partial Dispersions

$\theta_{C,t}$	0.7629
$\theta_{C,A'}$	0.3335
$\theta_{d,C}$	0.2992
$\theta_{e,C}$	0.5371
$\theta_{g,d}$	1.2613
$\theta_{g,F}$	0.5605
$\theta_{h,g}$	0.4736
$\theta_{i,g}$	1.2989
$\theta'_{C',t}$	0.8014
$\theta'_{e,C'}$	0.4845
$\theta'_{F',e}$	0.5155
$\theta'_{i,F'}$	1.7819

Coloring

λ 80／λ 5	38/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.10
350	0.41
360	0.69
370	0.83
380	0.916
390	0.951
400	0.968
420	0.982
440	0.987
460	0.990
480	0.993
500	0.995
550	0.997
600	0.996
650	0.996
700	0.997
800	0.999
900	0.997
1000	0.997
1200	0.996
1400	0.994
1600	0.992
1800	0.983
2000	0.966
2200	0.920
2400	0.77

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−0.8	−0.5	−0.5	−0.3	−0.1	0.3	0.8
−20 ～ 0	−0.8	−0.4	−0.4	−0.3	0.0	0.4	0.9
0 ～ 20	−0.8	−0.4	−0.4	−0.2	0.0	0.5	1.0
20 ～ 40	−0.8	−0.4	−0.3	−0.2	0.1	0.6	1.1
40 ～ 60	−0.8	−0.3	−0.3	−0.1	0.1	0.7	1.2
60 ～ 80	−0.8	−0.3	−0.3	−0.1	0.2	0.7	1.3

S–LAM7

750353
755350

Refractive Index	n_d	**1.74950** 1.749497	Abbe Number	ν_d	**35.3** 35.28	Dispersion	$n_F - n_C$ **0.02124** 0.021243
Refractive Index	n_e	1.754527	Abbe Number	ν_e	35.02	Dispersion	$n_{F'} - n_{C'}$ 0.021544

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.70583
n_{1970}	1.97009	1.71184
n_{1530}	1.52958	1.71866
n_{1129}	1.12864	1.72553
n_t	1.01398	1.72811
n_s	0.85211	1.73296
$n_{A'}$	0.76819	1.73649
n_r	0.70652	1.73984
n_C	0.65627	1.74328
$n_{C'}$	0.64385	1.74425
$n_{He\text{-}Ne}$	0.6328	1.74517
n_D	0.58929	1.74931
n_d	0.58756	1.74950
n_e	0.54607	1.75453
n_F	0.48613	1.76452
$n_{F'}$	0.47999	1.76579
$n_{He\text{-}Cd}$	0.44157	1.77530
n_g	0.435835	1.77699
n_h	0.404656	1.78787
n_i	0.365015	—

Partial Dispersions	
$n_C - n_t$	0.015167
$n_C - n_{A'}$	0.006783
$n_d - n_C$	0.006222
$n_e - n_C$	0.011252
$n_g - n_d$	0.027489
$n_g - n_F$	0.012468
$n_h - n_g$	0.010884
$n_i - n_g$	—
$n_{C'} - n_t$	0.016141
$n_e - n_{C'}$	0.010278
$n_{F'} - n_e$	0.011266
$n_i - n_{F'}$	—

Relative Partial Dispersions	
$\theta_{C,t}$	0.7140
$\theta_{C,A'}$	0.3193
$\theta_{d,C}$	0.2929
$\theta_{e,C}$	0.5297
$\theta_{g,d}$	1.2940
$\theta_{g,F}$	0.5869
$\theta_{h,g}$	0.5124
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7492
$\theta'_{e,C'}$	0.4771
$\theta'_{F',e}$	0.5229
$\theta'_{i,F'}$	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0018
$\Delta\theta_{C,A'}$	0.0007
$\Delta\theta_{g,d}$	0.0026
$\Delta\theta_{g,F}$	0.0025
$\Delta\theta_{i,g}$	—

Thermal Properties		
Strain Point	StP (℃)	583
Annealing Point	AP (℃)	615
Transformation Temperature	Tg (℃)	628
Yield Point	At (℃)	673
Softening Point	SP (℃)	739
Expansion Coefficients (−30～+70℃)		67
α (10^{-7}/℃) (+100～+300℃)		79
Thermal Conductivity	k (W/m·K)	0.871

Coloring	
λ 80／λ 5	42/36

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.08
370	0.34
380	0.59
390	0.75
400	0.84
420	0.935
440	0.965
460	0.977
480	0.984
500	0.989
550	0.996
600	0.997
650	0.998
700	0.998
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.996
1600	0.996
1800	0.990
2000	0.982
2200	0.950
2400	0.88

Constants of Dispersion Formula	
A_1	1.71014712
A_2	$2.56943292 \cdot 10^{-1}$
A_3	1.63986271
B_1	$1.05161080 \cdot 10^{-2}$
B_2	$5.02809636 \cdot 10^{-2}$
B_3	$1.46181217 \cdot 10^{2}$

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	970
Rigidity Modulus G	(10^8N/m^2)	381
Poisson's Ratio	σ	0.273
Knoop Hardness	Hk	560[6]
Abrasion	Aa	147
Photoelastic Constant (nm/cm/10^5Pa)	β	2.53

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.81
Remarks		

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	4.2	5.0	5.1	5.3	5.7	6.5	7.5
−20 ～ 0	4.4	5.2	5.2	5.5	5.9	6.7	7.7
0 ～ 20	4.4	5.3	5.3	5.6	6.0	6.9	8.0
20 ～ 40	4.5	5.4	5.5	5.8	6.2	7.1	8.2
40 ～ 60	4.6	5.5	5.6	6.0	6.3	7.3	8.4
60 ～ 80	4.6	5.6	5.7	6.2	6.5	7.5	8.7

S–LAM51

700481
703478

Refractive Index	n_d	**1.70000** 1.699998	Abbe Number	ν_d	**48.1** 48.08	Dispersion	$n_F - n_C$ **0.01456** 0.014559
Refractive Index	n_e	1.703462	Abbe Number	ν_e	47.80	Dispersion	$n_{F'} - n_{C'}$ 0.014717

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.66451
n_{1970}	1.97009	1.67024
n_{1530}	1.52958	1.67652
n_{1129}	1.12864	1.68239
n_t	1.01398	1.68444
n_s	0.85211	1.68815
$n_{A'}$	0.76819	1.69076
n_r	0.70652	1.69319
n_C	0.65627	**1.69564**
$n_{C'}$	0.64385	1.69633
$n_{He\text{-}Ne}$	0.6328	1.69697
n_D	0.58929	1.69987
n_d	0.58756	**1.70000**
n_e	0.54607	1.70346
n_F	0.48613	**1.71020**
$n_{F'}$	0.47999	1.71104
$n_{He\text{-}Cd}$	0.44157	1.71725
n_g	0.435835	**1.71834**
n_h	0.404656	1.72522
n_i	0.365015	1.73721

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0034
$\Delta\theta_{C,A'}$	0.0008
$\Delta\theta_{g,d}$	−0.0049
$\Delta\theta_{g,F}$	−0.0041
$\Delta\theta_{i,g}$	−0.0262

Constants of Dispersion Formula

A_1	1.63847200
A_2	$1.88330533 \cdot 10^{-1}$
A_3	1.47502357
B_1	$9.04853452 \cdot 10^{-3}$
B_2	$3.72740173 \cdot 10^{-2}$
B_3	$1.37770050 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.79
Remarks		

Partial Dispersions

$n_C - n_t$	0.011194
$n_C - n_{A'}$	0.004876
$n_d - n_C$	0.004362
$n_e - n_C$	0.007826
$n_g - n_d$	0.018344
$n_g - n_F$	0.008147
$n_h - n_g$	0.006879
$n_i - n_g$	0.018871
$n_{C'} - n_t$	0.011883
$n_e - n_{C'}$	0.007137
$n_{F'} - n_e$	0.007580
$n_i - n_{F'}$	0.026171

Thermal Properties

Strain Point	StP (℃)	597
Annealing Point	AP (℃)	624
Transformation Temperature	Tg (℃)	640
Yield Point	At (℃)	680
Softening Point	SP (℃)	736
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	71
	(+100～+300℃)	80
Thermal Conductivity	k (W/m·K)	0.867

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1007
Rigidity Modulus	G (10^8N/m^2)	394
Poisson's Ratio	σ	0.278
Knoop Hardness	Hk	570[6]
Abrasion	Aa	140
Photoelastic Constant (nm/cm/10^5Pa)	β	1.71

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7689
$\theta_{C,A'}$	0.3349
$\theta_{d,C}$	0.2996
$\theta_{e,C}$	0.5375
$\theta_{g,d}$	1.2600
$\theta_{g,F}$	0.5596
$\theta_{h,g}$	0.4725
$\theta_{i,g}$	1.2962
$\theta'_{C',t}$	0.8074
$\theta'_{e,C'}$	0.4849
$\theta'_{F',e}$	0.5151
$\theta'_{i,F'}$	1.7783

Coloring

λ 80／λ 5	39/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.14
350	0.45
360	0.70
370	0.84
380	0.914
390	0.948
400	0.966
420	0.980
440	0.985
460	0.989
480	0.992
500	0.995
550	0.997
600	0.996
650	0.996
700	0.997
800	0.997
900	0.997
1000	0.996
1200	0.996
1400	0.995
1600	0.995
1800	0.989
2000	0.980
2200	0.951
2400	0.85

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.4	2.8	2.8	2.9	3.2	3.6	4.1
−20 ～ 0	2.4	2.8	2.9	3.0	3.3	3.7	4.3
0 ～ 20	2.5	2.9	2.9	3.1	3.3	3.8	4.4
20 ～ 40	2.5	3.0	3.0	3.2	3.4	3.9	4.5
40 ～ 60	2.6	3.0	3.0	3.3	3.5	4.0	4.6
60 ～ 80	2.6	3.1	3.1	3.4	3.6	4.1	4.7

S–LAM52

720437
724434

Refractive Index	n_d	**1.72000** 1.720000	Abbe Number	ν_d	**43.7** 43.69	Dispersion	$n_F - n_C$ **0.01648** 0.016480
Refractive Index	n_e	1.723914	Abbe Number	ν_e	43.40	Dispersion	$n_{F'} - n_{C'}$ 0.016679

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.68281
n_{1970}	1.97009	1.68840
n_{1530}	1.52958	1.69463
n_{1129}	1.12864	1.70065
n_t	1.01398	1.70282
n_s	0.85211	1.70683
$n_{A'}$	0.76819	1.70969
n_r	0.70652	1.71238
n_C	0.65627	**1.71511**
$n_{C'}$	0.64385	1.71588
n_{He-Ne}	0.6328	1.71660
n_D	0.58929	1.71986
n_d	0.58756	**1.72000**
n_e	0.54607	1.72391
n_F	0.48613	**1.73159**
$n_{F'}$	0.47999	1.73256
n_{He-Cd}	0.44157	1.73972
n_g	0.435835	**1.74098**
n_h	0.404656	1.74901
n_i	0.365015	1.76328

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0063
$\Delta\theta_{C,A'}$	−0.0002
$\Delta\theta_{g,d}$	−0.0011
$\Delta\theta_{g,F}$	−0.0009
$\Delta\theta_{i,g}$	−0.0059

Constants of Dispersion Formula

A_1	1.73442942
A_2	$1.51553910 \cdot 10^{-1}$
A_3	1.46225433
B_1	$1.00690928 \cdot 10^{-2}$
B_2	$4.70634701 \cdot 10^{-2}$
B_3	$1.40084396 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.95
Remarks		

Partial Dispersions

$n_C - n_t$	0.012285
$n_C - n_{A'}$	0.005415
$n_d - n_C$	0.004895
$n_e - n_C$	0.008809
$n_g - n_d$	0.020977
$n_g - n_F$	0.009392
$n_h - n_g$	0.008035
$n_i - n_g$	0.022303
$n_{C'} - n_t$	0.013056
$n_e - n_{C'}$	0.008038
$n_{F'} - n_e$	0.008641
$n_i - n_{F'}$	0.030725

Thermal Properties

Strain Point	StP (℃)	604
Annealing Point	AP (℃)	632
Transformation Temperature	Tg (℃)	644
Yield Point	At (℃)	685
Softening Point	SP (℃)	743
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	77
	(+100～+300℃)	88
Thermal Conductivity	k (W/m·K)	0.801

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	957
Rigidity Modulus	G (10^8N/m^2)	374
Poisson's Ratio	σ	0.278
Knoop Hardness	Hk	530[5]
Abrasion	Aa	160
Photoelastic Constant (nm/cm/10^5Pa)	β	1.53

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	1.2

Relative Partial Dispersions

$\theta_{C,t}$	0.7454
$\theta_{C,A'}$	0.3286
$\theta_{d,C}$	0.2970
$\theta_{e,C}$	0.5345
$\theta_{g,d}$	1.2729
$\theta_{g,F}$	0.5699
$\theta_{h,g}$	0.4876
$\theta_{i,g}$	1.3533
$\theta'_{C',t}$	0.7828
$\theta'_{e,C'}$	0.4819
$\theta'_{F',e}$	0.5181
$\theta'_{i,F'}$	1.8421

Coloring

λ 80／λ 5	40/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.10
360	0.39
370	0.65
380	0.80
390	0.88
400	0.930
420	0.965
440	0.977
460	0.984
480	0.988
500	0.992
550	0.996
600	0.996
650	0.995
700	0.997
800	0.998
900	0.997
1000	0.997
1200	0.998
1400	0.997
1600	0.996
1800	0.990
2000	0.979
2200	0.947
2400	0.85

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	1.1	1.6	1.6	1.8	2.0	2.6	3.2
−20 ~ 0	1.1	1.6	1.7	1.9	2.1	2.7	3.3
0 ~ 20	1.1	1.7	1.8	2.0	2.2	2.8	3.5
20 ~ 40	1.1	1.8	1.8	2.0	2.3	3.0	3.6
40 ~ 60	1.2	1.9	1.9	2.1	2.4	3.1	3.8
60 ~ 80	1.2	1.9	2.0	2.2	2.5	3.2	3.9

S–LAM54

757478
761476

Refractive Index	n_d	**1.75700** 1.756998	Abbe Number ν_d	**47.8** 47.82	Dispersion $n_F - n_C$	**0.01583** 0.015830
Refractive Index	n_e	1.760765	Abbe Number ν_e	47.57	Dispersion $n_{F'} - n_{C'}$	0.015991

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.71415
n_{1970}	1.97009	1.72188
n_{1530}	1.52958	1.73007
n_{1129}	1.12864	1.73729
n_t	1.01398	1.73970
n_s	0.85211	1.74394
$n_{A'}$	0.76819	1.74686
n_r	0.70652	1.74954
n_C	0.65627	**1.75223**
$n_{C'}$	0.64385	1.75299
n_{He-Ne}	0.6328	1.75370
n_D	0.58929	1.75686
n_d	0.58756	**1.75700**
n_e	0.54607	1.76076
n_F	0.48613	**1.76806**
$n_{F'}$	0.47999	1.76898
n_{He-Cd}	0.44157	1.77570
n_g	0.435835	**1.77687**
n_h	0.404656	1.78431
n_i	0.365015	1.79726

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0205
$\Delta\theta_{C,A'}$	0.0058
$\Delta\theta_{g,d}$	−0.0098
$\Delta\theta_{g,F}$	−0.0076
$\Delta\theta_{i,g}$	−0.0367

Constants of Dispersion Formula

A_1	1.84213306
A_2	$1.75468631 \cdot 10^{-1}$
A_3	1.25750878
B_1	$9.43993220 \cdot 10^{-3}$
B_2	$3.95281122 \cdot 10^{-2}$
B_3	$8.65463013 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.08
Remarks		

Partial Dispersions

$n_C - n_t$	0.012530
$n_C - n_{A'}$	0.005376
$n_d - n_C$	0.004764
$n_e - n_C$	0.008531
$n_g - n_d$	0.019876
$n_g - n_F$	0.008810
$n_h - n_g$	0.007433
$n_i - n_g$	0.020388
$n_{C'} - n_t$	0.013285
$n_e - n_{C'}$	0.007776
$n_{F'} - n_e$	0.008215
$n_i - n_{F'}$	0.028282

Thermal Properties

Strain Point	StP (℃)	614
Annealing Point	AP (℃)	637
Transformation Temperature	Tg (℃)	664
Yield Point	At (℃)	687
Softening Point	SP (℃)	721
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	57
	(+100～+300℃)	69
Thermal Conductivity	k (W/m·K)	0.891

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1172
Rigidity Modulus G	(10^8N/m^2)	454
Poisson's Ratio	σ	0.292
Knoop Hardness	Hk	700[7]
Abrasion	Aa	62
Photoelastic Constant (nm/cm/10^5Pa)	β	1.70

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	51.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7915
$\theta_{C,A'}$	0.3396
$\theta_{d,C}$	0.3009
$\theta_{e,C}$	0.5389
$\theta_{g,d}$	1.2556
$\theta_{g,F}$	0.5565
$\theta_{h,g}$	0.4696
$\theta_{i,g}$	1.2879
$\theta'_{C',t}$	0.8308
$\theta'_{e,C'}$	0.4863
$\theta'_{F',e}$	0.5137
$\theta'_{i,F'}$	1.7686

Coloring

λ 80／λ 5	39/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.05
350	0.33
360	0.65
370	0.82
380	0.909
390	0.945
400	0.963
420	0.979
440	0.985
460	0.990
480	0.993
500	0.995
550	0.997
600	0.997
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.997
1200	0.997
1400	0.991
1600	0.991
1800	0.981
2000	0.954
2200	0.87
2400	0.62

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.8	4.2	4.3	4.4	4.7	5.1	5.6
−20 ～ 0	4.0	4.4	4.5	4.7	4.9	5.4	5.9
0 ～ 20	4.2	4.7	4.7	4.9	5.1	5.6	6.2
20 ～ 40	4.4	4.9	4.9	5.1	5.3	5.9	6.4
40 ～ 60	4.5	5.1	5.1	5.3	5.6	6.1	6.7
60 ～ 80	4.7	5.3	5.3	5.5	5.8	6.4	7.0

S–LAM55

762401
767398

Refractive Index	n_d	**1.76200** 1.762001	Abbe Number	ν_d	**40.1** 40.10	Dispersion	$n_F - n_C$ **0.01900** 0.019003
Refractive Index	n_e	1.766509	Abbe Number	ν_e	39.82	Dispersion	$n_{F'} - n_{C'}$ 0.019247

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.72020
n_{1970}	1.97009	1.72640
n_{1530}	1.52958	1.73328
n_{1129}	1.12864	1.73998
n_t	1.01398	1.74242
n_s	0.85211	1.74695
$n_{A'}$	0.76819	1.75020
n_r	0.70652	1.75327
n_C	0.65627	**1.75639**
$n_{C'}$	0.64385	1.75727
n_{He-Ne}	0.6328	1.75810
n_D	0.58929	1.76183
n_d	0.58756	**1.76200**
n_e	0.54607	1.76651
n_F	0.48613	**1.77539**
$n_{F'}$	0.47999	1.77652
n_{He-Cd}	0.44157	1.78487
n_g	0.435835	**1.78634**
n_h	0.404656	1.79580
n_i	0.365015	1.81280

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	−0.0002
$\Delta\theta_{C,A'}$	0.0008
$\Delta\theta_{g,d}$	−0.0004
$\Delta\theta_{g,F}$	−0.0001
$\Delta\theta_{i,g}$	0.0031

Constants of Dispersion Formula

A_1	1.85412979
A_2	$1.65450323 \cdot 10^{-1}$
A_3	1.27255422
B_1	$1.08438152 \cdot 10^{-2}$
B_2	$5.14050980 \cdot 10^{-2}$
B_3	$1.09986837 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.22
Remarks		

Partial Dispersions

$n_C - n_t$	0.013960
$n_C - n_{A'}$	0.006182
$n_d - n_C$	0.005616
$n_e - n_C$	0.010124
$n_g - n_d$	0.024342
$n_g - n_F$	0.010955
$n_h - n_g$	0.009453
$n_i - n_g$	0.026457
$n_{C'} - n_t$	0.014843
$n_e - n_{C'}$	0.009241
$n_{F'} - n_e$	0.010006
$n_i - n_{F'}$	0.036285

Thermal Properties

Strain Point	StP (℃)	589
Annealing Point	AP (℃)	617
Transformation Temperature	Tg (℃)	632
Yield Point	At (℃)	662
Softening Point	SP (℃)	709
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	71
	(+100～+300℃)	84
Thermal Conductivity	k (W/m·K)	0.741

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	967
Rigidity Modulus	G (10^8N/m^2)	374
Poisson's Ratio	σ	0.292
Knoop Hardness	Hk	550[6]
Abrasion	Aa	145
Photoelastic Constant (nm/cm/10^5Pa)	β	1.88

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7346
$\theta_{C,A'}$	0.3253
$\theta_{d,C}$	0.2955
$\theta_{e,C}$	0.5328
$\theta_{g,d}$	1.2810
$\theta_{g,F}$	0.5765
$\theta_{h,g}$	0.4974
$\theta_{i,g}$	1.3923
$\theta'_{C',t}$	0.7712
$\theta'_{e,C'}$	0.4801
$\theta'_{F',e}$	0.5199
$\theta'_{i,F'}$	1.8852

Coloring

λ 80／λ 5	40/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.06
360	0.37
370	0.67
380	0.82
390	0.89
400	0.932
420	0.963
440	0.976
460	0.984
480	0.989
500	0.993
550	0.997
600	0.997
650	0.997
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.995
1600	0.994
1800	0.986
2000	0.970
2200	0.923
2400	0.78

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.5	3.1	3.1	3.3	3.6	4.3	5.1
−20 ~ 0	2.6	3.2	3.2	3.5	3.8	4.5	5.3
0 ~ 20	2.6	3.3	3.3	3.6	3.9	4.7	5.5
20 ~ 40	2.7	3.4	3.4	3.7	4.0	4.8	5.7
40 ~ 60	2.8	3.5	3.5	3.8	4.2	5.0	5.9
60 ~ 80	2.8	3.6	3.6	3.9	4.3	5.2	6.1

S–LAM58

720420
724417

Refractive Index	n_d	**1.72000** 1.720000	Abbe Number	ν_d	**42.0** 41.98	Dispersion	$n_F - n_C$ **0.01715** 0.017152
Refractive Index	n_e	1.724072	Abbe Number	ν_e	41.69	Dispersion	$n_{F'} - n_{C'}$ 0.017366

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.68205
n_{1970}	1.97009	1.68764
n_{1530}	1.52958	1.69390
n_{1129}	1.12864	1.70001
n_t	1.01398	1.70224
n_s	0.85211	1.70636
$n_{A'}$	0.76819	1.70931
n_r	0.70652	1.71209
n_C	0.65627	**1.71492**
$n_{C'}$	0.64385	1.71572
$n_{He\text{-}Ne}$	0.6328	1.71647
n_D	0.58929	1.71985
n_d	0.58756	**1.72000**
n_e	0.54607	1.72407
n_F	0.48613	**1.73207**
$n_{F'}$	0.47999	1.73308
$n_{He\text{-}Cd}$	0.44157	1.74058
n_g	0.435835	**1.74190**
n_h	0.404656	1.75033
n_i	0.365015	1.76538

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	-0.0043
$\Delta\theta_{C,A'}$	0.0001
$\Delta\theta_{g,d}$	-0.0008
$\Delta\theta_{g,F}$	-0.0006
$\Delta\theta_{i,g}$	-0.0043

Constants of Dispersion Formula	
A_1	1.70984856
A_2	$1.73342897 \cdot 10^{-1}$
A_3	1.64833565
B_1	$1.00852127 \cdot 10^{-2}$
B_2	$4.70890831 \cdot 10^{-2}$
B_3	$1.57468520 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	4.00
Remarks		

Partial Dispersions	
$n_C - n_t$	0.012680
$n_C - n_{A'}$	0.005606
$n_d - n_C$	0.005081
$n_e - n_C$	0.009153
$n_g - n_d$	0.021898
$n_g - n_F$	0.009827
$n_h - n_g$	0.008436
$n_i - n_g$	0.023484
$n_{C'} - n_t$	0.013479
$n_e - n_{C'}$	0.008354
$n_{F'} - n_e$	0.009012
$n_i - n_{F'}$	0.032298

Thermal Properties		
Strain Point	StP (℃)	632
Annealing Point	AP (℃)	658
Transformation Temperature	Tg (℃)	681
Yield Point	At (℃)	726
Softening Point	SP (℃)	791
Expansion Coefficients (−30～+70℃)		66
α (10^{-7}/℃) (+100～+300℃)		77
Thermal Conductivity	k (W/m·K)	0.771

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	919
Rigidity Modulus G	(10^8N/m^2)	359
Poisson's Ratio	σ	0.279
Knoop Hardness	Hk	560[6]
Abrasion	Aa	151
Photoelastic Constant (nm/cm/10^5Pa)	β	2.03

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	2
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	3.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions	
$\theta_{C,t}$	0.7393
$\theta_{C,A'}$	0.3268
$\theta_{d,C}$	0.2962
$\theta_{e,C}$	0.5336
$\theta_{g,d}$	1.2767
$\theta_{g,F}$	0.5729
$\theta_{h,g}$	0.4918
$\theta_{i,g}$	1.3692
$\theta'_{C',t}$	0.7762
$\theta'_{e,C'}$	0.4811
$\theta'_{F',e}$	0.5189
$\theta'_{i,F'}$	1.8598

Coloring	
λ 80／λ 5	41/35

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.04
360	0.27
370	0.55
380	0.74
390	0.85
400	0.911
420	0.960
440	0.976
460	0.983
480	0.988
500	0.991
550	0.996
600	0.996
650	0.995
700	0.997
800	0.998
900	0.998
1000	0.998
1200	0.999
1400	0.997
1600	0.997
1800	0.992
2000	0.984
2200	0.956
2400	0.89

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.3	3.9	3.9	4.1	4.4	5.0	5.7
−20 ～ 0	3.4	4.0	4.0	4.3	4.6	5.2	5.9
0 ～ 20	3.4	4.1	4.2	4.4	4.7	5.4	6.1
20 ～ 40	3.6	4.3	4.3	4.6	4.9	5.6	6.3
40 ～ 60	3.6	4.4	4.5	4.7	5.0	5.7	6.5
60 ～ 80	3.7	4.5	4.6	4.8	5.2	5.9	6.8

S–LAM59

697485
700482

Refractive Index	n_d	**1.69700** 1.697002	Abbe Number	ν_d	**48.5** 48.52	Dispersion	$n_F - n_C$ **0.01436** 0.014366
Refractive Index	n_e	1.700421	Abbe Number	ν_e	48.24	Dispersion	$n_{F'} - n_{C'}$ 0.014521

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.66174
n_{1970}	1.97009	1.66748
n_{1530}	1.52958	1.67376
n_{1129}	1.12864	1.67959
n_t	1.01398	1.68163
n_s	0.85211	1.68530
$n_{A'}$	0.76819	1.68788
n_r	0.70652	1.69028
n_C	0.65627	1.69270
$n_{C'}$	0.64385	1.69338
n_{He-Ne}	0.6328	1.69401
n_D	0.58929	1.69688
n_d	0.58756	1.69700
n_e	0.54607	1.70042
n_F	0.48613	1.70706
$n_{F'}$	0.47999	1.70790
n_{He-Cd}	0.44157	1.71402
n_g	0.435835	1.71509
n_h	0.404656	1.72187
n_i	0.365015	1.73366

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	-0.0037
$\Delta\theta_{C,A'}$	0.0007
$\Delta\theta_{g,d}$	-0.0047
$\Delta\theta_{g,F}$	-0.0041
$\Delta\theta_{i,g}$	-0.0261

Constants of Dispersion Formula

A_1	1.63056133
A_2	$1.86994897 \cdot 10^{-1}$
A_3	1.30014289
B_1	$8.99690705 \cdot 10^{-3}$
B_2	$3.68011993 \cdot 10^{-2}$
B_3	$1.22239544 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.77
Remarks		

Partial Dispersions

$n_C - n_t$	0.011071
$n_C - n_{A'}$	0.004818
$n_d - n_C$	0.004306
$n_e - n_C$	0.007725
$n_g - n_d$	0.018089
$n_g - n_F$	0.008029
$n_h - n_g$	0.006774
$n_i - n_g$	0.018569
$n_{C'} - n_t$	0.011751
$n_e - n_{C'}$	0.007045
$n_{F'} - n_e$	0.007476
$n_i - n_{F'}$	0.025763

Thermal Properties

Strain Point	StP (℃)	594
Annealing Point	AP (℃)	623
Transformation Temperature	Tg (℃)	634
Yield Point	At (℃)	678
Softening Point	SP (℃)	735
Expansion Coefficients	(−30～+70℃)	71
α (10^{-7}/℃)	(+100～+300℃)	83
Thermal Conductivity	k (W/m·K)	0.847

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1006
Rigidity Modulus G	(10^8N/m^2)	394
Poisson's Ratio	σ	0.277
Knoop Hardness	Hk	600[6]
Abrasion	Aa	142
Photoelastic Constant (nm/cm/10^5Pa)	β	1.69

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	5.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7706
$\theta_{C,A'}$	0.3354
$\theta_{d,C}$	0.2997
$\theta_{e,C}$	0.5377
$\theta_{g,d}$	1.2592
$\theta_{g,F}$	0.5589
$\theta_{h,g}$	0.4715
$\theta_{i,g}$	1.2926
$\theta'_{C',t}$	0.8092
$\theta'_{e,C'}$	0.4852
$\theta'_{F',e}$	0.5148
$\theta'_{i,F'}$	1.7742

Coloring

λ 80／λ 5	38/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.14
350	0.47
360	0.73
370	0.86
380	0.923
390	0.954
400	0.969
420	0.982
440	0.986
460	0.989
480	0.992
500	0.995
550	0.997
600	0.996
650	0.995
700	0.997
800	0.998
900	0.998
1000	0.998
1200	0.998
1400	0.996
1600	0.996
1800	0.991
2000	0.982
2200	0.952
2400	0.85

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20		2.7	2.7	2.9	3.1	3.5	4.0
−20 ～ 0		2.8	2.8	3.0	3.2	3.7	4.2
0 ～ 20		2.9	2.9	3.1	3.3	3.8	4.3
20 ～ 40		3.0	3.0	3.2	3.4	3.9	4.5
40 ～ 60		3.1	3.1	3.3	3.5	4.1	4.6
60 ～ 80		3.1	3.2	3.4	3.6	4.2	4.8

S–LAM60

743493
747491

Refractive Index	n_d	**1.74320** 1.743198	Abbe Number ν_d	**49.3** 49.34	Dispersion $n_F - n_C$	**0.01507** 0.015063
Refractive Index	n_e	1.746784	Abbe Number ν_e	49.10	Dispersion $n_{F'} - n_{C'}$	0.015210

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.70181
n_{1970}	1.97009	1.70932
n_{1530}	1.52958	1.71730
n_{1129}	1.12864	1.72431
n_t	1.01398	1.72663
n_s	0.85211	1.73071
$n_{A'}$	0.76819	1.73351
n_r	0.70652	1.73608
n_C	0.65627	**1.73865**
$n_{C'}$	0.64385	1.73937
$n_{He\text{-}Ne}$	0.6328	1.74005
n_D	0.58929	1.74306
n_d	0.58756	**1.74320**
n_e	0.54607	1.74678
n_F	0.48613	**1.75372**
$n_{F'}$	0.47999	1.75458
$n_{He\text{-}Cd}$	0.44157	1.76094
n_g	0.435835	**1.76205**
n_h	0.404656	1.76904
n_i	0.365015	1.78113

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0197
$\Delta\theta_{C,A'}$	0.0057
$\Delta\theta_{g,d}$	−0.0109
$\Delta\theta_{g,F}$	−0.0085
$\Delta\theta_{i,g}$	−0.0450

Constants of Dispersion Formula

A_1	1.60673056
A_2	$3.66415640 \cdot 10^{-1}$
A_3	1.31761804
B_1	$7.75046140 \cdot 10^{-3}$
B_2	$2.89967611 \cdot 10^{-2}$
B_3	$9.30720709 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.06
Remarks		

Partial Dispersions

$n_C - n_t$	0.012019
$n_C - n_{A'}$	0.005143
$n_d - n_C$	0.004545
$n_e - n_C$	0.008131
$n_g - n_d$	0.018849
$n_g - n_F$	0.008331
$n_h - n_g$	0.006993
$n_i - n_g$	0.019083
$n_{C'} - n_t$	0.012740
$n_e - n_{C'}$	0.007410
$n_{F'} - n_e$	0.007800
$n_i - n_{F'}$	0.026546

Thermal Properties

Strain Point	StP (℃)	594
Annealing Point	AP (℃)	615
Transformation Temperature	Tg (℃)	643
Yield Point	At (℃)	658
Softening Point	SP (℃)	693
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	54
	(+100～+300℃)	66
Thermal Conductivity	k (W/m·K)	0.845

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1132
Rigidity Modulus	G (10^8N/m^2)	438
Poisson's Ratio	σ	0.294
Knoop Hardness	Hk	730[7]
Abrasion	Aa	71
Photoelastic Constant (nm/cm/10^5Pa)	β	1.90

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	52.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7979
$\theta_{C,A'}$	0.3414
$\theta_{d,C}$	0.3017
$\theta_{e,C}$	0.5398
$\theta_{g,d}$	1.2513
$\theta_{g,F}$	0.5531
$\theta_{h,g}$	0.4643
$\theta_{i,g}$	1.2669
$\theta'_{C',t}$	0.8376
$\theta'_{e,C'}$	0.4872
$\theta'_{F',e}$	0.5128
$\theta'_{i,F'}$	1.7453

Coloring

λ 80／λ 5	38/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.03
340	0.29
350	0.60
360	0.79
370	0.89
380	0.937
390	0.961
400	0.974
420	0.985
440	0.990
460	0.993
480	0.995
500	0.997
550	0.998
600	0.997
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.991
1600	0.991
1800	0.980
2000	0.953
2200	0.87
2400	0.62

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	5.3	5.7	5.7	5.9	6.1	6.6	7.1
−20 ～ 0	5.4	5.8	5.9	6.1	6.3	6.8	7.3
0 ～ 20	5.5	6.0	6.0	6.2	6.4	7.0	7.5
20 ～ 40	5.6	6.1	6.2	6.4	6.6	7.2	7.7
40 ～ 60	5.7	6.3	6.3	6.5	6.8	7.4	7.9
60 ～ 80	5.9	6.5	6.5	6.6	7.0	7.5	8.1

S–LAM61

720460
724457

Refractive Index	n_d	**1.72000** 1.720002	Abbe Number ν_d	**46.0** 46.02	Dispersion $n_F - n_C$	**0.01564** 0.015644
Refractive Index	n_e	1.723721	Abbe Number ν_e	45.75	Dispersion $n_{F'} - n_{C'}$	0.015820

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.68252
n_{1970}	1.97009	1.68854
n_{1530}	1.52958	1.69511
n_{1129}	1.12864	1.70126
n_t	1.01398	1.70342
n_s	0.85211	1.70735
$n_{A'}$	0.76819	1.71012
n_r	0.70652	1.71271
n_C	0.65627	**1.71533**
$n_{C'}$	0.64385	1.71607
n_{He-Ne}	0.6328	1.71676
n_D	0.58929	1.71986
n_d	0.58756	**1.72000**
n_e	0.54607	1.72372
n_F	0.48613	**1.73097**
$n_{F'}$	0.47999	1.73189
n_{He-Cd}	0.44157	1.73861
n_g	0.435835	**1.73979**
n_h	0.404656	1.74727
n_i	0.365015	1.76042

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	-0.0013
$\Delta\theta_{C,A'}$	0.0012
$\Delta\theta_{g,d}$	-0.0043
$\Delta\theta_{g,F}$	-0.0035
$\Delta\theta_{i,g}$	-0.0206

Constants of Dispersion Formula	
A_1	1.73883330
A_2	$1.50937430 \cdot 10^{-1}$
A_3	1.12118445
B_1	$9.80244105 \cdot 10^{-3}$
B_2	$4.33179685 \cdot 10^{-2}$
B_3	$1.01214625 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	4.10
Remarks		

Partial Dispersions	
$n_C - n_t$	0.011910
$n_C - n_{A'}$	0.005206
$n_d - n_C$	0.004672
$n_e - n_C$	0.008391
$n_g - n_d$	0.019787
$n_g - n_F$	0.008815
$n_h - n_g$	0.007485
$n_i - n_g$	0.020636
$n_{C'} - n_t$	0.012647
$n_e - n_{C'}$	0.007654
$n_{F'} - n_e$	0.008166
$n_i - n_{F'}$	0.028538

Thermal Properties		
Strain Point	StP (℃)	585
Annealing Point	AP (℃)	602
Transformation Temperature	Tg (℃)	629
Yield Point	At (℃)	665
Softening Point	SP (℃)	713
Expansion Coefficients (−30～+70℃)		66
α (10^{-7}/℃) (+100～+300℃)		80
Thermal Conductivity	k(W/m·K)	0.732

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	937
Rigidity Modulus G	(10^8N/m^2)	363
Poisson's Ratio	σ	0.290
Knoop Hardness	Hk	560[6]
Abrasion	Aa	144
Photoelastic Constant (nm/cm/10^5Pa)	β	1.99

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	5
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	2.2

Relative Partial Dispersions	
$\theta_{C,t}$	0.7613
$\theta_{C,A'}$	0.3328
$\theta_{d,C}$	0.2986
$\theta_{e,C}$	0.5364
$\theta_{g,d}$	1.2648
$\theta_{g,F}$	0.5635
$\theta_{h,g}$	0.4785
$\theta_{i,g}$	1.3191
$\theta'_{C',t}$	0.7994
$\theta'_{e,C'}$	0.4838
$\theta'_{F',e}$	0.5162
$\theta'_{i,F'}$	1.8039

Coloring	
λ 80／λ 5	39/34

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.03
350	0.26
360	0.56
370	0.75
380	0.86
390	0.914
400	0.943
420	0.969
440	0.979
460	0.985
480	0.989
500	0.993
550	0.997
600	0.996
650	0.997
700	0.997
800	0.998
900	0.999
1000	0.998
1200	0.999
1400	0.997
1600	0.997
1800	0.991
2000	0.978
2200	0.942
2400	0.80

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.9	3.5	3.5	3.7	3.9	4.5	5.1
−20 ~ 0	3.0	3.6	3.7	3.9	4.1	4.7	5.3
0 ~ 20	3.2	3.8	3.8	4.0	4.3	4.8	5.5
20 ~ 40	3.2	3.9	3.9	4.1	4.4	5.0	5.7
40 ~ 60	3.3	4.0	4.1	4.3	4.6	5.2	5.9
60 ~ 80	3.4	4.2	4.2	4.4	4.7	5.4	6.1

S–LAM66

801350
806347

Refractive Index	n_d	**1.80100** 1.800999	Abbe Number	ν_d	**35.0** 34.97	Dispersion	$n_F - n_C$ **0.02291** 0.022907
Refractive Index	n_e	1.806423	Abbe Number	ν_e	34.72	Dispersion	$n_{F'} - n_{C'}$ 0.023227

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.75094
n_{1970}	1.97009	1.75842
n_{1530}	1.52958	1.76672
n_{1129}	1.12864	1.77475
n_t	1.01398	1.77766
n_s	0.85211	1.78304
$n_{A'}$	0.76819	1.78691
n_r	0.70652	1.79055
n_C	0.65627	**1.79427**
$n_{C'}$	0.64385	1.79533
n_{He-Ne}	0.6328	1.79632
n_D	0.58929	1.80080
n_d	0.58756	**1.80100**
n_e	0.54607	1.80642
n_F	0.48613	**1.81718**
$n_{F'}$	0.47999	1.81856
n_{He-Cd}	0.44157	1.82879
n_g	0.435835	**1.83061**
n_h	0.404656	1.84236
n_i	0.365015	1.86391

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0148
$\Delta\theta_{C,A'}$	0.0035
$\Delta\theta_{g,d}$	0.0007
$\Delta\theta_{g,F}$	0.0015
$\Delta\theta_{i,g}$	0.0212

Constants of Dispersion Formula

A_1	1.92094221
A_2	$2.19901208 \cdot 10^{-1}$
A_3	1.72705231
B_1	$1.15075241 \cdot 10^{-2}$
B_2	$5.47993543 \cdot 10^{-2}$
B_3	$1.20133674 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.55
Remarks		

Partial Dispersions

$n_C - n_t$	0.016620
$n_C - n_{A'}$	0.007369
$n_d - n_C$	0.006724
$n_e - n_C$	0.012148
$n_g - n_d$	0.029615
$n_g - n_F$	0.013432
$n_h - n_g$	0.011747
$n_i - n_g$	0.033294
$n_{C'} - n_t$	0.017674
$n_e - n_{C'}$	0.011094
$n_{F'} - n_e$	0.012133
$n_i - n_{F'}$	0.045352

Thermal Properties

Strain Point	StP (℃)	514
Annealing Point	AP (℃)	544
Transformation Temperature	Tg (℃)	554
Yield Point	At (℃)	586
Softening Point	SP (℃)	629
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	79
	(+100～+300℃)	95
Thermal Conductivity	k (W/m·K)	1.062

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1210
Rigidity Modulus G	(10^8N/m^2)	473
Poisson's Ratio	σ	0.280
Knoop Hardness	Hk	660[7]
Abrasion	Aa	92
Photoelastic Constant (nm/cm/10^5Pa)	β	1.92

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	4.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7255
$\theta_{C,A'}$	0.3217
$\theta_{d,C}$	0.2935
$\theta_{e,C}$	0.5303
$\theta_{g,d}$	1.2928
$\theta_{g,F}$	0.5864
$\theta_{h,g}$	0.5128
$\theta_{i,g}$	1.4534
$\theta'_{C',t}$	0.7609
$\theta'_{e,C'}$	0.4776
$\theta'_{F',e}$	0.5224
$\theta'_{i,F'}$	1.9526

Coloring

λ 80／λ 5	43/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.03
360	0.28
370	0.57
380	0.73
390	0.82
400	0.87
420	0.932
440	0.954
460	0.968
480	0.977
500	0.985
550	0.994
600	0.994
650	0.994
700	0.997
800	0.998
900	0.998
1000	0.998
1200	0.999
1400	0.998
1600	0.997
1800	0.992
2000	0.976
2200	0.937
2400	0.77

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.2	3.0	3.1	3.3	3.7	4.5	5.5
−20 ～ 0	2.2	3.1	3.1	3.4	3.8	4.7	5.7
0 ～ 20	2.2	3.2	3.2	3.5	3.9	4.9	5.9
20 ～ 40	2.3	3.2	3.3	3.6	4.0	5.0	6.1
40 ～ 60	2.3	3.3	3.4	3.7	4.1	5.2	6.4
60 ～ 80	2.4	3.4	3.5	3.8	4.3	5.4	6.6

S–LAH51

786442
790439

Refractive Index	n_d	**1.78590** 1.785896	Abbe Number ν_d	**44.2** 44.20	Dispersion $n_F - n_C$	**0.01778** 0.017780
Refractive Index	n_e	1.790123	Abbe Number ν_e	43.95	Dispersion $n_{F'} - n_{C'}$	0.017979

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.74265
n_{1970}	1.97009	1.74972
n_{1530}	1.52958	1.75740
n_{1129}	1.12864	1.76452
n_t	1.01398	1.76700
n_s	0.85211	1.77150
$n_{A'}$	0.76819	1.77466
n_r	0.70652	1.77761
n_C	0.65627	**1.78058**
$n_{C'}$	0.64385	1.78142
n_{He-Ne}	0.6328	1.78221
n_D	0.58929	1.78574
n_d	0.58756	**1.78590**
n_e	0.54607	1.79012
n_F	0.48613	**1.79836**
$n_{F'}$	0.47999	1.79940
n_{He-Cd}	0.44157	1.80704
n_g	0.435835	**1.80838**
n_h	0.404656	1.81687
n_i	0.365015	1.83175

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0097
$\Delta\theta_{C,A'}$	0.0037
$\Delta\theta_{g,d}$	−0.0086
$\Delta\theta_{g,F}$	−0.0069
$\Delta\theta_{i,g}$	−0.0402

Constants of Dispersion Formula

A_1	1.82586991
A_2	$2.83023349 \cdot 10^{-1}$
A_3	1.35964319
B_1	$9.35297152 \cdot 10^{-3}$
B_2	$3.73803057 \cdot 10^{-2}$
B_3	$1.00655798 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.40
Remarks		

Partial Dispersions

$n_C - n_t$	0.013580
$n_C - n_{A'}$	0.005923
$n_d - n_C$	0.005312
$n_e - n_C$	0.009539
$n_g - n_d$	0.022480
$n_g - n_F$	0.010012
$n_h - n_g$	0.008492
$n_i - n_g$	0.023375
$n_{C'} - n_t$	0.014419
$n_e - n_{C'}$	0.008700
$n_{F'} - n_e$	0.009279
$n_i - n_{F'}$	0.032349

Thermal Properties

Strain Point	StP (℃)	568
Annealing Point	AP (℃)	598
Transformation Temperature	Tg (℃)	617
Yield Point	At (℃)	641
Softening Point	SP (℃)	677
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	59
	(+100～+300℃)	72
Thermal Conductivity	k (W/m·K)	0.826

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1129
Rigidity Modulus G	(10^8N/m^2)	435
Poisson's Ratio	σ	0.297
Knoop Hardness	Hk	660[7]
Abrasion	Aa	79
Photoelastic Constant (nm/cm/10^5Pa)	β	1.88

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	4.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7638
$\theta_{C,A'}$	0.3331
$\theta_{d,C}$	0.2988
$\theta_{e,C}$	0.5365
$\theta_{g,d}$	1.2643
$\theta_{g,F}$	0.5631
$\theta_{h,g}$	0.4776
$\theta_{i,g}$	1.3147
$\theta'_{C',t}$	0.8020
$\theta'_{e,C'}$	0.4839
$\theta'_{F',e}$	0.5161
$\theta'_{i,F'}$	1.7993

Coloring

λ 80／λ 5	39/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.01
340	0.17
350	0.51
360	0.73
370	0.84
380	0.910
390	0.942
400	0.961
420	0.977
440	0.984
460	0.989
480	0.993
500	0.995
550	0.998
600	0.997
650	0.997
700	0.998
800	0.998
900	0.997
1000	0.996
1200	0.996
1400	0.991
1600	0.989
1800	0.981
2000	0.957
2200	0.89
2400	0.68

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20		6.0		6.3	6.6	7.3	7.8
−20 ～ 0		6.0		6.3	6.6	7.3	7.9
0 ～ 20		6.1		6.4	6.7	7.4	8.1
20 ～ 40		6.2		6.5	6.8	7.6	8.3
40 ～ 60		6.4		6.7	7.0	7.8	8.6
60 ～ 80		6.6		6.9	7.2	8.1	8.9

S–LAH52

800422
804420

Refractive Index	n_d	**1.79952** 1.799516	Abbe Number	ν_d	**42.2** 42.22	Dispersion	$n_F - n_C$ **0.01893** 0.018935
Refractive Index	n_e	1.804015	Abbe Number	ν_e	41.97	Dispersion	$n_{F'} - n_{C'}$ 0.019157

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.75495
n_{1970}	1.97009	1.76202
n_{1530}	1.52958	1.76976
n_{1129}	1.12864	1.77703
n_t	1.01398	1.77961
n_s	0.85211	1.78430
$n_{A'}$	0.76819	1.78762
n_r	0.70652	1.79073
n_C	0.65627	**1.79388**
$n_{C'}$	0.64385	1.79477
$n_{He\text{-}Ne}$	0.6328	1.79560
n_D	0.58929	1.79935
n_d	0.58756	**1.79952**
n_e	0.54607	1.80401
n_F	0.48613	**1.81281**
$n_{F'}$	0.47999	1.81393
$n_{He\text{-}Cd}$	0.44157	1.82211
n_g	0.435835	**1.82355**
n_h	0.404656	1.83271
n_i	0.365015	1.84885

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0090
$\Delta\theta_{C,A'}$	0.0035
$\Delta\theta_{g,d}$	−0.0075
$\Delta\theta_{g,F}$	−0.0060
$\Delta\theta_{i,g}$	−0.0358

Constants of Dispersion Formula

A_1	1.85390925
A_2	$2.97925555 \cdot 10^{-1}$
A_3	1.39382086
B_1	$9.55320687 \cdot 10^{-3}$
B_2	$3.93816850 \cdot 10^{-2}$
B_3	$1.02706848 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.41
Remarks		

Partial Dispersions

$n_C - n_t$	0.014274
$n_C - n_{A'}$	0.006258
$n_d - n_C$	0.005637
$n_e - n_C$	0.010136
$n_g - n_d$	0.024038
$n_g - n_F$	0.010740
$n_h - n_g$	0.009152
$n_i - n_g$	0.025292
$n_{C'} - n_t$	0.015163
$n_e - n_{C'}$	0.009247
$n_{F'} - n_e$	0.009910
$n_i - n_{F'}$	0.034921

Thermal Properties

Strain Point	StP (℃)	565
Annealing Point	AP (℃)	596
Transformation Temperature	Tg (℃)	618
Yield Point	At (℃)	636
Softening Point	SP (℃)	679
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	60
	(+100～+300℃)	73
Thermal Conductivity	k (W/m·K)	0.828

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1119
Rigidity Modulus	G (10^8N/m^2)	431
Poisson's Ratio	σ	0.297
Knoop Hardness	Hk	640[6]
Abrasion	Aa	82
Photoelastic Constant (nm/cm/10^5Pa)	β	1.92

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7538
$\theta_{C,A'}$	0.3305
$\theta_{d,C}$	0.2977
$\theta_{e,C}$	0.5353
$\theta_{g,d}$	1.2695
$\theta_{g,F}$	0.5672
$\theta_{h,g}$	0.4833
$\theta_{i,g}$	1.3357
$\theta'_{C',t}$	0.7915
$\theta'_{e,C'}$	0.4827
$\theta'_{F',e}$	0.5173
$\theta'_{i,F'}$	1.8229

Coloring

λ 80／λ 5	40/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.02
340	0.23
350	0.52
360	0.72
370	0.83
380	0.89
390	0.931
400	0.951
420	0.971
440	0.979
460	0.985
480	0.990
500	0.993
550	0.997
600	0.997
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.998
1200	0.997
1400	0.994
1600	0.993
1800	0.986
2000	0.965
2200	0.910
2400	0.71

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	5.1	6.1	6.2	6.4	6.6	7.3	8.0
−20 ～ 0	5.2	6.1	6.2	6.4	6.6	7.3	8.1
0 ～ 20	5.2	6.1	6.1	6.4	6.7	7.5	8.3
20 ～ 40	5.3	6.2	6.2	6.5	6.9	7.7	8.5
40 ～ 60	5.5	6.4	6.5	6.7	7.1	7.9	8.8
60 ～ 80	5.8	6.6	6.6	6.9	7.3	8.2	9.1

S–LAH53

806409
811407

Refractive Index	n_d	**1.80610** 1.806098	Abbe Number	ν_d	**40.9** 40.92	Dispersion	$n_F - n_C$ **0.01969** 0.019697
Refractive Index	n_e	1.810775	Abbe Number	ν_e	40.67	Dispersion	$n_{F'} - n_{C'}$ 0.019935

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.76051
n_{1970}	1.97009	1.76764
n_{1530}	1.52958	1.77546
n_{1129}	1.12864	1.78287
n_t	1.01398	1.78551
n_s	0.85211	1.79034
$n_{A'}$	0.76819	1.79377
n_r	0.70652	1.79699
n_C	0.65627	**1.80025**
$n_{C'}$	0.64385	1.80117
n_{He-Ne}	0.6328	1.80203
n_D	0.58929	1.80592
n_d	0.58756	**1.80610**
n_e	0.54607	1.81078
n_F	0.48613	**1.81994**
$n_{F'}$	0.47999	1.82110
n_{He-Cd}	0.44157	1.82967
n_g	0.435835	**1.83117**
n_h	0.404656	1.84078
n_i	0.365015	1.85782

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0096
$\Delta\theta_{C,A'}$	0.0034
$\Delta\theta_{g,d}$	−0.0066
$\Delta\theta_{g,F}$	−0.0052
$\Delta\theta_{i,g}$	−0.0294

Constants of Dispersion Formula

A_1	1.91811619
A_2	$2.53724399 \cdot 10^{-1}$
A_3	1.39473885
B_1	$1.02147684 \cdot 10^{-2}$
B_2	$4.33176011 \cdot 10^{-2}$
B_3	$1.01938021 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.43
Remarks		

Partial Dispersions

$n_C - n_t$	0.014740
$n_C - n_{A'}$	0.006479
$n_d - n_C$	0.005850
$n_e - n_C$	0.010527
$n_g - n_d$	0.025076
$n_g - n_F$	0.011229
$n_h - n_g$	0.009607
$n_i - n_g$	0.026650
$n_{C'} - n_t$	0.015661
$n_e - n_{C'}$	0.009606
$n_{F'} - n_e$	0.010329
$n_i - n_{F'}$	0.036720

Thermal Properties

Strain Point	StP (℃)	
Annealing Point	AP (℃)	
Transformation Temperature	Tg (℃)	610
Yield Point	At (℃)	637
Softening Point	SP (℃)	687
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	59
	(+100～+300℃)	70
Thermal Conductivity	k (W/m·K)	0.860

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1127
Rigidity Modulus G	(10^8N/m^2)	434
Poisson's Ratio	σ	0.299
Knoop Hardness	Hk	640[6]
Abrasion	Aa	78
Photoelastic Constant (nm/cm/10^5Pa)	β	1.96

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	4.2
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7483
$\theta_{C,A'}$	0.3289
$\theta_{d,C}$	0.2970
$\theta_{e,C}$	0.5344
$\theta_{g,d}$	1.2731
$\theta_{g,F}$	0.5701
$\theta_{h,g}$	0.4877
$\theta_{i,g}$	1.3530
$\theta'_{C',t}$	0.7856
$\theta'_{e,C'}$	0.4819
$\theta'_{F',e}$	0.5181
$\theta'_{i,F'}$	1.8420

Coloring

λ 80／λ 5	41/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.06
350	0.38
360	0.65
370	0.80
380	0.88
390	0.925
400	0.947
420	0.969
440	0.979
460	0.985
480	0.989
500	0.993
550	0.996
600	0.996
650	0.997
700	0.998
800	0.998
900	0.999
1000	0.999
1200	0.999
1400	0.997
1600	0.996
1800	0.989
2000	0.969
2200	0.915
2400	0.72

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	5.1	6.2	6.2	6.5	6.8	7.6	8.3
−20 ～ 0	5.2	6.3	6.3	6.6	6.9	7.7	8.5
0 ～ 20	5.3	6.4	6.4	6.7	7.1	7.9	8.7
20 ～ 40	5.6	6.6	6.7	6.9	7.3	8.1	9.0
40 ～ 60	5.8	6.8	6.9	7.2	7.6	8.4	9.4
60 ～ 80	6.2	7.1	7.2	7.5	7.8	8.7	9.8

S–LAH55

835427
839425

Refractive Index	n_d	**1.83481** 1.834807	Abbe Number ν_d	**42.7** 42.71	Dispersion $n_F - n_C$	**0.01954** 0.019545
Refractive Index	n_e	1.839453	Abbe Number ν_e	42.47	Dispersion $n_{F'} - n_{C'}$	0.019767

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.78803
n_{1970}	1.97009	1.79558
n_{1530}	1.52958	1.80378
n_{1129}	1.12864	1.81144
n_t	1.01398	1.81413
n_s	0.85211	1.81903
$n_{A'}$	0.76819	1.82248
n_r	0.70652	1.82571
n_C	0.65627	**1.82898**
$n_{C'}$	0.64385	1.82990
n_{He-Ne}	0.6328	1.83076
n_D	0.58929	1.83464
n_d	0.58756	**1.83481**
n_e	0.54607	1.83945
n_F	0.48613	**1.84852**
$n_{F'}$	0.47999	1.84966
n_{He-Cd}	0.44157	1.85807
n_g	0.435835	**1.85955**
n_h	0.404656	1.86891
n_i	0.365015	1.88534

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0122
$\Delta\theta_{C,A'}$	0.0045
$\Delta\theta_{g,d}$	-0.0102
$\Delta\theta_{g,F}$	-0.0082
$\Delta\theta_{i,g}$	-0.0479

Constants of Dispersion Formula

A_1	1.95615766
A_2	$3.19216215 \cdot 10^{-1}$
A_3	1.39173189
B_1	$9.79338965 \cdot 10^{-3}$
B_2	$3.76836296 \cdot 10^{-2}$
B_3	$9.48775271 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.73
Remarks		

Partial Dispersions

$n_C - n_t$	0.014841
$n_C - n_{A'}$	0.006490
$n_d - n_C$	0.005832
$n_e - n_C$	0.010478
$n_g - n_d$	0.024741
$n_g - n_F$	0.011028
$n_h - n_g$	0.009363
$n_i - n_g$	0.025790
$n_{C'} - n_t$	0.015762
$n_e - n_{C'}$	0.009557
$n_{F'} - n_e$	0.010210
$n_i - n_{F'}$	0.035675

Thermal Properties

Strain Point	StP (℃)	642
Annealing Point	AP (℃)	664
Transformation Temperature	Tg (℃)	684
Yield Point	At (℃)	711
Softening Point	SP (℃)	734
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	62
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.846

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1249
Rigidity Modulus G	(10^8N/m^2)	482
Poisson's Ratio	σ	0.296
Knoop Hardness	Hk	750[7]
Abrasion	Aa	59
Photoelastic Constant (nm/cm/10^5Pa)	β	1.31

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	4.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7593
$\theta_{C,A'}$	0.3321
$\theta_{d,C}$	0.2984
$\theta_{e,C}$	0.5361
$\theta_{g,d}$	1.2658
$\theta_{g,F}$	0.5642
$\theta_{h,g}$	0.4790
$\theta_{i,g}$	1.3195
$\theta'_{C',t}$	0.7974
$\theta'_{e,C'}$	0.4835
$\theta'_{F',e}$	0.5165
$\theta'_{i,F'}$	1.8048

Coloring

λ 80／λ 5	40/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.01
330	0.18
340	0.44
350	0.65
360	0.78
370	0.86
380	0.913
390	0.941
400	0.958
420	0.974
440	0.982
460	0.988
480	0.991
500	0.994
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.999
1200	0.999
1400	0.996
1600	0.994
1800	0.985
2000	0.962
2200	0.89
2400	0.68

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	3.3	4.0	4.0	4.2	4.5	5.1	5.7
−20 ~ 0	3.4	4.1	4.1	4.4	4.6	5.3	6.0
0 ~ 20	3.5	4.2	4.3	4.5	4.8	5.5	6.2
20 ~ 40	3.6	4.4	4.5	4.7	5.0	5.7	6.4
40 ~ 60	3.7	4.5	4.6	4.9	5.2	5.9	6.7
60 ~ 80	3.8	4.7	4.8	5.0	5.4	6.1	6.9

S–LAH58

883408
888405

Refractive Index	n_d	**1.88300** 1.882997	Abbe Number ν_d	**40.8** 40.76	Dispersion $n_F - n_C$	**0.02166** 0.021661
Refractive Index	n_e	1.888146	Abbe Number ν_e	40.52	Dispersion $n_{F'} - n_{C'}$	0.021919

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.83590
n_{1970}	1.97009	1.84264
n_{1530}	1.52958	1.85023
n_{1129}	1.12864	1.85776
n_t	1.01398	1.86054
n_s	0.85211	1.86572
$n_{A'}$	0.76819	1.86946
n_r	0.70652	1.87298
n_C	0.65627	**1.87656**
$n_{C'}$	0.64385	1.87757
n_{He-Ne}	0.6328	1.87852
n_D	0.58929	1.88281
n_d	0.58756	**1.88300**
n_e	0.54607	1.88815
n_F	0.48613	**1.89822**
$n_{F'}$	0.47999	1.89949
n_{He-Cd}	0.44157	1.90885
n_g	0.435835	**1.91050**
n_h	0.404656	1.92092
n_i	0.365015	1.93917

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0018
$\Delta\theta_{C,A'}$	0.0026
$\Delta\theta_{g,d}$	−0.0105
$\Delta\theta_{g,F}$	−0.0088
$\Delta\theta_{i,g}$	−0.0598

Constants of Dispersion Formula

A_1	1.78764964
A_2	$6.52635600 \cdot 10^{-1}$
A_3	1.79914564
B_1	$8.47378536 \cdot 10^{-3}$
B_2	$3.13126408 \cdot 10^{-2}$
B_3	$1.32788001 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	5.52
Remarks		

Partial Dispersions

$n_C - n_t$	0.016022
$n_C - n_{A'}$	0.007103
$n_d - n_C$	0.006437
$n_e - n_C$	0.011586
$n_g - n_d$	0.027500
$n_g - n_F$	0.012276
$n_h - n_g$	0.010422
$n_i - n_g$	0.028677
$n_{C'} - n_t$	0.017035
$n_e - n_{C'}$	0.010573
$n_{F'} - n_e$	0.011346
$n_i - n_{F'}$	0.039682

Thermal Properties

Strain Point	StP (℃)	666
Annealing Point	AP (℃)	714
Transformation Temperature	Tg (℃)	738
Yield Point	At (℃)	765
Softening Point	SP (℃)	803
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	66
	(+100～+300℃)	78
Thermal Conductivity	k (W/m·K)	0.827

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1268
Rigidity Modulus	G (10^8N/m^2)	487
Poisson's Ratio	σ	0.301
Knoop Hardness	Hk	710[7]
Abrasion	Aa	61
Photoelastic Constant (nm/cm/10^5Pa)	β	1.30

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	2.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7397
$\theta_{C,A'}$	0.3279
$\theta_{d,C}$	0.2972
$\theta_{e,C}$	0.5349
$\theta_{g,d}$	1.2696
$\theta_{g,F}$	0.5667
$\theta_{h,g}$	0.4811
$\theta_{i,g}$	1.3239
$\theta'_{C',t}$	0.7772
$\theta'_{e,C'}$	0.4824
$\theta'_{F',e}$	0.5176
$\theta'_{i,F'}$	1.8104

Coloring

λ 80／λ 5	45/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.05
330	0.17
340	0.34
350	0.51
360	0.66
370	0.77
380	0.84
390	0.89
400	0.924
420	0.951
440	0.965
460	0.974
480	0.982
500	0.988
550	0.995
600	0.995
650	0.995
700	0.995
800	0.995
900	0.995
1000	0.995
1200	0.996
1400	0.996
1600	0.996
1800	0.992
2000	0.980
2200	0.956
2400	0.84

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.3	4.1	4.1	4.4	4.7	5.4	6.2
−20 ～ 0	3.4	4.2	4.3	4.6	4.9	5.6	6.4
0 ～ 20	3.6	4.3	4.4	4.7	5.0	5.8	6.6
20 ～ 40	3.7	4.5	4.5	4.9	5.2	6.0	6.8
40 ～ 60	3.9	4.6	4.6	5.0	5.3	6.2	7.1
60 ～ 80	4.0	4.7	4.8	5.2	5.5	6.4	7.3

S–LAH59

816466
820464

Refractive Index	n_d	**1.81600** 1.816000	Abbe Number	ν_d	**46.6** 46.62	Dispersion	$n_F - n_C$ **0.01750** 0.017503
Refractive Index	n_e	1.820167	Abbe Number	ν_e	46.37	Dispersion	$n_{F'} - n_{C'}$ 0.017688

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.77345
n_{1970}	1.97009	1.78033
n_{1530}	1.52958	1.78784
n_{1129}	1.12864	1.79483
n_t	1.01398	1.79729
n_s	0.85211	1.80174
$n_{A'}$	0.76819	1.80488
n_r	0.70652	1.80780
n_C	0.65627	**1.81075**
$n_{C'}$	0.64385	1.81158
n_{He-Ne}	0.6328	1.81236
n_D	0.58929	1.81585
n_d	0.58756	**1.81600**
n_e	0.54607	1.82017
n_F	0.48613	**1.82825**
$n_{F'}$	0.47999	1.82927
n_{He-Cd}	0.44157	1.83670
n_g	0.435835	**1.83800**
n_h	0.404656	1.84619
n_i	0.365015	1.86034

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0036
$\Delta\theta_{C,A'}$	0.0030
$\Delta\theta_{g,d}$	−0.0111
$\Delta\theta_{g,F}$	−0.0092
$\Delta\theta_{i,g}$	−0.0582

Constants of Dispersion Formula

A_1	1.51372967
A_2	$7.02462343 \cdot 10^{-1}$
A_3	1.33600982
B_1	$7.05246901 \cdot 10^{-3}$
B_2	$2.49488689 \cdot 10^{-2}$
B_3	$1.00085908 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	5.07
Remarks		

Partial Dispersions

$n_C - n_t$	0.013459
$n_C - n_{A'}$	0.005870
$n_d - n_C$	0.005251
$n_e - n_C$	0.009418
$n_g - n_d$	0.021997
$n_g - n_F$	0.009745
$n_h - n_g$	0.008188
$n_i - n_g$	0.022341
$n_{C'} - n_t$	0.014289
$n_e - n_{C'}$	0.008588
$n_{F'} - n_e$	0.009100
$n_i - n_{F'}$	0.031071

Thermal Properties

Strain Point	StP (℃)	644
Annealing Point	AP (℃)	690
Transformation Temperature	Tg (℃)	714
Yield Point	At (℃)	737
Softening Point	SP (℃)	773
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	63
	(+100～+300℃)	76
Thermal Conductivity	k (W/m·K)	0.816

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1250
Rigidity Modulus	G (10^8N/m^2)	482
Poisson's Ratio	σ	0.298
Knoop Hardness	Hk	750[7]
Abrasion	Aa	57
Photoelastic Constant (nm/cm/10^5Pa)	β	1.37

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	2
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	3.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7690
$\theta_{C,A'}$	0.3354
$\theta_{d,C}$	0.3000
$\theta_{e,C}$	0.5381
$\theta_{g,d}$	1.2568
$\theta_{g,F}$	0.5568
$\theta_{h,g}$	0.4678
$\theta_{i,g}$	1.2764
$\theta'_{C',t}$	0.8078
$\theta'_{e,C'}$	0.4855
$\theta'_{F',e}$	0.5145
$\theta'_{i,F'}$	1.7566

Coloring

λ 80／λ 5	39/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	0.02
300	0.06
310	0.09
320	0.28
330	0.43
340	0.58
350	0.71
360	0.81
370	0.88
380	0.921
390	0.943
400	0.958
420	0.973
440	0.979
460	0.984
480	0.989
500	0.994
550	0.997
600	0.996
650	0.996
700	0.996
800	0.996
900	0.995
1000	0.995
1200	0.995
1400	0.995
1600	0.994
1800	0.989
2000	0.973
2200	0.938
2400	0.76

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	4.1	4.6	4.6	4.9	5.1	5.6	6.2
−20 ～ 0	4.1	4.7	4.7	5.0	5.2	5.8	6.4
0 ～ 20	4.2	4.8	4.8	5.1	5.3	5.9	6.5
20 ～ 40	4.3	4.9	4.9	5.2	5.4	6.1	6.7
40 ～ 60	4.3	5.0	5.0	5.3	5.6	6.2	6.9
60 ～ 80	4.4	5.1	5.1	5.4	5.7	6.4	7.0

S–LAH60

834372
839369

Refractive Index	n_d	**1.83400** 1.834000	Abbe Number	ν_d	**37.2** 37.16	Dispersion	$n_F - n_C$ **0.02244** 0.022443
Refractive Index	n_e	1.839323	Abbe Number	ν_e	36.92	Dispersion	$n_{F'} - n_{C'}$ 0.022736

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.78473
n_{1970}	1.97009	1.79205
n_{1530}	1.52958	1.80018
n_{1129}	1.12864	1.80807
n_t	1.01398	1.81094
n_s	0.85211	1.81627
$n_{A'}$	0.76819	1.82009
n_r	0.70652	1.82370
n_C	0.65627	**1.82738**
$n_{C'}$	0.64385	1.82842
$n_{He\text{-}Ne}$	0.6328	1.82939
n_D	0.58929	1.83380
n_d	0.58756	**1.83400**
n_e	0.54607	1.83932
n_F	0.48613	**1.84982**
$n_{F'}$	0.47999	1.85115
$n_{He\text{-}Cd}$	0.44157	1.86103
n_g	0.435835	**1.86278**
n_h	0.404656	1.87396
n_i	0.365015	1.89403

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0114
$\Delta\theta_{C,A'}$	0.0036
$\Delta\theta_{g,d}$	−0.0051
$\Delta\theta_{g,F}$	−0.0037
$\Delta\theta_{i,g}$	−0.0215

Constants of Dispersion Formula

A_1	1.95243469
A_2	$3.07100210 \cdot 10^{-1}$
A_3	1.56578094
B_1	$1.06442437 \cdot 10^{-2}$
B_2	$4.56735302 \cdot 10^{-2}$
B_3	$1.10281410 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.43
Remarks		

Partial Dispersions

$n_C - n_t$	0.016437
$n_C - n_{A'}$	0.007283
$n_d - n_C$	0.006624
$n_e - n_C$	0.011947
$n_g - n_d$	0.028781
$n_g - n_F$	0.012962
$n_h - n_g$	0.011183
$n_i - n_g$	0.031249
$n_{C'} - n_t$	0.017477
$n_e - n_{C'}$	0.010907
$n_{F'} - n_e$	0.011829
$n_i - n_{F'}$	0.042878

Thermal Properties

Strain Point	StP (℃)	
Annealing Point	AP (℃)	
Transformation Temperature	Tg (℃)	612
Yield Point	At (℃)	632
Softening Point	SP (℃)	676
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	56
	(+100～+300℃)	71
Thermal Conductivity	k (W/m·K)	0.872

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1248
Rigidity Modulus	G (10^8N/m^2)	481
Poisson's Ratio	σ	0.296
Knoop Hardness	Hk	670[7]
Abrasion	Aa	78
Photoelastic Constant (nm/cm/10^5Pa)	β	2.15

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	4.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7324
$\theta_{C,A'}$	0.3245
$\theta_{d,C}$	0.2951
$\theta_{e,C}$	0.5323
$\theta_{g,d}$	1.2824
$\theta_{g,F}$	0.5776
$\theta_{h,g}$	0.4983
$\theta_{i,g}$	1.3924
$\theta'_{C',t}$	0.7687
$\theta'_{e,C'}$	0.4797
$\theta'_{F',e}$	0.5203
$\theta'_{i,F'}$	1.8859

Coloring

λ 80／λ 5	42/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.03
350	0.27
360	0.54
370	0.72
380	0.83
390	0.88
400	0.924
420	0.957
440	0.972
460	0.980
480	0.986
500	0.990
550	0.996
600	0.997
650	0.997
700	0.998
800	0.999
900	0.998
1000	0.997
1200	0.996
1400	0.993
1600	0.992
1800	0.984
2000	0.964
2200	0.906
2400	0.72

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	6.0	6.9	6.9	7.3	7.6	8.4	9.3
−20 ~ 0	6.3	7.0	7.1	7.4	7.7	8.6	9.6
0 ~ 20	6.3	7.1	7.2	7.6	7.9	8.8	9.8
20 ~ 40	6.4	7.3	7.3	7.7	8.1	9.0	10.1
40 ~ 60	6.6	7.4	7.5	7.9	8.3	9.3	10.3
60 ~ 80	6.7	7.5	7.6	8.0	8.4	9.5	10.6

S–LAH63

804396
809393

Refractive Index	n_d	**1.80440** 1.804398	Abbe Number	ν_d	**39.6** 39.59	Dispersion	$n_F - n_C$ **0.02032** 0.020320
Refractive Index	n_e	1.809221	Abbe Number	ν_e	39.33	Dispersion	$n_{F'} - n_{C'}$ 0.020573

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.75781
n_{1970}	1.97009	1.76505
n_{1530}	1.52958	1.77300
n_{1129}	1.12864	1.78056
n_t	1.01398	1.78325
n_s	0.85211	1.78820
$n_{A'}$	0.76819	1.79172
n_r	0.70652	1.79502
n_C	0.65627	**1.79838**
$n_{C'}$	0.64385	1.79932
n_{He-Ne}	0.6328	1.80021
n_D	0.58929	1.80422
n_d	0.58756	**1.80440**
n_e	0.54607	1.80922
n_F	0.48613	**1.81870**
$n_{F'}$	0.47999	1.81990
n_{He-Cd}	0.44157	1.82877
n_g	0.435835	**1.83034**
n_h	0.404656	1.84033
n_i	0.365015	1.85815

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0119
$\Delta\theta_{C,A'}$	0.0039
$\Delta\theta_{g,d}$	−0.0059
$\Delta\theta_{g,F}$	−0.0045
$\Delta\theta_{i,g}$	−0.0249

Constants of Dispersion Formula

A_1	1.89458276
A_2	$2.68702978 \cdot 10^{-1}$
A_3	1.45705526
B_1	$1.02277048 \cdot 10^{-2}$
B_2	$4.42801243 \cdot 10^{-2}$
B_3	$1.04874927 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.34
Remarks		

Partial Dispersions

$n_C - n_t$	0.015124
$n_C - n_{A'}$	0.006658
$n_d - n_C$	0.006022
$n_e - n_C$	0.010845
$n_g - n_d$	0.025940
$n_g - n_F$	0.011642
$n_h - n_g$	0.009994
$n_i - n_g$	0.027810
$n_{C'} - n_t$	0.016071
$n_e - n_{C'}$	0.009898
$n_{F'} - n_e$	0.010675
$n_i - n_{F'}$	0.038252

Thermal Properties

Strain Point	StP (℃)	558
Annealing Point	AP (℃)	588
Transformation Temperature	Tg (℃)	607
Yield Point	At (℃)	630
Softening Point	SP (℃)	675
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	58
	(+100～+300℃)	70
Thermal Conductivity	k (W/m·K)	0.849

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1121
Rigidity Modulus	G (10^8N/m^2)	433
Poisson's Ratio	σ	0.295
Knoop Hardness	Hk	640[6]
Abrasion	Aa	82
Photoelastic Constant (nm/cm/10^5Pa)	β	2.18

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	4.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7443
$\theta_{C,A'}$	0.3277
$\theta_{d,C}$	0.2964
$\theta_{e,C}$	0.5337
$\theta_{g,d}$	1.2766
$\theta_{g,F}$	0.5729
$\theta_{h,g}$	0.4918
$\theta_{i,g}$	1.3686
$\theta'_{C',t}$	0.7812
$\theta'_{e,C'}$	0.4811
$\theta'_{F',e}$	0.5189
$\theta'_{i,F'}$	1.8593

Coloring

λ 80／λ 5	41/34

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.06
350	0.31
360	0.59
370	0.76
380	0.86
390	0.909
400	0.937
420	0.965
440	0.976
460	0.983
480	0.988
500	0.992
550	0.997
600	0.998
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.997
1200	0.997
1400	0.993
1600	0.992
1800	0.984
2000	0.963
2200	0.89
2400	0.70

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	5.5	6.6	6.6	6.8	7.3	8.0	8.7
−20 ～ 0	5.7	6.7	6.7	6.9	7.3	8.1	8.9
0 ～ 20	5.8	6.8	6.8	7.0	7.5	8.3	9.1
20 ～ 40	5.9	6.9	6.9	7.2	7.6	8.5	9.4
40 ～ 60	6.2	7.1	7.2	7.5	7.8	8.8	9.7
60 ～ 80	6.4	7.3	7.4	7.7	8.1	9.1	10.1

S–LAH64

788474
792471

Refractive Index	n_d	**1.78800** 1.788001	Abbe Number	ν_d	**47.4** 47.37	Dispersion	$n_F - n_C$ **0.01663** 0.016636
Refractive Index	n_e	1.791961	Abbe Number	ν_e	47.12	Dispersion	$n_{F'} - n_{C'}$ 0.016806

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.74466
n_{1970}	1.97009	1.75220
n_{1530}	1.52958	1.76026
n_{1129}	1.12864	1.76750
n_t	1.01398	1.76996
n_s	0.85211	1.77433
$n_{A'}$	0.76819	1.77737
n_r	0.70652	1.78018
n_C	0.65627	**1.78300**
$n_{C'}$	0.64385	1.78379
n_{He-Ne}	0.6328	1.78453
n_D	0.58929	1.78785
n_d	0.58756	**1.78800**
n_e	0.54607	1.79196
n_F	0.48613	**1.79963**
$n_{F'}$	0.47999	1.80060
n_{He-Cd}	0.44157	1.80765
n_g	0.435835	**1.80888**
n_h	0.404656	1.81666
n_i	0.365015	1.83016

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0148
$\Delta\theta_{C,A'}$	0.0050
$\Delta\theta_{g,d}$	−0.0111
$\Delta\theta_{g,F}$	−0.0089
$\Delta\theta_{i,g}$	−0.0493

Constants of Dispersion Formula

A_1	1.83021453
A_2	$2.91563590 \cdot 10^{-1}$
A_3	1.28544024
B_1	$9.04823290 \cdot 10^{-3}$
B_2	$3.30756689 \cdot 10^{-2}$
B_3	$8.93675501 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.30
Remarks		

Partial Dispersions

$n_C - n_t$	0.013038
$n_C - n_{A'}$	0.005628
$n_d - n_C$	0.005003
$n_e - n_C$	0.008963
$n_g - n_d$	0.020881
$n_g - n_F$	0.009248
$n_h - n_g$	0.007782
$n_i - n_g$	0.021279
$n_{C'} - n_t$	0.013830
$n_e - n_{C'}$	0.008171
$n_{F'} - n_e$	0.008635
$n_i - n_{F'}$	0.029565

Thermal Properties

Strain Point	StP (℃)	644
Annealing Point	AP (℃)	660
Transformation Temperature	Tg (℃)	685
Yield Point	At (℃)	705
Softening Point	SP (℃)	732
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	61
	(+100～+300℃)	74
Thermal Conductivity	k (W/m·K)	0.856

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1224
Rigidity Modulus	G (10^8N/m^2)	473
Poisson's Ratio	σ	0.294
Knoop Hardness	Hk	750[7]
Abrasion	Aa	61
Photoelastic Constant (nm/cm/10^5Pa)	β	1.40

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	4.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7837
$\theta_{C,A'}$	0.3383
$\theta_{d,C}$	0.3007
$\theta_{e,C}$	0.5388
$\theta_{g,d}$	1.2552
$\theta_{g,F}$	0.5559
$\theta_{h,g}$	0.4678
$\theta_{i,g}$	1.2791
$\theta'_{C',t}$	0.8229
$\theta'_{e,C'}$	0.4862
$\theta'_{F',e}$	0.5138
$\theta'_{i,F'}$	1.7592

Coloring

λ 80／λ 5	38/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.13
330	0.40
340	0.63
350	0.77
360	0.85
370	0.912
380	0.943
390	0.961
400	0.972
420	0.981
440	0.986
460	0.990
480	0.993
500	0.996
550	0.998
600	0.998
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.997
1200	0.996
1400	0.995
1600	0.993
1800	0.987
2000	0.966
2200	0.915
2400	0.68

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20	3.5	3.9	3.9	4.1	4.3	4.8	5.3
−20 ~ 0	3.5	4.0	4.0	4.2	4.4	5.0	5.5
0 ~ 20	3.6	4.1	4.1	4.3	4.6	5.1	5.7
20 ~ 40	3.7	4.2	4.2	4.4	4.7	5.3	5.8
40 ~ 60	3.8	4.3	4.3	4.5	4.8	5.4	6.0
60 ~ 80	3.9	4.4	4.4	4.6	4.9	5.5	6.2

S–LAH65

804466
808463

Refractive Index	n_d	**1.80400** 1.804000	Abbe Number	ν_d	**46.6** 46.57	Dispersion	$n_F - n_C$ **0.01726** 0.017265
Refractive Index	n_e	1.808109	Abbe Number	ν_e	46.33	Dispersion	$n_{F'} - n_{C'}$ 0.017444

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.75978
n_{1970}	1.97009	1.76734
n_{1530}	1.52958	1.77547
n_{1129}	1.12864	1.78284
n_t	1.01398	1.78536
n_s	0.85211	1.78986
$n_{A'}$	0.76819	1.79299
n_r	0.70652	1.79590
n_C	0.65627	**1.79882**
$n_{C'}$	0.64385	1.79964
n_{He-Ne}	0.6328	1.80040
n_D	0.58929	1.80385
n_d	0.58756	**1.80400**
n_e	0.54607	1.80811
n_F	0.48613	**1.81608**
$n_{F'}$	0.47999	1.81708
n_{He-Cd}	0.44157	1.82442
n_g	0.435835	**1.82570**
n_h	0.404656	1.83380
n_i	0.365015	1.84786

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0139
$\Delta\theta_{C,A'}$	0.0048
$\Delta\theta_{g,d}$	−0.0112
$\Delta\theta_{g,F}$	−0.0090
$\Delta\theta_{i,g}$	−0.0518

Constants of Dispersion Formula

A_1	1.68191258
A_2	$4.93779818 \cdot 10^{-1}$
A_3	1.45682822
B_1	$7.76684250 \cdot 10^{-3}$
B_2	$2.88916181 \cdot 10^{-2}$
B_3	$9.92574356 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.76
Remarks		

Partial Dispersions

$n_C - n_t$	0.013452
$n_C - n_{A'}$	0.005820
$n_d - n_C$	0.005185
$n_e - n_C$	0.009294
$n_g - n_d$	0.021699
$n_g - n_F$	0.009619
$n_h - n_g$	0.008101
$n_i - n_g$	0.022157
$n_{C'} - n_t$	0.014273
$n_e - n_{C'}$	0.008473
$n_{F'} - n_e$	0.008971
$n_i - n_{F'}$	0.030776

Thermal Properties

Strain Point	StP (℃)	622
Annealing Point	AP (℃)	670
Transformation Temperature	Tg (℃)	700
Yield Point	At (℃)	723
Softening Point	SP (℃)	743
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	60
	(+100～+300℃)	73
Thermal Conductivity	k (W/m·K)	0.833

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1258
Rigidity Modulus	G (10^8N/m^2)	486
Poisson's Ratio	σ	0.295
Knoop Hardness	Hk	730[7]
Abrasion	Aa	56
Photoelastic Constant (nm/cm/10^5Pa)	β	1.42

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	4.1
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7791
$\theta_{C,A'}$	0.3371
$\theta_{d,C}$	0.3003
$\theta_{e,C}$	0.5383
$\theta_{g,d}$	1.2568
$\theta_{g,F}$	0.5571
$\theta_{h,g}$	0.4692
$\theta_{i,g}$	1.2833
$\theta'_{C',t}$	0.8182
$\theta'_{e,C'}$	0.4857
$\theta'_{F',e}$	0.5143
$\theta'_{i,F'}$	1.7643

Coloring

λ 80／λ 5	39/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.08
330	0.28
340	0.50
350	0.66
360	0.78
370	0.86
380	0.916
390	0.947
400	0.964
420	0.980
440	0.988
460	0.992
480	0.995
500	0.996
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.997
1000	0.997
1200	0.997
1400	0.994
1600	0.993
1800	0.983
2000	0.959
2200	0.89
2400	0.66

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.6	4.0	4.0	4.2	4.4	5.0	5.5
−20 ～ 0	3.7	4.1	4.1	4.4	4.6	5.1	5.7
0 ～ 20	3.8	4.2	4.3	4.5	4.7	5.3	5.9
20 ～ 40	3.9	4.4	4.4	4.7	4.9	5.5	6.1
40 ～ 60	4.0	4.5	4.5	4.8	5.0	5.7	6.3
60 ～ 80	4.0	4.6	4.7	5.0	5.2	5.8	6.5

S–LAH66

773496
776493

Refractive Index	n_d	**1.77250** 1.772499	Abbe Number	ν_d	**49.6** 49.60	Dispersion	$n_F - n_C$ **0.01557** 0.015576
Refractive Index	n_e	1.776208	Abbe Number	ν_e	49.36	Dispersion	$n_{F'} - n_{C'}$ 0.015727

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.73031
n_{1970}	1.97009	1.73786
n_{1530}	1.52958	1.74590
n_{1129}	1.12864	1.75303
n_t	1.01398	1.75541
n_s	0.85211	1.75960
$n_{A'}$	0.76819	1.76248
n_r	0.70652	1.76514
n_C	0.65627	**1.76780**
$n_{C'}$	0.64385	1.76854
n_{He-Ne}	0.6328	1.76924
n_D	0.58929	1.77236
n_d	0.58756	**1.77250**
n_e	0.54607	1.77621
n_F	0.48613	**1.78337**
$n_{F'}$	0.47999	1.78427
n_{He-Cd}	0.44157	1.79083
n_g	0.435835	**1.79197**
n_h	0.404656	1.79917
n_i	0.365015	1.81158

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0161
$\Delta\theta_{C,A'}$	0.0052
$\Delta\theta_{g,d}$	−0.0115
$\Delta\theta_{g,F}$	−0.0092
$\Delta\theta_{i,g}$	−0.0507

Constants of Dispersion Formula

A_1	1.39280586
A_2	$6.79577094 \cdot 10^{-1}$
A_3	1.38702069
B_1	$6.08475118 \cdot 10^{-3}$
B_2	$2.33925351 \cdot 10^{-2}$
B_3	$9.58354094 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.23
Remarks		

Partial Dispersions

$n_C - n_t$	0.012391
$n_C - n_{A'}$	0.005314
$n_d - n_C$	0.004701
$n_e - n_C$	0.008410
$n_g - n_d$	0.019473
$n_g - n_F$	0.008598
$n_h - n_g$	0.007202
$n_i - n_g$	0.019610
$n_{C'} - n_t$	0.013137
$n_e - n_{C'}$	0.007664
$n_{F'} - n_e$	0.008063
$n_i - n_{F'}$	0.027311

Thermal Properties

Strain Point	StP (℃)	641
Annealing Point	AP (℃)	660
Transformation Temperature	Tg (℃)	686
Yield Point	At (℃)	706
Softening Point	SP (℃)	726
Expansion Coefficients	(−30～+70℃)	62
α (10^{-7}/℃)	(+100～+300℃)	74
Thermal Conductivity	k (W/m·K)	0.845

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1219
Rigidity Modulus	G (10^8N/m^2)	472
Poisson's Ratio	σ	0.291
Knoop Hardness	Hk	700[7]
Abrasion	Aa	65
Photoelastic Constant (nm/cm/10^5Pa)	β	1.43

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7955
$\theta_{C,A'}$	0.3412
$\theta_{d,C}$	0.3018
$\theta_{e,C}$	0.5399
$\theta_{g,d}$	1.2502
$\theta_{g,F}$	0.5520
$\theta_{h,g}$	0.4624
$\theta_{i,g}$	1.2590
$\theta'_{C',t}$	0.8353
$\theta'_{e,C'}$	0.4873
$\theta'_{F',e}$	0.5127
$\theta'_{i,F'}$	1.7366

Coloring

λ 80／λ 5	38/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.10
320	0.33
330	0.55
340	0.71
350	0.81
360	0.88
370	0.930
380	0.956
390	0.971
400	0.979
420	0.987
440	0.991
460	0.994
480	0.996
500	0.997
550	0.999
600	0.998
650	0.998
700	0.999
800	0.998
900	0.998
1000	0.998
1200	0.997
1400	0.993
1600	0.993
1800	0.983
2000	0.958
2200	0.88
2400	0.64

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.4	3.8	3.8	4.0	4.2	4.7	5.1
−20 ～ 0	3.5	3.9	4.0	4.2	4.4	4.8	5.3
0 ～ 20	3.6	4.1	4.1	4.3	4.5	5.0	5.5
20 ～ 40	3.7	4.2	4.3	4.5	4.7	5.2	5.7
40 ～ 60	3.8	4.4	4.4	4.7	4.9	5.4	5.9
60 ～ 80	3.9	4.5	4.6	4.8	5.0	5.6	6.1

S–LAH79

003283
011281

Refractive Index	n_d	**2.00330** 2.003300	Abbe Number ν_d	**28.3** 28.27	Dispersion $n_F - n_C$	**0.03549** 0.035486
Refractive Index	n_e	2.011689	Abbe Number ν_e	28.07	Dispersion $n_{F'} - n_{C'}$	0.036041

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.93904
n_{1970}	1.97009	1.94642
n_{1530}	1.52958	1.95518
n_{1129}	1.12864	1.96486
n_t	1.01398	1.96873
n_s	0.85211	1.97630
$n_{A'}$	0.76819	1.98195
n_r	0.70652	1.98739
n_C	0.65627	**1.99301**
$n_{C'}$	0.64385	1.99461
$n_{He\text{-}Ne}$	0.6328	1.99613
n_D	0.58929	2.00299
n_d	0.58756	**2.00330**
n_e	0.54607	2.01169
n_F	0.48613	**2.02850**
$n_{F'}$	0.47999	2.03066
$n_{He\text{-}Cd}$	0.44157	2.04682
n_g	0.435835	**2.04972**
n_h	0.404656	2.06844
n_i	0.365015	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0049
$\Delta\theta_{C,A'}$	0.0015
$\Delta\theta_{g,d}$	0.0020
$\Delta\theta_{g,F}$	0.0023
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula	
A_1	2.32557148
A_2	$5.07967133 \cdot 10^{-1}$
A_3	2.43087198
B_1	$1.32895208 \cdot 10^{-2}$
B_2	$5.28335449 \cdot 10^{-2}$
B_3	$1.61122408 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	5.23
Remarks		

Partial Dispersions	
$n_C - n_t$	0.024281
$n_C - n_{A'}$	0.011059
$n_d - n_C$	0.010289
$n_e - n_C$	0.018678
$n_g - n_d$	0.046416
$n_g - n_F$	0.021219
$n_h - n_g$	0.018725
$n_i - n_g$	—
$n_{C'} - n_t$	0.025885
$n_e - n_{C'}$	0.017074
$n_{F'} - n_e$	0.018967
$n_i - n_{F'}$	—

Thermal Properties		
Strain Point	StP (℃)	
Annealing Point	AP (℃)	
Transformation Temperature	Tg (℃)	699
Yield Point	At (℃)	731
Softening Point	SP (℃)	
Expansion Coefficients (−30～+70℃)		60
α (10^{-7}/℃) (+100～+300℃)		71
Thermal Conductivity	k (W/m·K)	0.957

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	1255
Rigidity Modulus G	(10^8N/m^2)	484
Poisson's Ratio	σ	0.297
Knoop Hardness	Hk	700[7]
Abrasion	Aa	61
Photoelastic Constant (nm/cm/10^5Pa)	β	1.89

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions	
$\theta_{C,t}$	0.6842
$\theta_{C,A'}$	0.3116
$\theta_{d,C}$	0.2899
$\theta_{e,C}$	0.5263
$\theta_{g,d}$	1.3080
$\theta_{g,F}$	0.5980
$\theta_{h,g}$	0.5277
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.7182
$\theta'_{e,C'}$	0.4737
$\theta'_{F',e}$	0.5263
$\theta'_{i,F'}$	—

Coloring	
λ_{70} / λ_5	46/37

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.03
380	0.16
390	0.33
400	0.50
420	0.72
440	0.83
460	0.88
480	0.921
500	0.945
550	0.979
600	0.988
650	0.991
700	0.993
800	0.996
900	0.997
1000	0.997
1200	0.998
1400	0.998
1600	0.997
1800	0.994
2000	0.986
2200	0.966
2400	0.89

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	6.5	8.0	8.1	8.6	9.2	10.7	12.4
−20 ～ 0	6.7	8.2	8.3	8.9	9.5	11.1	12.9
0 ～ 20	6.9	8.5	8.6	9.2	9.8	11.5	13.4
20 ～ 40	7.0	8.7	8.9	9.4	10.1	11.9	13.8
40 ～ 60	7.2	9.0	9.1	9.7	10.4	12.2	14.3
60 ～ 80	7.4	9.2	9.4	10.0	10.7	12.6	14.8

S–YGH51

755523
758521

Refractive Index	n_d	**1.75500** 1.754999	Abbe Number	ν_d	**52.3** 52.32	Dispersion	$n_F - n_C$ **0.01443** 0.014431
Refractive Index	n_e	1.758437	Abbe Number	ν_e	52.08	Dispersion	$n_{F'} - n_{C'}$ 0.014562

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.71387
n_{1970}	1.97009	1.72153
n_{1530}	1.52958	1.72961
n_{1129}	1.12864	1.73662
n_t	1.01398	1.73893
n_s	0.85211	1.74292
$n_{A'}$	0.76819	1.74565
n_r	0.70652	1.74814
n_C	0.65627	**1.75062**
$n_{C'}$	0.64385	1.75132
n_{He-Ne}	0.6328	1.75197
n_D	0.58929	1.75487
n_d	0.58756	**1.75500**
n_e	0.54607	1.75844
n_F	0.48613	**1.76505**
$n_{F'}$	0.47999	1.76588
n_{He-Cd}	0.44157	1.77191
n_g	0.435835	**1.77296**
n_h	0.404656	1.77954
n_i	0.365015	1.79083

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0185
$\Delta\theta_{C,A'}$	0.0055
$\Delta\theta_{g,d}$	−0.0118
$\Delta\theta_{g,F}$	−0.0093
$\Delta\theta_{i,g}$	−0.0485

Constants of Dispersion Formula

A_1	1.08280170
A_2	$9.33988681 \cdot 10^{-1}$
A_3	1.32367286
B_1	$1.81156360 \cdot 10^{-2}$
B_2	$3.04157575 \cdot 10^{-3}$
B_3	$9.10353195 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	4.40
Remarks		

Partial Dispersions

$n_C - n_t$	0.011699
$n_C - n_{A'}$	0.004976
$n_d - n_C$	0.004375
$n_e - n_C$	0.007813
$n_g - n_d$	0.017957
$n_g - n_F$	0.007901
$n_h - n_g$	0.006588
$n_i - n_g$	0.017871
$n_{C'} - n_t$	0.012394
$n_e - n_{C'}$	0.007118
$n_{F'} - n_e$	0.007444
$n_i - n_{F'}$	0.024946

Thermal Properties

Strain Point	StP (℃)	651
Annealing Point	AP (℃)	670
Transformation Temperature	Tg (℃)	700
Yield Point	At (℃)	712
Softening Point	SP (℃)	738
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	58
	(+100～+300℃)	70
Thermal Conductivity	k (W/m·K)	0.842

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	1222
Rigidity Modulus	G (10^8N/m^2)	473
Poisson's Ratio	σ	0.291
Knoop Hardness	Hk	720[7]
Abrasion	Aa	61
Photoelastic Constant (nm/cm/10^5Pa)	β	1.48

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	51.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8107
$\theta_{C,A'}$	0.3448
$\theta_{d,C}$	0.3032
$\theta_{e,C}$	0.5414
$\theta_{g,d}$	1.2443
$\theta_{g,F}$	0.5475
$\theta_{h,g}$	0.4565
$\theta_{i,g}$	1.2384
$\theta'_{C',t}$	0.8511
$\theta'_{e,C'}$	0.4888
$\theta'_{F',e}$	0.5112
$\theta'_{i,F'}$	1.7131

Coloring

λ 80／λ 5	38/28

Internal Transmittance

λ (nm)	τ 10mm
280	0.03
290	0.12
300	0.21
310	0.24
320	0.47
330	0.61
340	0.73
350	0.82
360	0.88
370	0.930
380	0.956
390	0.972
400	0.980
420	0.988
440	0.991
460	0.994
480	0.996
500	0.997
550	0.998
600	0.998
650	0.998
700	0.998
800	0.998
900	0.998
1000	0.997
1200	0.997
1400	0.993
1600	0.993
1800	0.984
2000	0.958
2200	0.88
2400	0.62

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ~ −20		4.5		4.6	4.8	5.3	5.6
−20 ~ 0		4.5		4.7	4.9	5.3	5.7
0 ~ 20		4.6		4.8	5.0	5.4	5.9
20 ~ 40		4.7		4.9	5.1	5.6	6.1
40 ~ 60		4.9		5.1	5.4	5.8	6.3
60 ~ 80		5.1		5.4	5.6	6.0	6.6

S–FTM16

593353
597350

Refractive Index	n_d	**1.59270** 1.592701	Abbe Number	ν_d	**35.3** 35.31	Dispersion	$n_F - n_C$ **0.01679** 0.016785
Refractive Index	n_e	1.596670	Abbe Number	ν_e	35.03	Dispersion	$n_{F'} - n_{C'}$ 0.017031

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.55603
n_{1970}	1.97009	1.56154
n_{1530}	1.52958	1.56767
n_{1129}	1.12864	1.57357
n_t	1.01398	1.57569
n_s	0.85211	1.57962
$n_{A'}$	0.76819	1.58243
n_r	0.70652	1.58508
n_C	0.65627	**1.58779**
$n_{C'}$	0.64385	1.58856
n_{He-Ne}	0.6328	1.58929
n_D	0.58929	1.59255
n_d	0.58756	**1.59270**
n_e	0.54607	1.59667
n_F	0.48613	**1.60458**
$n_{F'}$	0.47999	1.60559
n_{He-Cd}	0.44157	1.61318
n_g	0.435835	**1.61454**
n_h	0.404656	1.62334
n_i	0.365015	1.63974

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0088
$\Delta\theta_{C,A'}$	0.0010
$\Delta\theta_{g,d}$	0.0096
$\Delta\theta_{g,F}$	0.0090
$\Delta\theta_{i,g}$	0.0721

Constants of Dispersion Formula

A_1	1.32940907
A_2	$1.41512125 \cdot 10^{-1}$
A_3	1.44299068
B_1	$1.02377287 \cdot 10^{-2}$
B_2	$5.78081956 \cdot 10^{-2}$
B_3	$1.50597139 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.64
Remarks		

Partial Dispersions

$n_C - n_t$	0.012104
$n_C - n_{A'}$	0.005365
$n_d - n_C$	0.004906
$n_e - n_C$	0.008875
$n_g - n_d$	0.021838
$n_g - n_F$	0.009959
$n_h - n_g$	0.008800
$n_i - n_g$	0.025202
$n_{C'} - n_t$	0.012872
$n_e - n_{C'}$	0.008107
$n_{F'} - n_e$	0.008924
$n_i - n_{F'}$	0.034147

Thermal Properties

Strain Point	StP (℃)	—
Annealing Point	AP (℃)	—
Transformation Temperature	Tg (℃)	501
Yield Point	At (℃)	542
Softening Point	SP (℃)	—
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	90
	(+100～+300℃)	100
Thermal Conductivity	k (W/m·K)	0.947

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	653
Rigidity Modulus G	(10^8N/m^2)	264
Poisson's Ratio	σ	0.238
Knoop Hardness	Hk	490[5]
Abrasion	Aa	172
Photoelastic Constant (nm/cm/10^5Pa)	β	3.33

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7211
$\theta_{C,A'}$	0.3196
$\theta_{d,C}$	0.2923
$\theta_{e,C}$	0.5287
$\theta_{g,d}$	1.3010
$\theta_{g,F}$	0.5933
$\theta_{h,g}$	0.5243
$\theta_{i,g}$	1.5015
$\theta'_{C',t}$	0.7558
$\theta'_{e,C'}$	0.4760
$\theta'_{F',e}$	0.5240
$\theta'_{i,F'}$	2.0050

Coloring

λ 80／λ 5	38/35

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	0.04
360	0.43
370	0.81
380	0.934
390	0.973
400	0.984
420	0.989
440	0.990
460	0.991
480	0.992
500	0.994
550	0.997
600	0.997
650	0.996
700	0.996
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.996
1600	0.994
1800	0.989
2000	0.987
2200	0.959
2400	0.953

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−1.0	−0.5	−0.4	−0.2	0.0	0.7	1.4
−20 ～ 0	−0.9	−0.4	−0.3	0.0	0.2	0.8	1.6
0 ～ 20	−0.8	−0.2	−0.2	0.1	0.3	1.0	1.8
20 ～ 40	−0.7	−0.1	−0.1	0.2	0.5	1.2	2.1
40 ～ 60	−0.6	0.0	0.0	0.3	0.6	1.4	2.3
60 ～ 80	−0.5	0.1	0.1	0.4	0.7	1.6	2.5

S–NPH 1

808228
816226

Refractive Index	n_d	**1.80809** 1.808095	Abbe Number	ν_d	**22.8** 22.76	Dispersion	$n_F - n_C$ **0.03550** 0.035504
Refractive Index	n_e	1.816434	Abbe Number	ν_e	22.57	Dispersion	$n_{F'} - n_{C'}$ 0.036174

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.74455
n_{1970}	1.97009	1.75226
n_{1530}	1.52958	1.76125
n_{1129}	1.12864	1.77084
n_t	1.01398	1.77459
n_s	0.85211	1.78187
$n_{A'}$	0.76819	1.78731
n_r	0.70652	1.79256
n_C	0.65627	**1.79801**
$n_{C'}$	0.64385	1.79957
n_{He-Ne}	0.6328	1.80105
n_D	0.58929	1.80779
n_d	0.58756	**1.80809**
n_e	0.54607	1.81643
n_F	0.48613	**1.83351**
$n_{F'}$	0.47999	1.83575
n_{He-Cd}	0.44157	1.85279
n_g	0.435835	**1.85590**
n_h	0.404656	1.87658
n_i	0.365015	—

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0061
$\Delta\theta_{C,A'}$	−0.0020
$\Delta\theta_{g,d}$	0.0292
$\Delta\theta_{g,F}$	0.0261
$\Delta\theta_{i,g}$	—

Constants of Dispersion Formula

A_1	1.75156623
A_2	$3.64006304 \cdot 10^{-1}$
A_3	2.47874141
B_1	$1.35004681 \cdot 10^{-2}$
B_2	$6.68245147 \cdot 10^{-2}$
B_3	$1.70756006 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	3.29
Remarks		

Partial Dispersions

$n_C - n_t$	0.023420
$n_C - n_{A'}$	0.010701
$n_d - n_C$	0.010086
$n_e - n_C$	0.018425
$n_g - n_d$	0.047809
$n_g - n_F$	0.022391
$n_h - n_g$	0.020676
$n_i - n_g$	—
$n_{C'} - n_t$	0.024983
$n_e - n_{C'}$	0.016862
$n_{F'} - n_e$	0.019312
$n_i - n_{F'}$	—

Thermal Properties

Strain Point	StP (℃)	516
Annealing Point	AP (℃)	547
Transformation Temperature	Tg (℃)	552
Yield Point	At (℃)	589
Softening Point	SP (℃)	645
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	83
	(+100～+300℃)	104
Thermal Conductivity	k (W/m·K)	0.882

Mechanical Properties

Young's Modulus	E (10^8N/m^2)	893
Rigidity Modulus	G (10^8N/m^2)	357
Poisson's Ratio	σ	0.250
Knoop Hardness	Hk	460[5]
Abrasion	Aa	291
Photoelastic Constant (nm/cm/10^5Pa)	β	3.23

Chemical Properties

Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6596
$\theta_{C,A'}$	0.3014
$\theta_{d,C}$	0.2841
$\theta_{e,C}$	0.5190
$\theta_{g,d}$	1.3466
$\theta_{g,F}$	0.6307
$\theta_{h,g}$	0.5824
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.6906
$\theta'_{e,C'}$	0.4661
$\theta'_{F',e}$	0.5339
$\theta'_{i,F'}$	—

Coloring

λ 80／λ 5	44/38

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	
380	0.14
390	0.53
400	0.77
420	0.917
440	0.952
460	0.967
480	0.975
500	0.982
550	0.992
600	0.994
650	0.995
700	0.996
800	0.997
900	0.997
1000	0.996
1200	0.997
1400	0.994
1600	0.992
1800	0.984
2000	0.973
2200	0.934
2400	0.88

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20	−1.9	−1.2	−1.1	−0.7	−0.2	1.2	3.0
−20 ～ 0	−1.9	−1.1	−1.0	−0.6	0.0	1.5	3.4
0 ～ 20	−1.8	−0.9	−0.8	−0.4	0.2	1.8	3.8
20 ～ 40	−1.8	−0.8	−0.7	−0.3	0.4	2.1	4.3
40 ～ 60	−1.8	−0.7	−0.6	−0.1	0.6	2.4	4.7
60 ～ 80	−1.7	−0.5	−0.4	0.1	0.8	2.7	5.1

S–NPH2

923189
934187

Refractive Index	n_d	**1.92286** 1.922860	Abbe Number ν_d	**18.9** 18.90	Dispersion $n_F - n_C$	**0.04884** 0.048838
Refractive Index	n_e	1.934291	Abbe Number ν_e	18.74	Dispersion $n_{F'} - n_{C'}$	0.049853

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.84214
n_{1970}	1.97009	1.85093
n_{1530}	1.52958	1.86146
n_{1129}	1.12864	1.87327
n_t	1.01398	1.87807
n_s	0.85211	1.88758
$n_{A'}$	0.76819	1.89479
n_r	0.70652	1.90181
n_C	0.65627	**1.90916**
$n_{C'}$	0.64385	1.91127
n_{He-Ne}	0.6328	1.91327
n_D	0.58929	1.92245
n_d	0.58756	**1.92286**
n_e	0.54607	1.93429
n_F	0.48613	**1.95800**
$n_{F'}$	0.47999	1.96112
n_{He-Cd}	0.44157	1.98526
n_g	0.435835	**1.98972**
n_h	0.404656	2.01976
n_i	0.365015	—

Partial Dispersions	
$n_C - n_t$	0.031086
$n_C - n_{A'}$	0.014367
$n_d - n_C$	0.013702
$n_e - n_C$	0.025133
$n_g - n_d$	0.066857
$n_g - n_F$	0.031721
$n_h - n_g$	0.030046
$n_i - n_g$	—
$n_{C'} - n_t$	0.033200
$n_e - n_{C'}$	0.023019
$n_{F'} - n_e$	0.026834
$n_i - n_{F'}$	—

Relative Partial Dispersions	
$\theta_{C,t}$	0.6365
$\theta_{C,A'}$	0.2942
$\theta_{d,C}$	0.2806
$\theta_{e,C}$	0.5146
$\theta_{g,d}$	1.3690
$\theta_{g,F}$	0.6495
$\theta_{h,g}$	0.6152
$\theta_{i,g}$	—
$\theta'_{C',t}$	0.6660
$\theta'_{e,C'}$	0.4617
$\theta'_{F',e}$	0.5383
$\theta'_{i,F'}$	—

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0012
$\Delta\theta_{C,A'}$	-0.0045
$\Delta\theta_{g,d}$	0.0436
$\Delta\theta_{g,F}$	0.0386
$\Delta\theta_{i,g}$	—

Thermal Properties		
Strain Point	StP (℃)	604
Annealing Point	AP (℃)	631
Transformation Temperature	Tg (℃)	650
Yield Point	At (℃)	676
Softening Point	SP (℃)	716
Expansion Coefficients (−30～+70℃)		67
α (10^{-7}/℃) (+100～+300℃)		83
Thermal Conductivity	k (W/m·K)	0.969

Coloring	
λ 70／λ 5	44/39

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	
380	
390	0.02
400	0.24
420	0.70
440	0.85
460	0.910
480	0.936
500	0.953
550	0.978
600	0.988
650	0.990
700	0.993
800	0.996
900	0.996
1000	0.996
1200	0.997
1400	0.997
1600	0.996
1800	0.992
2000	0.988
2200	0.977
2400	0.961

Constants of Dispersion Formula	
A_1	2.03869510
A_2	$4.37269641 \cdot 10^{-1}$
A_3	2.96711461
B_1	$1.70796224 \cdot 10^{-2}$
B_2	$7.49254813 \cdot 10^{-2}$
B_3	$1.74155354 \cdot 10^{2}$

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	991
Rigidity Modulus G	(10^8N/m^2)	397
Poisson's Ratio	σ	0.249
Knoop Hardness	Hk	450[5]
Abrasion	Aa	224
Photoelastic Constant (nm/cm/10^5Pa)	β	3.31

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.58
Remarks		

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	-0.6	0.4	0.5	1.2	1.8	3.8	6.6
−20 ～ 0	-0.6	0.6	0.7	1.4	2.1	4.3	7.4
0 ～ 20	-0.4	0.9	1.0	1.8	2.5	4.8	8.1
20 ～ 40	-0.2	1.1	1.3	2.1	2.8	5.4	8.8
40 ～ 60	0.0	1.4	1.5	2.3	3.2	5.9	9.6
60 ～ 80	0.2	1.6	1.8	2.7	3.6	6.4	10.3

S–NBM51

613443
617440

Refractive Index	n_d	**1.61340** 1.613397	Abbe Number	ν_d	**44.3** 44.27	Dispersion	$n_F - n_C$ **0.01386** 0.013857
Refractive Index	n_e	1.616690	Abbe Number	ν_e	44.02	Dispersion	$n_{F'} - n_{C'}$ 0.014008

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.57660
n_{1970}	1.97009	1.58313
n_{1530}	1.52958	1.59012
n_{1129}	1.12864	1.59633
n_t	1.01398	1.59841
n_s	0.85211	1.60206
$n_{A'}$	0.76819	1.60459
n_r	0.70652	1.60691
n_C	0.65627	**1.60925**
$n_{C'}$	0.64385	1.60990
n_{He-Ne}	0.6328	1.61052
n_D	0.58929	1.61328
n_d	0.58756	**1.61340**
n_e	0.54607	1.61669
n_F	0.48613	**1.62311**
$n_{F'}$	0.47999	1.62391
n_{He-Cd}	0.44157	1.62986
n_g	0.435835	**1.63091**
n_h	0.404656	1.63755
n_i	0.365015	1.64927

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0281
$\Delta\theta_{C,A'}$	0.0070
$\Delta\theta_{g,d}$	-0.0089
$\Delta\theta_{g,F}$	-0.0065
$\Delta\theta_{i,g}$	-0.0294

Constants of Dispersion Formula

A_1	1.37023101
A_2	$1.77665568 \cdot 10^{-1}$
A_3	1.30515471
B_1	$8.71920342 \cdot 10^{-3}$
B_2	$4.05725552 \cdot 10^{-2}$
B_3	$1.12703058 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.93
Remarks		

Partial Dispersions

$n_C - n_t$	0.010843
$n_C - n_{A'}$	0.004663
$n_d - n_C$	0.004149
$n_e - n_C$	0.007442
$n_g - n_d$	0.017514
$n_g - n_F$	0.007806
$n_h - n_g$	0.006644
$n_i - n_g$	0.018359
$n_{C'} - n_t$	0.011500
$n_e - n_{C'}$	0.006785
$n_{F'} - n_e$	0.007223
$n_i - n_{F'}$	0.025357

Thermal Properties

Strain Point	StP (℃)	509
Annealing Point	AP (℃)	531
Transformation Temperature	Tg (℃)	554
Yield Point	At (℃)	611
Softening Point	SP (℃)	693
Expansion Coefficients (−30～+70℃)		65
α (10^{-7}/℃) (+100～+300℃)		78
Thermal Conductivity	k (W/m·K)	0.904

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	817
Rigidity Modulus G	(10^8N/m^2)	329
Poisson's Ratio	σ	0.243
Knoop Hardness	Hk	570[6]
Abrasion	Aa	121
Photoelastic Constant (nm/cm/10^5Pa)	β	3.47

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7825
$\theta_{C,A'}$	0.3365
$\theta_{d,C}$	0.2994
$\theta_{e,C}$	0.5371
$\theta_{g,d}$	1.2639
$\theta_{g,F}$	0.5633
$\theta_{h,g}$	0.4795
$\theta_{i,g}$	1.3249
$\theta'_{C',t}$	0.8210
$\theta'_{e,C'}$	0.4844
$\theta'_{F',e}$	0.5156
$\theta'_{i,F'}$	1.8102

Coloring

λ_{80} / λ_5	36/32

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	0.08
330	0.48
340	0.75
350	0.87
360	0.925
370	0.953
380	0.968
390	0.978
400	0.984
420	0.989
440	0.992
460	0.993
480	0.995
500	0.997
550	0.999
600	0.999
650	0.999
700	0.999
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.998
1600	0.994
1800	0.987
2000	0.972
2200	0.89
2400	0.76

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.0	3.4	3.4	3.6	3.8	4.2	4.7
−20 ～ 0	3.1	3.6	3.6	3.7	3.9	4.4	4.9
0 ～ 20	3.2	3.7	3.7	3.9	4.1	4.6	5.1
20 ～ 40	3.2	3.8	3.8	4.0	4.2	4.8	5.3
40 ～ 60	3.4	3.9	4.0	4.2	4.4	4.9	5.5
60 ～ 80	3.5	4.1	4.1	4.3	4.5	5.1	5.7

S–NBH5

654397
658395

Refractive Index	n_d	**1.65412** 1.654115	Abbe Number ν_d	**39.7** 39.68	Dispersion $n_F - n_C$	**0.01648** 0.016484
Refractive Index	n_e	1.658026	Abbe Number ν_e	39.43	Dispersion $n_{F'} - n_{C'}$	0.016687

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.61410
n_{1970}	1.97009	1.62070
n_{1530}	1.52958	1.62787
n_{1129}	1.12864	1.63448
n_t	1.01398	1.63677
n_s	0.85211	1.64090
$n_{A'}$	0.76819	1.64379
n_r	0.70652	1.64649
n_C	0.65627	**1.64923**
$n_{C'}$	0.64385	1.65000
n_{He-Ne}	0.6328	1.65072
n_D	0.58929	1.65397
n_d	0.58756	**1.65412**
n_e	0.54607	1.65803
n_F	0.48613	**1.66571**
$n_{F'}$	0.47999	1.66668
n_{He-Cd}	0.44157	1.67389
n_g	0.435835	**1.67517**
n_h	0.404656	1.68331
n_i	0.365015	1.69791

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0226
$\Delta\theta_{C,A'}$	0.0056
$\Delta\theta_{g,d}$	-0.0052
$\Delta\theta_{g,F}$	-0.0036
$\Delta\theta_{i,g}$	-0.0132

Constants of Dispersion Formula	
A_1	1.47544521
A_2	$1.93060095 \cdot 10^{-1}$
A_3	1.50939010
B_1	$9.55836740 \cdot 10^{-3}$
B_2	$4.60430483 \cdot 10^{-2}$
B_3	$1.26422746 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.02
Remarks		

Partial Dispersions	
$n_C - n_t$	0.012452
$n_C - n_{A'}$	0.005432
$n_d - n_C$	0.004890
$n_e - n_C$	0.008801
$n_g - n_d$	0.021051
$n_g - n_F$	0.009457
$n_h - n_g$	0.008144
$n_i - n_g$	0.022741
$n_{C'} - n_t$	0.013223
$n_e - n_{C'}$	0.008030
$n_{F'} - n_e$	0.008657
$n_i - n_{F'}$	0.031224

Thermal Properties		
Strain Point	StP (℃)	489
Annealing Point	AP (℃)	511
Transformation Temperature	Tg (℃)	524
Yield Point	At (℃)	575
Softening Point	SP (℃)	645
Expansion Coefficients (−30～+70℃)		66
α (10^{-7}/℃) (+100～+300℃)		84
Thermal Conductivity	k(W/m·K)	0.965

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	902
Rigidity Modulus G	(10^8N/m^2)	361
Poisson's Ratio	σ	0.248
Knoop Hardness	Hk	580[6]
Abrasion	Aa	130
Photoelastic Constant (nm/cm/10^5Pa)	β	3.22

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions	
$\theta_{C,t}$	0.7554
$\theta_{C,A'}$	0.3295
$\theta_{d,C}$	0.2967
$\theta_{e,C}$	0.5339
$\theta_{g,d}$	1.2771
$\theta_{g,F}$	0.5737
$\theta_{h,g}$	0.4941
$\theta_{i,g}$	1.3796
$\theta'_{C',t}$	0.7924
$\theta'_{e,C'}$	0.4812
$\theta'_{F',e}$	0.5188
$\theta'_{i,F'}$	1.8712

Coloring	
λ 80／λ 5	37/33

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.12
340	0.47
350	0.71
360	0.83
370	0.902
380	0.936
390	0.957
400	0.969
420	0.980
440	0.985
460	0.988
480	0.991
500	0.994
550	0.997
600	0.997
650	0.997
700	0.998
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.991
1600	0.994
1800	0.989
2000	0.976
2200	0.919
2400	0.80

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	3.5	4.1	4.1	4.3	4.6	5.1	5.8
−20 ～ 0	3.6	4.2	4.2	4.5	4.7	5.3	6.0
0 ～ 20	3.7	4.3	4.4	4.6	4.9	5.5	6.2
20 ～ 40	3.8	4.4	4.5	4.8	5.0	5.7	6.4
40 ～ 60	3.9	4.6	4.6	4.9	5.1	5.8	6.6
60 ～ 80	3.9	4.7	4.7	5.0	5.3	6.0	6.8

S–NBH8

720347
725345

Refractive Index	n_d	**1.72047** 1.720467	Abbe Number ν_d	**34.7** 34.71	Dispersion $n_F - n_C$	**0.02075** 0.020758
Refractive Index	n_e	1.725385	Abbe Number ν_e	34.47	Dispersion $n_{F'} - n_{C'}$	0.021042

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.67534
n_{1970}	1.97009	1.68198
n_{1530}	1.52958	1.68941
n_{1129}	1.12864	1.69665
n_t	1.01398	1.69928
n_s	0.85211	1.70416
$n_{A'}$	0.76819	1.70767
n_r	0.70652	1.71099
n_C	0.65627	**1.71437**
$n_{C'}$	0.64385	1.71532
n_{He-Ne}	0.6328	1.71622
n_D	0.58929	1.72029
n_d	0.58756	**1.72047**
n_e	0.54607	1.72538
n_F	0.48613	**1.73512**
$n_{F'}$	0.47999	1.73636
n_{He-Cd}	0.44157	1.74559
n_g	0.435835	**1.74723**
n_h	0.404656	1.75777
n_i	0.365015	1.77689

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0172
$\Delta\theta_{C,A'}$	0.0044
$\Delta\theta_{g,d}$	-0.0031
$\Delta\theta_{g,F}$	-0.0019
$\Delta\theta_{i,g}$	-0.0056

Constants of Dispersion Formula

A_1	1.61344136
A_2	$2.57295888 \cdot 10^{-1}$
A_3	1.98364455
B_1	$1.06386752 \cdot 10^{-2}$
B_2	$4.87071624 \cdot 10^{-2}$
B_3	$1.59784404 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.19
Remarks		

Partial Dispersions

$n_C - n_t$	0.015084
$n_C - n_{A'}$	0.006690
$n_d - n_C$	0.006102
$n_e - n_C$	0.011020
$n_g - n_d$	0.026767
$n_g - n_F$	0.012111
$n_h - n_g$	0.010534
$n_i - n_g$	0.029660
$n_{C'} - n_t$	0.016041
$n_e - n_{C'}$	0.010063
$n_{F'} - n_e$	0.010979
$n_i - n_{F'}$	0.040530

Thermal Properties

Strain Point	StP (℃)	476
Annealing Point	AP (℃)	499
Transformation Temperature	Tg (℃)	508
Yield Point	At (℃)	555
Softening Point	SP (℃)	611
Expansion Coefficients (−30～+70℃)		81
α (10^{-7}/℃) (+100～+300℃)		100
Thermal Conductivity	k (W/m·K)	1.052

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1017
Rigidity Modulus G	(10^8N/m^2)	407
Poisson's Ratio	σ	0.250
Knoop Hardness	Hk	590[6]
Abrasion	Aa	155
Photoelastic Constant (nm/cm/10^5Pa)	β	2.90

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7267
$\theta_{C,A'}$	0.3223
$\theta_{d,C}$	0.2940
$\theta_{e,C}$	0.5309
$\theta_{g,d}$	1.2895
$\theta_{g,F}$	0.5834
$\theta_{h,g}$	0.5075
$\theta_{i,g}$	1.4288
$\theta'_{C',t}$	0.7623
$\theta'_{e,C'}$	0.4782
$\theta'_{F',e}$	0.5218
$\theta'_{i,F'}$	1.9261

Coloring

λ 80／λ 5	40/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.03
340	0.24
350	0.49
360	0.67
370	0.79
380	0.86
390	0.908
400	0.936
420	0.962
440	0.972
460	0.979
480	0.984
500	0.989
550	0.996
600	0.997
650	0.997
700	0.998
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.997
1600	0.997
1800	0.992
2000	0.984
2200	0.955
2400	0.88

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
–40 ~ –20	2.2	3.0	3.0	3.3	3.6	4.3	5.2
–20 ~ 0	2.2	3.0	3.1	3.4	3.7	4.5	5.4
0 ~ 20	2.2	3.1	3.1	3.4	3.8	4.6	5.5
20 ~ 40	2.2	3.1	3.2	3.5	3.9	4.7	5.7
40 ~ 60	2.3	3.2	3.3	3.6	3.9	4.9	5.9
60 ~ 80	2.4	3.3	3.3	3.6	4.0	5.0	6.1

S–NBH51

750353
755351

Refractive Index	n_d	**1.74950** 1.749505	Abbe Number	ν_d	**35.3** 35.33	Dispersion	$n_F - n_C$ **0.02121** 0.021214
Refractive Index	n_e	1.754531	Abbe Number	ν_e	35.10	Dispersion	$n_{F'} - n_{C'}$ 0.021498

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.70260
n_{1970}	1.97009	1.70965
n_{1530}	1.52958	1.71748
n_{1129}	1.12864	1.72503
n_t	1.01398	1.72776
n_s	0.85211	1.73279
$n_{A'}$	0.76819	1.73640
n_r	0.70652	1.73980
n_C	0.65627	**1.74326**
$n_{C'}$	0.64385	1.74424
$n_{He\text{-}Ne}$	0.6328	1.74516
n_D	0.58929	1.74932
n_d	0.58756	**1.74950**
n_e	0.54607	1.75453
n_F	0.48613	**1.76447**
$n_{F'}$	0.47999	1.76574
$n_{He\text{-}Cd}$	0.44157	1.77515
n_g	0.435835	**1.77681**
n_h	0.404656	1.78753
n_i	0.365015	1.80695

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0184
$\Delta\theta_{C,A'}$	0.0047
$\Delta\theta_{g,d}$	-0.0039
$\Delta\theta_{g,F}$	-0.0025
$\Delta\theta_{i,g}$	-0.0085

Constants of Dispersion Formula

A_1	1.71203689
A_2	$2.55989588 \cdot 10^{-1}$
A_3	1.81456998
B_1	$1.07724134 \cdot 10^{-2}$
B_2	$4.88593504 \cdot 10^{-2}$
B_3	$1.36359013 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.29
Remarks		

Partial Dispersions

$n_C - n_t$	0.015503
$n_C - n_{A'}$	0.006860
$n_d - n_C$	0.006246
$n_e - n_C$	0.011272
$n_g - n_d$	0.027310
$n_g - n_F$	0.012342
$n_h - n_g$	0.010718
$n_i - n_g$	0.030139
$n_{C'} - n_t$	0.016484
$n_e - n_{C'}$	0.010291
$n_{F'} - n_e$	0.011207
$n_i - n_{F'}$	0.041216

Thermal Properties

Strain Point	StP (℃)	500
Annealing Point	AP (℃)	521
Transformation Temperature	Tg (℃)	535
Yield Point	At (℃)	578
Softening Point	SP (℃)	631
Expansion Coefficients (−30～+70℃)		73
α (10^{-7}/℃) (+100～+300℃)		92
Thermal Conductivity	k (W/m·K)	1.124

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1097
Rigidity Modulus G	(10^8N/m^2)	438
Poisson's Ratio	σ	0.253
Knoop Hardness	Hk	610[6]
Abrasion	Aa	115
Photoelastic Constant (nm/cm/10^5Pa)	β	2.66

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	3
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7308
$\theta_{C,A'}$	0.3234
$\theta_{d,C}$	0.2944
$\theta_{e,C}$	0.5313
$\theta_{g,d}$	1.2874
$\theta_{g,F}$	0.5818
$\theta_{h,g}$	0.5052
$\theta_{i,g}$	1.4207
$\theta'_{C',t}$	0.7668
$\theta'_{e,C'}$	0.4787
$\theta'_{F',e}$	0.5213
$\theta'_{i,F'}$	1.9172

Coloring

λ 80／λ 5	40/33

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	0.02
340	0.22
350	0.49
360	0.68
370	0.80
380	0.87
390	0.918
400	0.943
420	0.967
440	0.976
460	0.982
480	0.987
500	0.991
550	0.997
600	0.997
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.998
1400	0.995
1600	0.994
1800	0.989
2000	0.980
2200	0.945
2400	0.87

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
–40 ~ –20	4.1	4.9	4.9	5.2	5.5	6.3	7.1
–20 ~ 0	4.1	4.9	5.0	5.2	5.6	6.4	7.3
0 ~ 20	4.1	4.9	5.0	5.3	5.6	6.5	7.5
20 ~ 40	4.1	5.0	5.0	5.3	5.7	6.6	7.6
40 ~ 60	4.1	5.0	5.1	5.4	5.8	6.7	7.8
60 ~ 80	4.1	5.1	5.1	5.4	5.9	6.9	8.0

GLASS TYPE	CODE	n_d	ν_d	n_F-n_C	n_e	ν_e	$n_{F'}$-$n_{C'}$	$n_{A'}$	n_C	$n_{He\text{-}Ne}$	n_F	n_g	n_h	n_i	Powder Test		Surface Test			Tg (℃)	At (℃)	α ($X10^{-7}$)		Knoop Hard-ness Group	Abra-sion	Color-ing	Bub. Grp.	Spe-cific Grav-ity	Re-marks	GLASS TYPE
		587.56			546.07			768.19	656.27	632.8	486.13	435.83	404.66	365.01	RW(P)	RA(P)	W(S)	SR	PR			-30~ 70℃	100~ 300℃							
FSL 3	465659	1.46450	66.0	0.00704	1.46618	65.8	0.00709	1.45978	1.46233	1.46300	1.46937	1.47312	1.47621	1.48142	6	6	3~4	52.0	2.0	363	447	79	93	340 3	131	34/29		2.25		FSL 3
S-APL 1	517696	1.51728	69.6	0.00743	1.51905	69.3	0.00749	1.51232	1.51499	1.51570	1.52242	1.52638	1.52963	1.53515	3	3	2	1.0	1.0	465	511	96	115	380 4	264	35/31		2.59		S-APL 1
BSL 1	510636	1.51009	63.7	0.00801	1.51200	63.4	0.00808	1.50479	1.50764	1.50839	1.51565	1.51997	1.52353	1.52953	1	1	1	1.0	1.0	550	601	80	94	540 5	106	33/29		2.48		BSL 1
BSL 3	498650	1.49831	65.1	0.00766	1.50014	64.8	0.00772	1.49318	1.49595	1.49668	1.50361	1.50769	1.51104	1.51670	3	4	2	3.0	2.0	538	590	58	65	470 5	90	33/29	B	2.36		BSL 3
BSL21	504668	1.50378	66.8	0.00754	1.50558	66.6	0.00759	1.49873	1.50145	1.50217	1.50899	1.51299	1.51627	1.52182	1	1	1	1.0	1.0	573	648	62	70	540 5	95	32/29		2.46		BSL21
BSL22	518650	1.51821	65.0	0.00797	1.52011	64.9	0.00802	1.51285	1.51574	1.51651	1.52371	1.52795	1.53145	1.53736	3	1	1	1.0	1.0	580	622	71	82	570 6	98	34/29		2.52		BSL22
S-NSL2	516568	1.51602	56.8	0.00908	1.51818	56.6	0.00916	1.51012	1.51326	1.51411	1.52234	1.52731	1.53147	1.53860	3	1	1	1.0	1.0	481	530	88	108	510 5	101	35/32		2.47		S-NSL2
NSL 7	511605	1.51112	60.5	0.00845	1.51314	60.2	0.00852	1.50560	1.50855	1.50934	1.51700	1.52159	1.52540	1.53189	3	1	2	1.0	1.0	515	567	90	102	510 5	111	33/30		2.49		NSL 7
NSL33	515547	1.51454	54.7	0.00941	1.51678	54.4	0.00950	1.50847	1.51169	1.51257	1.52110	1.52628	1.53061	1.53810	3	2	2	1.0	1.0	450	504	91	107	420 4	102	33/30	B	2.60		NSL33
BAL 5	547536	1.54739	53.6	0.01022	1.54983	53.3	0.01032	1.54083	1.54431	1.54526	1.55453	1.56020	1.56496	1.57322	2	3	2	2.2	2.0	500	544	92	106	520 5	150	34/31		2.82		BAL 5
BAL 7	589512	1.58875	51.2	0.01151	1.59149	50.9	0.01162	1.58145	1.58530	1.58636	1.59681	1.60322	1.60862	1.61800	1	3	2	4.2	2.2	535	586	75	88	560 6	140	35/32		3.18		BAL 7
BAL15	557587	1.55671	58.7	0.00948	1.55897	58.5	0.00956	1.55053	1.55383	1.55471	1.56331	1.56848	1.57277	1.58012	1	2	2	2.2	2.0	552	605	74	85	530 5	136	34/30		2.90		BAL15
S-BAL22	569631	1.56873	63.1	0.00901	1.57088	62.9	0.00908	1.56276	1.56597	1.56682	1.57498	1.57982	1.58382	1.59060	4	5	3~4	51.2	3.0	619	654	65	75	570 6	127	34/29		3.05		S-BAL22
S-BAL50	560612	1.55963	61.2	0.00915	1.56181	60.9	0.00922	1.55362	1.55683	1.55769	1.56598	1.57091	1.57499	1.58193	3	4	2	4.2	2.2	538	573	75	90	620 6	115	35/30		2.74		S-BAL50
S-PHM51	617628	1.61700	62.8	0.00982	1.61934	62.6	0.00990	1.61058	1.61401	1.61493	1.62383	1.62917	1.63359	1.64111	2	5	2	51.2	4.0	563	599	97	111	450 5	284	37/32		3.53		S-PHM51
BSM 6	614564	1.61375	56.4	0.01088	1.61634	56.1	0.01099	1.60673	1.61046	1.61147	1.62134	1.62731	1.63229	1.64083	1	4	2~3	51.2	2.0	655	682	66	77	520 5	141	36/30		3.60		BSM 6
BSM 7	607594	1.60729	59.4	0.01023	1.60973	59.1	0.01031	1.60064	1.60418	1.60514	1.61441	1.61997	1.62458	1.63246	2	4	3	51.2	2.2	667	699	65	76	540 5	131	35/29		3.51		BSM 7
BSM16C	620603	1.62041	60.3	0.01029	1.62287	59.9	0.01039	1.61369	1.61728	1.61824	1.62757	1.63316	1.63779	1.64568	3	5	3	52.2	3.2	651	683	63	74	530 5	132	35/29		3.57		BSM16C
S-BSM21	617540	1.61720	54.0	0.01142	1.61991	53.8	0.01153	1.60986	1.61375	1.61481	1.62517	1.63148	1.63677	1.64594	2	2	2~3	1.0	1.0	676	715	65	76	550 6	136	38/34		3.49		S-BSM21
BSM23	615512	1.61484	51.2	0.01201	1.61770	50.9	0.01214	1.60720	1.61124	1.61234	1.62325	1.62995	1.63559	1.64543	1	3	2	4.2	2.0	615	656	71	82	500 5	167	38/34		3.45		BSM23
BSM24	618551	1.61765	55.0	0.01122	1.62032	54.8	0.01133	1.61042	1.61425	1.61530	1.62547	1.63165	1.63681	1.64568	1	4	2	51.2	2.2	655	680	65	76	520 5	141	36/32		3.63		BSM24
S-BSM36	643584	1.64250	58.4	0.01101	1.64512	58.1	0.01110	1.63528	1.63914	1.64017	1.65015	1.65611	1.66104	1.66947	4	5	3	53.2	4.2	640	664	64	78	550 6	127	36/29		3.64		S-BSM36
S-BSM93	641569	1.64100	56.9	0.01126	1.64368	56.7	0.01136	1.63370	1.63759	1.63863	1.64885	1.65500	1.66013	1.66894	4	5	3	53.0	3.2	672	692	67	80	550 6	146	37/33		3.70		S-BSM93
PBL 1	548458	1.54814	45.8	0.01197	1.55099	45.5	0.01211	1.54058	1.54457	1.54566	1.55654	1.56331	1.56908	1.57927	2	1	1	1.0	1.0	442	485	84	97	430 4	106	33/31		2.93		PBL 1
PBL 2	541472	1.54072	47.2	0.01145	1.54344	47.0	0.01157	1.53347	1.53730	1.53834	1.54875	1.55519	1.56067	1.57032	2	1	1	1.0	1.0	435	480	88	104	420 4	113	33/30		2.86		PBL 2
PBL 6	532489	1.53172	48.9	0.01088	1.53430	48.6	0.01099	1.52480	1.52845	1.52945	1.53933	1.54541	1.55056	1.55959	2	1	2	1.0	1.0	414	463	84	99	430 4	115	33/31		2.80		PBL 6
PBL21	573426	1.57309	42.6	0.01346	1.57629	42.3	0.01363	1.56471	1.56911	1.57032	1.58257	1.59026	1.59685	1.60861	1	1	1	1.0	1.0	445	480	85	95	440 4	136	35/32		3.17		PBL21

GLASS TYPE	CODE	n_d	ν_d	n_F-n_C	n_e	ν_e	$n_{F'}$-$n_{C'}$	$n_{A'}$	n_C	n_{He-Ne}	n_F	n_g	n_h	n_i	Powder Test		Surface Test			Tg (℃)	At (℃)	α (X10^{-7})		Knoop Hard-ness Group	Abra-sion	Color-ing	Bub. Grp.	Spe-cific Grav-ity	Re-marks	GLASS TYPE
		587.56			546.07			768.19	656.27	632.8	486.13	435.83	404.66	365.01	RW(P)	RA(P)	W(S)	SR	PR			-30~ 70℃	100~ 300℃							
PBL22	589411	1.58921	41.1	0.01434	1.59261	40.8	0.01452	1.58028	1.58496	1.58625	1.59930	1.60754	1.61463	1.62729	1	1	1	1.0	1.0	445	480	91	100	460 5	148	35/32		3.30		PBL22
PBL25	581408	1.58144	40.7	0.01427	1.58482	40.5	0.01445	1.57258	1.57722	1.57851	1.59149	1.59969	1.60674	1.61936	2	1	1	1.0	2.0	440	468	87	98	460 5	130	34/31		3.23		PBL25
PBL26	567428	1.56732	42.8	0.01325	1.57047	42.5	0.01341	1.55904	1.56339	1.56459	1.57664	1.58420	1.59069	1.60222	2	1	1~2	1.0	1.0	432	466	89	104	420 4	135	34/31		3.10		PBL26
PBL27	575415	1.57501	41.5	0.01386	1.57830	41.2	0.01403	1.56637	1.57090	1.57215	1.58476	1.59270	1.59951	1.61169	1	1	1	1.0	1.0	445	501	76	90	440 4	137	34/31		3.20		PBL27
PBM 1	626357	1.62588	35.7	0.01754	1.63004	35.4	0.01778	1.61515	1.62074	1.62231	1.63828	1.64852	1.65741	1.67357	1	2	1~2	1.0	2.0	440	466	89	97	400 4	156	36/33		3.65		PBM 1
PBM 2	620363	1.62004	36.3	0.01710	1.62409	36.0	0.01734	1.60955	1.61502	1.61655	1.63212	1.64209	1.65073	1.66640	1	2	1	1.0	2.0	432	473	87	99	420 4	164	36/32		3.60		PBM 2
PBM 3	613370	1.61293	37.0	0.01657	1.61686	36.7	0.01679	1.60273	1.60806	1.60954	1.62463	1.63426	1.64261	1.65768	1	1~2	1	1.0	2.0	434	479	83	95	410 4	150	35/32		3.53		PBM 3
PBM 4	617366	1.61659	36.6	0.01683	1.62058	36.4	0.01707	1.60626	1.61165	1.61315	1.62848	1.63829	1.64679	1.66217	2	1	1	1.0	1.0	440	480	86	95	400 4	160	36/32		3.58		PBM 4
PBM 5	603380	1.60342	38.0	0.01587	1.60718	37.7	0.01609	1.59363	1.59875	1.60017	1.61462	1.62382	1.63177	1.64608	1	1	1	1.0	2.0	440	472	88	98	420 4	133	35/32		3.44		PBM 5
PBM 6	636354	1.63636	35.4	0.01798	1.64062	35.1	0.01824	1.62535	1.63109	1.63269	1.64907	1.65960	1.66875	1.68538	2	1	2	1.0	2.0	443	473	85	94	420 4	160	36/33		3.74		PBM 6
PBM 8	596392	1.59551	39.2	0.01518	1.59911	39.0	0.01538	1.58610	1.59103	1.59239	1.60621	1.61498	1.62253	1.63609	2	1	1	1.0	2.0	445	485	85	96	400 4	151	35/32		3.36		PBM 8
PBM 9	620381	1.62045	38.1	0.01628	1.62431	37.9	0.01649	1.61038	1.61565	1.61711	1.63193	1.64135	1.64949	1.66420	2	2	2	2.0	2.0	468	498	80	93	460 5	147	37/33		3.56		PBM 9
PBM22	648338	1.64769	33.8	0.01916	1.65223	33.6	0.01943	1.63602	1.64209	1.64379	1.66125	1.67253	1.68236	1.70031	1	1	2	2.2	2.0	430	465	88	98	400 4	160	36/33		3.85		PBM22
PBM25	673321	1.67270	32.1	0.02095	1.67766	31.9	0.02127	1.66001	1.66660	1.66845	1.68755	1.69996	1.71084	1.73081	1	2	1	2.2	2.0	442	469	86	95	390 4	152	37/34		4.07		PBM25
PBM27	640345	1.63980	34.5	0.01856	1.64419	34.2	0.01882	1.62847	1.63437	1.63602	1.65293	1.66383	1.67333	1.69062	2	1	2	1.0	2.0	455	488	88	98	400 4	174	36/33		3.78		PBM27
PBM28	689311	1.68893	31.1	0.02217	1.69417	30.9	0.02250	1.67553	1.68248	1.68444	1.70465	1.71782	1.72940	1.75073	2	2	2	2.2	2.0	443	470	86	94	370 4	167	39/34		4.22		PBM28
PBM28W	689311																									38/34				PBM28W
PBM35	699301	1.69895	30.1	0.02320	1.70443	29.9	0.02357	1.68502	1.69223	1.69426	1.71543	1.72933	1.74164	—	1	1	1	1.0	1.0	475	512	74	82	420 4	176	40/37		4.10		PBM35
PBM39	667331	1.66680	33.0	0.02018	1.67158	32.8	0.02047	1.65453	1.66091	1.66270	1.68109	1.69298	1.70337	1.72234	1	1	2	1.2	2.0	442	482	76	86	400 4	158	38/34		4.02		PBM39
S-TIM6	636354	1.63636	35.4	0.01798	1.64061	35.1	0.01824	1.62535	1.63110	1.63269	1.64908	1.65968	1.66899	—	2	1	1	1.0	1.0	597	627	83	102	530 5	148	39/36		2.79		S-TIM6
TIM11	621359	1.62096	35.9	0.01731	1.62505	35.6	0.01755	1.61032	1.61588	1.61743	1.63319	1.64339	1.65237	—	1	1	1	1.0	1.0	590	617	75	89	530 5	120	40/36		2.66		TIM11
PBH 1	717295	1.71736	29.5	0.02430	1.72311	29.3	0.02469	1.70275	1.71032	1.71245	1.73462	1.74917	1.76202	1.78585	1	3	1	3.2	2.0	431	470	80	89	390 4	176	39/34		4.47		PBH 1
PBH 3	740283	1.74000	28.3	0.02616	1.74618	28.1	0.02658	1.72435	1.73244	1.73473	1.75860	1.77437	1.78837	1.81450	2	3	2	3.2	3.0	433	468	83	92	360 4	182	41/35		4.66		PBH 3
PBH 3W	740283																									40/35				PBH 3W
PBH 4	755275	1.75520	27.5	0.02745	1.76168	27.3	0.02790	1.73883	1.74728	1.74967	1.77473	1.79132	1.80608	1.83371	1	3	2~3	4.2	1.0	453	477	79	89	350 4	183	41/35		4.78		PBH 4
PBH 4W	755275																									40/35				PBH 4W
PBH 6	805254	1.80518	25.4	0.03166	1.81265	25.2	0.03220	1.78647	1.79609	1.79883	1.82775	1.84706	1.86436	1.89714	1	3	3	51.2	3.2	455	476	81	90	340 3	212	42/36		5.19		PBH 6

GLASS TYPE	CODE	n_d	ν_d	n_F-n_C	n_e	ν_e	$n_{F'}$-$n_{C'}$	$n_{A'}$	n_C	n_{He-Ne}	n_F	n_g	n_h	n_i	Powder Test		Surface Test			Tg (℃)	At (℃)	α ($X10^7$)		Knoop Hard-ness Group	Abra-sion	Color-ing	Bub. Grp.	Spe-cific Grav-ity	Re-marks	GLASS TYPE
		587.56			546.07			768.19	656.27	632.8	486.13	435.83	404.66	365.01	RW(P)	RA(P)	W(S)	SR	PR			-30~ 70℃	100~ 300℃							
PBH 6W	805254	1.80518	25.4	0.03166	1.81265	25.2	0.03220	1.78647	1.79609	1.79883	1.82775	1.84706	1.86436	1.89714	1	3	3	51.2	3.2	455	476	81	90	340 3	212	41/36		5.19		PBH 6W
PBH10	728285	1.72825	28.5	0.02559	1.73429	28.2	0.02600	1.71295	1.72086	1.72309	1.74645	1.76191	1.77567	—	1	1	1	1.0	1.0	466	511	71	81	400 4	158	42/37		4.33		PBH10
PBH11	785257	1.78472	25.7	0.03052	1.79191	25.5	0.03105	1.76666	1.77596	1.77860	1.80648	1.82518	1.84202	—	1	2	1	1.2	1.2	467	503	74	84	390 4	202	43/38		4.79		PBH11
PBH11W	785257																									42/38				PBH11W
PBH13	741278	1.74077	27.8	0.02666	1.74706	27.6	0.02709	1.72487	1.73308	1.73541	1.75974	1.77590	1.79033	—	1	1	2	1.2	2.0	462	503	73	84	400 4	194	42/37		4.44		PBH13
PBH13W	741278																									41/37				PBH13W
PBH14	762266	1.76182	26.6	0.02869	1.76859	26.3	0.02918	1.74482	1.75358	1.75607	1.78227	1.79980	1.81556	—	1	1	1	1.2	2.0	485	526	71	82	390 4	185	43/38		4.55		PBH14
PBH14W	762266																									42/38				PBH14W
PBH18	722292	1.72151	29.2	0.02468	1.72734	29.0	0.02507	1.70671	1.71436	1.71652	1.73904	1.75381	1.76686	1.79110	1	2	2	3.2	2.2	440	466	83	94	360 4	168	40/35		4.50		PBH18
PBH23	785262	1.78470	26.2	0.02993	1.79177	26.0	0.03044	1.76696	1.77610	1.77869	1.80603	1.82424	1.84052	1.87136	1	2	2	3.2	3.0	456	476	75	87	350 4	184	42/37		4.99		PBH23
PBH23W	785262																									41/37				PBH23W
PBH25	762271	1.76180	27.1	0.02811	1.76843	26.9	0.02857	1.74508	1.75370	1.75615	1.78181	1.79884	1.81404	1.84272	1	3	2	3.2	2.2	465	488	75	85	370 4	200	42/37		4.79		PBH25
PBH53	847239	1.84666	23.9	0.03545	1.85501	23.7	0.03608	1.82583	1.83653	1.83958	1.87198	1.89382	1.91350	—	4	3	3	52.2	3.2	447	466	78	87	330 3	257	44/37		5.53		PBH53
PBH53W	847239																									43/37				PBH53W
PBH55	850241	1.84986	24.1	0.03533	1.85819	23.9	0.03595	1.82905	1.83975	1.84280	1.87508	1.89680	1.91635	—	1	4	2	53.2	4.0	409	440	80	92	330 3	287	41/36		5.51		PBH55
PBH56	841246	1.84139	24.6	0.03426	1.84947	24.4	0.03485	1.82116	1.83157	1.83453	1.86583	1.88682	1.90566	—	1	4				386	413	84	96	360 4	316	40/35		5.35		PBH56
PBH71	923213	1.92286	21.3	0.04335	1.93306	21.1	0.04418	1.89768	1.91057	1.91427	1.95392	1.98112	2.00599	—	1	4	2~3	53.4	4.0	389	408	89	101	300 3	445	(41)/38	B	6.05		PBH71
PBH72	915212	1.91536	21.2	0.04323	1.92552	21.0	0.04406	1.89028	1.90311	1.90679	1.94634	1.97354	1.99850	—	1	4	3	53.4	4.2	415	436	88	96	290 3	324	(45)/39		5.97		PBH72
S-TIH20	706302	1.70585	30.2	0.02334	1.71136	30.0	0.02371	1.69177	1.69908	1.70113	1.72242	1.73647	1.74899	—	1	1	1	1.0	1.0	625	660	81	95	580 6	147	41/36		3.00		S-TIH20
TIH53	847238	1.84666	23.8	0.03561	1.85504	23.6	0.03624	1.82571	1.83649	1.83956	1.87210	1.89421	1.91435	—	1	1	1	1.0	1.0	612	645	89	102	520 5	165	(42)/38	B	3.58		TIH53
TPH55	756251	1.75550	25.1	0.03014	1.76260	24.9	0.03068	1.73770	1.74688	1.74948	1.77702	1.79573	1.81279	1.84596	2	1	1~2	1.0	1.0	585	612	77	94	470 5	212	43/37		3.06		TPH55
BAM 5	607492	1.60729	49.2	0.01234	1.61023	48.9	0.01248	1.59947	1.60360	1.60473	1.61594	1.62287	1.62872	1.63896	1	4	2	52.2	2.2	540	588	81	91	500 5	173	36/32		3.39		BAM 5
BAM 8	624471	1.62374	47.1	0.01324	1.62689	46.8	0.01339	1.61538	1.61979	1.62099	1.63303	1.64049	1.64683	1.65800	1	4	3	52.2	2.2	570	608	63	74	490 5	142	36/33		3.62		BAM 8
BAM 9	643479	1.64328	47.9	0.01344	1.64648	47.5	0.01360	1.63481	1.63927	1.64049	1.65271	1.66029	1.66672	1.67801	1	4	3	52.2	3.2	615	643	69	80	490 5	174	37/33		3.85		BAM 9
BAM21	626392	1.62606	39.2	0.01597	1.62985	38.9	0.01618	1.61618	1.62135	1.62278	1.63732	1.64655	1.65451	1.66883	2	2	2	2.2	1.2	478	525	82	92	450 5	166	36/33		3.63		BAM21
BAM23	607403	1.60717	40.3	0.01508	1.61074	40.0	0.01527	1.59783	1.60272	1.60407	1.61780	1.62650	1.63399	1.64736	1	1	2	1.0	1.0	438	490	89	103	420 4	152	36/32		3.48		BAM23
BAH13	669450	1.66892	45.0	0.01487	1.67245	44.7	0.01505	1.65961	1.66450	1.66585	1.67937	1.68784	1.69507	1.70792	3	4	3	53.2	3.2	600	645	76	88	500 5	198	39/35		4.00		BAH13
BAH22	664358	1.66446	35.8	0.01856	1.66886	35.5	0.01882	1.65311	1.65902	1.66067	1.67758	1.68843	1.69786	1.71498	1	3	1~2	3.2	2.2	475	523	85	94	440 4	199	38/33		3.96		BAH22

GLASS TYPE	CODE	n_d	ν_d	n_F-n_C	n_e	ν_e	$n_{F'}$-$n_{C'}$	$n_{A'}$	n_C	$n_{He\text{-}Ne}$	n_F	n_g	n_h	n_i	Powder Test		Surface Test			Tg (℃)	At (℃)	α (X10^{-7})		Knoop Hard-ness Group	Abra-sion	Color-ing	Bub. Grp.	Spe-cific Grav-ity	Re-marks	GLASS TYPE
		587.56			546.07			768.19	656.27	632.8	486.13	435.83	404.66	365.01	RW(P)	RA(P)	W(S)	SR	PR			-30~ 70℃	100~ 300℃							
BAH26	668419	1.66755	41.9	0.01593	1.67133	41.6	0.01613	1.65767	1.66284	1.66428	1.67877	1.68792	1.69579	1.70988	1	3	2	51.2	2.2	585	621	75	88	500 5	185	40/36		3.80		BAH26
BAH30	650394	1.65016	39.4	0.01651	1.65407	39.1	0.01673	1.64000	1.64530	1.64678	1.66181	1.67137	1.67962	1.69446	1	2	2~3	51.2	2.0	492	530	92	105	450 5	205	38/33		3.91		BAH30
S-BAH54	695422	1.69500	42.2	0.01648	1.69891	41.9	0.01668	1.68467	1.69010	1.69160	1.70658	1.71597	1.72398	1.73813	1	1	1	1.0	1.0	573	620	66	81	610 6	119	38/33		3.30		S-BAH54
BAH71	702401	1.70200	40.1	0.01751	1.70615	39.8	0.01774	1.69118	1.69683	1.69841	1.71434	1.72444	1.73314	1.74877	1	2	2	4.2	2.0	620	672	74	84	500 5	174	40/36		3.97		BAH71
BAH77	702412	1.70154	41.2	0.01703	1.70558	40.9	0.01724	1.69096	1.69650	1.69804	1.71353	1.72332	1.73174	1.74681	3	4	3	51.2	2.0	572	606	72	84	510 5	184	38/34		4.15		BAH77
BAH78	723380	1.72342	38.0	0.01902	1.72793	37.8	0.01928	1.71171	1.71782	1.71953	1.73684	1.74786	1.75738	1.77452	1	4	2~3	51.2	2.2	550	582	69	80	490 5	169	39/34		4.24		BAH78
S-LAL11	658573	1.65830	57.3	0.01148	1.66103	57.1	0.01158	1.65085	1.65481	1.65588	1.66629	1.67255	1.67775	1.68663	3	5	4	53.0	4.2	657	677	73	84	560 6	170	36/29		3.90		S-LAL11
S-LAL52	670573	1.67000	57.4	0.01168	1.67279	57.1	0.01179	1.66239	1.66645	1.66754	1.67813	1.68449	1.68976	1.69880	6	5	4	53.2	4.1	628	647	74	89	540 5	160	36/29		3.96		S-LAL52
S-LAL60	726536	1.72600	53.5	0.01356	1.72923	53.3	0.01367	1.71718	1.72188	1.72315	1.73544	1.74283	1.74898	1.75951	1	4	2	52.0	3.0	660	674	56	70	700 7	73	38/30		3.91		S-LAL60
S-LAH54	816443	1.81554	44.3	0.01839	1.81992	44.1	0.01859	1.80390	1.81004	1.81173	1.82843	1.83875	1.84748	1.86275	1	3	1	4.2	1.0	692	709	59	71	680 7	61	40/33		4.54		S-LAH54
S-LAH67	795453	1.79500	45.3	0.01755	1.79917	45.0	0.01774	1.78385	1.78974	1.79135	1.80729	1.81712	1.82542	1.83993	1	3	1	4.2	1.0	681	701	60	69	670 7	64	39/32		4.29		S-LAH67
LAH71	850323	1.85026	32.3	0.02634	1.85649	32.0	0.02673	1.83428	1.84258	1.84491	1.86892	1.88450	1.89819	—	1	4	2	51.2	1.0	598	633	74	83	460 5	151	48/36		4.81		LAH71
LAH78	901315	1.90135	31.5	0.02857	1.90811	31.3	0.02900	1.88401	1.89303	1.89556	1.92160	1.93859	1.95356	—	1	1	2	3.0	1.0	658	687	60	74	680 7	63	㊵/36		4.48		LAH78
LAH80	885302	1.88500	30.2	0.02934	1.89193	29.9	0.02979	1.86725	1.87647	1.87906	1.90581	1.92336	1.93889	—	1	2	2	2.3	1.0	622	659	66	82	660 7	74	㊶/36		3.99		LAH80
S-YGH52	787500	1.78650	50.0	0.01573	1.79025	49.8	0.01588	1.77639	1.78175	1.78321	1.79748	1.80616	1.81340	1.82588	1	3	1	4.0	1.0	686	718	63	77	720 7	60	38/31	B	4.79		S-YGH52
SSL 2	529517	1.52944	51.7	0.01024	1.53188	51.5	0.01033	1.52280	1.52634	1.52729	1.53658	1.54222	1.54695	1.55516	4	3	1	1.0	1.0	473	523	54	60	470 5	114	35/30		2.57		SSL 2
SSL 5	521526	1.52130	52.6	0.00992	1.52366	52.3	0.01001	1.51486	1.51829	1.51922	1.52821	1.53366	1.53822	1.54615	4	4	2	2.1	2.0	455	525	53	59	460 5	111	35/30		2.51		SSL 5
BPM 4	613438	1.61340	43.8	0.01399	1.61673	43.6	0.01414	1.60449	1.60921	1.61049	1.62320	1.63107	1.63776	1.64958	3	5	3~4	53.2	4.2	482	513	53	64	420 4	118	38/32		3.22		BPM 4
BPM51	613443	1.61340	44.3	0.01386	1.61669	44.0	0.01400	1.60454	1.60924	1.61051	1.62310	1.63088	1.63749	1.64914	4	6	1	53.2	4.2	483	508	52	62	420 4	120	38/31		3.24		BPM51
BPH 5	654397	1.65412	39.7	0.01648	1.65803	39.5	0.01667	1.64374	1.64921	1.65071	1.66569	1.67510	1.68318	1.69758	3	5	1~2	52.2	4.2	512	540	46	57	440 4	117	38/33		3.49		BPH 5
BPH 8	720347	1.72047	34.7	0.02075	1.72538	34.5	0.02103	1.70766	1.71436	1.71622	1.73511	1.74721	1.75771	1.77676	2	5	4	53.2	4.2	492	517	54	67	450 5	166	40/34		4.20		BPH 8
BPH35	645408	1.64450	40.8	0.01579	1.64825	40.6	0.01597	1.63455	1.63979	1.64123	1.65558	1.66456	1.67225	1.68590	3	5	3	52.1	4.2	485	519	48	62	470 5	111	39/33		3.46		BPH35
BPH40	677375	1.67650	37.5	0.01802	1.68077	37.3	0.01825	1.66529	1.67117	1.67280	1.68919	1.69958	1.70853	1.72459	2	5	3	52.1	4.1	484	508	53	64	460 5	116	40/33		3.76		BPH40
BPH45	719335	1.71850	33.5	0.02144	1.72358	33.3	0.02174	1.70536	1.71222	1.71413	1.73366	1.74623	1.75717	1.77703	2	4	3	52.0	4.3	457	482	57	69	460 5	131	42/35		4.16		BPH45
BPH50	740317	1.74000	31.7	0.02334	1.74552	31.5	0.02368	1.72580	1.73318	1.73525	1.75652	1.77030	1.78235	1.80447	1	5	2~3	52.2	4.2	477	506	56	65	430 4	142	42/35		4.48		BPH50
FTL 8	511510	1.51118	51.0	0.01002	1.51356	50.7	0.01013	1.50481	1.50818	1.50910	1.51820	1.52386	1.52870	—	1	1	2	1.0	1.0	435	495	90	100	430 4	137	38/35		2.50		FTL 8
S-FTL10	501564	1.50137	56.4	0.00889	1.50349	56.1	0.00898	1.49562	1.49868	1.49951	1.50757	1.51249	1.51663	1.52384	1	2	1	1.0	1.0	475	544	88	99	470 5	138	36/33		2.46		S-FTL10
FTM 8	533459	1.53256	45.9	0.01160	1.53532	45.6	0.01174	1.52528	1.52912	1.53017	1.54072	1.54739	1.55316	1.56366	1	1	1	1.0	1.0	470	528	85	97	450 5	147	38/35		2.53		FTM 8

L–BSL7

516641
518638

Refractive Index	n_d	**1.51633** 1.516330	Abbe Number	ν_d	**64.1** 64.06	Dispersion	$n_F - n_C$ **0.00806** 0.008060
Refractive Index	n_e	1.518253	Abbe Number	ν_e	63.87	Dispersion	$n_{F'} - n_{C'}$ 0.008114

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.48810
n_{1970}	1.97009	1.49404
n_{1530}	1.52958	1.50020
n_{1129}	1.12864	1.50523
n_t	1.01398	1.50677
n_s	0.85211	1.50930
$n_{A'}$	0.76819	1.51094
n_r	0.70652	1.51241
n_C	0.65627	**1.51385**
$n_{C'}$	0.64385	1.51424
$n_{He\text{-}Ne}$	0.6328	1.51462
n_D	0.58929	1.51626
n_d	0.58756	**1.51633**
n_e	0.54607	1.51825
n_F	0.48613	**1.52191**
$n_{F'}$	0.47999	1.52236
$n_{He\text{-}Cd}$	0.44157	1.52564
n_g	0.435835	**1.52620**
n_h	0.404656	1.52975
n_i	0.365015	1.53574

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0312
$\Delta\theta_{C,A'}$	0.0068
$\Delta\theta_{g,d}$	−0.0066
$\Delta\theta_{g,F}$	−0.0045
$\Delta\theta_{i,g}$	−0.0049

Constants of Dispersion Formula	
A_1	$9.17473918 \cdot 10^{-1}$
A_2	$3.52687665 \cdot 10^{-1}$
A_3	1.05579788
B_1	$5.27701411 \cdot 10^{-3}$
B_2	$1.70809497 \cdot 10^{-2}$
B_3	$1.04302583 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	2.38
Remarks		

Partial Dispersions	
$n_C - n_t$	0.007081
$n_C - n_{A'}$	0.002904
$n_d - n_C$	0.002484
$n_e - n_C$	0.004407
$n_g - n_d$	0.009874
$n_g - n_F$	0.004298
$n_h - n_g$	0.003544
$n_i - n_g$	0.009541
$n_{C'} - n_t$	0.007479
$n_e - n_{C'}$	0.004009
$n_{F'} - n_e$	0.004105
$n_i - n_{F'}$	0.013387

Thermal Properties		
Strain Point	StP (℃)	464
Annealing Point	AP (℃)	488
Transformation Temperature	Tg (℃)	498
Yield Point	At (℃)	549
Softening Point	SP (℃)	630
Expansion Coefficients (α (10^{-7}/℃)	(−30～+70℃)	58
	(+100～+300℃)	71
Thermal Conductivity	k (W/m·K)	1.169

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	793
Rigidity Modulus G	(10^8N/m^2)	327
Poisson's Ratio	σ	0.214
Knoop Hardness	Hk	560[6]
Abrasion	Aa	69
Photoelastic Constant (nm/cm/10^5Pa)	β	2.93

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	3
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.2

Relative Partial Dispersions	
$\theta_{C,t}$	0.8785
$\theta_{C,A'}$	0.3603
$\theta_{d,C}$	0.3082
$\theta_{e,C}$	0.5468
$\theta_{g,d}$	1.2251
$\theta_{g,F}$	0.5333
$\theta_{h,g}$	0.4397
$\theta_{i,g}$	1.1837
$\theta'_{C',t}$	0.9217
$\theta'_{e,C'}$	0.4941
$\theta'_{F',e}$	0.5059
$\theta'_{i,F'}$	1.6499

Coloring	
λ 80／λ 5	33/30

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	0.08
310	0.40
320	0.71
330	0.87
340	0.942
350	0.973
360	0.986
370	0.992
380	0.994
390	0.996
400	0.997
420	0.997
440	0.997
460	0.997
480	0.998
500	0.999
550	0.999
600	0.999
650	0.999
700	0.999
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.974
1600	0.994
1800	0.988
2000	0.974
2200	0.87
2400	0.80

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	4.0	4.3	4.3	4.4	4.5	4.7	4.9
−20 ～ 0	4.1	4.4	4.4	4.5	4.6	4.8	5.1
0 ～ 20	4.1	4.5	4.5	4.6	4.7	4.9	5.2
20 ～ 40	4.2	4.6	4.6	4.7	4.8	5.1	5.3
40 ～ 60	4.3	4.7	4.7	4.8	4.9	5.2	5.5
60 ～ 80	4.4	4.7	4.8	4.9	5.0	5.3	5.6

L-PHL1

565608
567605

Refractive Index	n_d	**1.56455** 1.564550	Abbe Number ν_d	**60.8** 60.82	Dispersion $n_F - n_C$	**0.00928** 0.009283
Refractive Index	n_e	1.566764	Abbe Number ν_e	60.51	Dispersion $n_{F'} - n_{C'}$	0.009366

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.53937
n_{1970}	1.97009	1.54382
n_{1530}	1.52958	1.54859
n_{1129}	1.12864	1.55285
n_t	1.01398	1.55428
n_s	0.85211	1.55680
$n_{A'}$	0.76819	1.55854
n_r	0.70652	1.56014
n_C	0.65627	**1.56174**
$n_{C'}$	0.64385	1.56218
n_{He-Ne}	0.6328	1.56260
n_D	0.58929	1.56447
n_d	0.58756	**1.56455**
n_e	0.54607	1.56676
n_F	0.48613	**1.57102**
$n_{F'}$	0.47999	1.57155
n_{He-Cd}	0.44157	1.57541
n_g	0.435835	**1.57608**
n_h	0.404656	1.58029
n_i	0.365015	1.58747

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	−0.0289
$\Delta\theta_{C,A'}$	−0.0056
$\Delta\theta_{g,d}$	0.0041
$\Delta\theta_{g,F}$	0.0026
$\Delta\theta_{i,g}$	0.0111

Constants of Dispersion Formula

A_1	1.07570798
A_2	$3.35020347 \cdot 10^{-1}$
A_3	$8.10997558 \cdot 10^{-1}$
B_1	$5.91654042 \cdot 10^{-3}$
B_2	$2.03432769 \cdot 10^{-2}$
B_3	$1.06182158 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.18
Remarks		

Partial Dispersions

$n_C - n_t$	0.007455
$n_C - n_{A'}$	0.003193
$n_d - n_C$	0.002815
$n_e - n_C$	0.005029
$n_g - n_d$	0.011534
$n_g - n_F$	0.005066
$n_h - n_g$	0.004209
$n_i - n_g$	0.011388
$n_{C'} - n_t$	0.007903
$n_e - n_{C'}$	0.004581
$n_{F'} - n_e$	0.004785
$n_i - n_{F'}$	0.015923

Thermal Properties

Strain Point	StP (℃)	308
Annealing Point	AP (℃)	331
Transformation Temperature	Tg (℃)	347
Yield Point	At (℃)	379
Softening Point	SP (℃)	408
Expansion Coefficients (−30～+70℃)		105
α (10^{-7}/℃) (+100～+300℃)		140
Thermal Conductivity	k (W/m·K)	0.627

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	589
Rigidity Modulus G	(10^8N/m^2)	230
Poisson's Ratio	σ	0.280
Knoop Hardness	Hk	350[4]
Abrasion	Aa	547
Photoelastic Constant (nm/cm/10^5Pa)	β	3.29

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	5
Weathering Resistance (Surface) Group	W (S)	3
Acid Resistance (Surface) Group	SR	53.3
Phosphate Resistance	PR	4.3

Relative Partial Dispersions

$\theta_{C,t}$	0.8031
$\theta_{C,A'}$	0.3440
$\theta_{d,C}$	0.3032
$\theta_{e,C}$	0.5417
$\theta_{g,d}$	1.2425
$\theta_{g,F}$	0.5457
$\theta_{h,g}$	0.4534
$\theta_{i,g}$	1.2268
$\theta'_{C',t}$	0.8438
$\theta'_{e,C'}$	0.4891
$\theta'_{F',e}$	0.5109
$\theta'_{i,F'}$	1.7001

Coloring

λ 80／λ 5	34/31

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	0.06
320	0.37
330	0.70
340	0.88
350	0.952
360	0.981
370	0.990
380	0.994
390	0.996
400	0.996
420	0.996
440	0.996
460	0.997
480	0.997
500	0.998
550	0.999
600	0.999
650	0.999
700	0.999
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.998
1600	0.986
1800	0.955
2000	0.923
2200	0.86
2400	0.83

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	-0.7	-0.4	-0.3	-0.2	0.0	0.3	0.7
−20 ～ 0	-0.7	-0.4	-0.3	-0.2	0.0	0.3	0.7
0 ～ 20	-0.8	-0.4	-0.3	-0.2	0.0	0.3	0.7
20 ～ 40	-0.8	-0.4	-0.4	-0.2	-0.1	0.3	0.7
40 ～ 60	-0.9	-0.4	-0.4	-0.2	-0.1	0.3	0.7
60 ～ 80	-1.0	-0.5	-0.4	-0.3	-0.1	0.4	0.8

L-PHL2

559625
561623

Refractive Index	n_d	**1.55880** 1.558800	Abbe Number ν_d	**62.5** 62.55	Dispersion $n_F - n_C$	**0.00894** 0.008933
Refractive Index	n_e	1.560931	Abbe Number ν_e	62.26	Dispersion $n_{F'} - n_{C'}$	0.009009

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.53345
n_{1970}	1.97009	1.53809
n_{1530}	1.52958	1.54303
n_{1129}	1.12864	1.54736
n_t	1.01398	1.54879
n_s	0.85211	1.55129
$n_{A'}$	0.76819	1.55298
n_r	0.70652	1.55454
n_C	0.65627	**1.55608**
$n_{C'}$	0.64385	1.55652
n_{He-Ne}	0.6328	1.55692
n_D	0.58929	1.55872
n_d	0.58756	**1.55880**
n_e	0.54607	1.56093
n_F	0.48613	**1.56502**
$n_{F'}$	0.47999	1.56552
n_{He-Cd}	0.44157	1.56922
n_g	0.435835	**1.56987**
n_h	0.404656	1.57389
n_i	0.365015	1.58073

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	−0.0242
$\Delta\theta_{C,A'}$	−0.0048
$\Delta\theta_{g,d}$	0.0041
$\Delta\theta_{g,F}$	0.0027
$\Delta\theta_{i,g}$	0.0154

Constants of Dispersion Formula	
A_1	1.08137176
A_2	$3.13257660 \cdot 10^{-1}$
A_3	$8.79192863 \cdot 10^{-1}$
B_1	$5.94210177 \cdot 10^{-3}$
B_2	$1.98011567 \cdot 10^{-2}$
B_3	$1.09893817 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.03
Remarks		

Partial Dispersions	
$n_C - n_t$	0.007289
$n_C - n_{A'}$	0.003099
$n_d - n_C$	0.002717
$n_e - n_C$	0.004848
$n_g - n_d$	0.011067
$n_g - n_F$	0.004851
$n_h - n_g$	0.004022
$n_i - n_g$	0.010868
$n_{C'} - n_t$	0.007721
$n_e - n_{C'}$	0.004416
$n_{F'} - n_e$	0.004593
$n_i - n_{F'}$	0.015211

Thermal Properties		
Strain Point	StP (℃)	337
Annealing Point	AP (℃)	359
Transformation Temperature	Tg (℃)	381
Yield Point	At (℃)	407
Softening Point	SP (℃)	440
Expansion Coefficients (α (10^{-7}/℃)	(−30～+70℃)	99
	(+100～+300℃)	130
Thermal Conductivity	k (W/m·K)	0.683

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	645
Rigidity Modulus G	(10^8N/m^2)	253
Poisson's Ratio	σ	0.272
Knoop Hardness	Hk	370[4]
Abrasion	Aa	468
Photoelastic Constant (nm/cm/10^5Pa)	β	2.99

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	5
Weathering Resistance (Surface) Group	W (S)	3～4
Acid Resistance (Surface) Group	SR	51.1
Phosphate Resistance	PR	4.1

Relative Partial Dispersions	
$\theta_{C,t}$	0.8160
$\theta_{C,A'}$	0.3469
$\theta_{d,C}$	0.3042
$\theta_{e,C}$	0.5427
$\theta_{g,d}$	1.2389
$\theta_{g,F}$	0.5430
$\theta_{h,g}$	0.4502
$\theta_{i,g}$	1.2166
$\theta'_{C',t}$	0.8570
$\theta'_{e,C'}$	0.4902
$\theta'_{F',e}$	0.5098
$\theta'_{i,F'}$	1.6884

Coloring	
λ 80／λ 5	34/30

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	0.01
310	0.16
320	0.49
330	0.75
340	0.89
350	0.954
360	0.980
370	0.991
380	0.995
390	0.997
400	0.997
420	0.997
440	0.997
460	0.997
480	0.997
500	0.998
550	0.999
600	0.999
650	0.998
700	0.999
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.998
1600	0.989
1800	0.964
2000	0.939
2200	0.89
2400	0.86

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	-0.3	0.0	0.0	0.1	0.3	0.6	0.9
−20 ～ 0	-0.4	0.0	0.0	0.1	0.3	0.6	0.9
0 ～ 20	-0.4	-0.1	0.0	0.1	0.2	0.6	0.9
20 ～ 40	-0.4	-0.1	-0.1	0.1	0.2	0.6	0.9
40 ～ 60	-0.5	-0.1	-0.1	0.1	0.2	0.6	0.9
60 ～ 80	-0.5	-0.1	-0.1	0.0	0.2	0.6	1.0

L–BAL35

589612
591609

Refractive Index	n_d	**1.58913** 1.589130	Abbe Number ν_d	**61.2** 61.15	Dispersion $n_F - n_C$	**0.00963** 0.009634
Refractive Index	n_e	1.591428	Abbe Number ν_e	60.93	Dispersion $n_{F'} - n_{C'}$	0.009706

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.55775
n_{1970}	1.97009	1.56407
n_{1530}	1.52958	1.57069
n_{1129}	1.12864	1.57622
n_t	1.01398	1.57795
n_s	0.85211	1.58085
$n_{A'}$	0.76819	1.58276
n_r	0.70652	1.58448
n_C	0.65627	**1.58618**
$n_{C'}$	0.64385	1.58665
$n_{He\text{-}Ne}$	0.6328	1.58709
n_D	0.58929	1.58904
n_d	0.58756	**1.58913**
n_e	0.54607	1.59143
n_F	0.48613	**1.59581**
$n_{F'}$	0.47999	1.59636
$n_{He\text{-}Cd}$	0.44157	1.60031
n_g	0.435835	**1.60100**
n_h	0.404656	1.60528
n_i	0.365015	1.61256

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0207
$\Delta\theta_{C,A'}$	0.0048
$\Delta\theta_{g,d}$	−0.0059
$\Delta\theta_{g,F}$	−0.0043
$\Delta\theta_{i,g}$	−0.0124

Constants of Dispersion Formula	
A_1	1.16262630
A_2	$3.25661051 \cdot 10^{-1}$
A_3	1.35132486
B_1	$1.25957437 \cdot 10^{-2}$
B_2	$-3.26911050 \cdot 10^{-3}$
B_3	$1.19214596 \cdot 10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	2.82
Remarks		FG

Partial Dispersions	
$n_C - n_t$	0.008230
$n_C - n_{A'}$	0.003418
$n_d - n_C$	0.002952
$n_e - n_C$	0.005250
$n_g - n_d$	0.011867
$n_g - n_F$	0.005185
$n_h - n_g$	0.004288
$n_i - n_g$	0.011567
$n_{C'} - n_t$	0.008702
$n_e - n_{C'}$	0.004778
$n_{F'} - n_e$	0.004928
$n_i - n_{F'}$	0.016208

Thermal Properties		
Strain Point	StP (℃)	489
Annealing Point	AP (℃)	520
Transformation Temperature	Tg (℃)	527
Yield Point	At (℃)	567
Softening Point	SP (℃)	619
Expansion Coefficients (−30～+70℃)		66
α (10^{-7}/℃) (+100～+300℃)		81
Thermal Conductivity	k (W/m·K)	1.126

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	1008
Rigidity Modulus G	(10^8N/m^2)	403
Poisson's Ratio	σ	0.252
Knoop Hardness	Hk	630[6]
Abrasion	Aa	100
Photoelastic Constant (nm/cm/10^5Pa)	β	2.29

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	4
Weathering Resistance (Surface) Group	W (S)	3
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	3.2

Relative Partial Dispersions	
$\theta_{C,t}$	0.8543
$\theta_{C,A'}$	0.3548
$\theta_{d,C}$	0.3064
$\theta_{e,C}$	0.5449
$\theta_{g,d}$	1.2318
$\theta_{g,F}$	0.5382
$\theta_{h,g}$	0.4451
$\theta_{i,g}$	1.2006
$\theta'_{C',t}$	0.8966
$\theta'_{e,C'}$	0.4923
$\theta'_{F',e}$	0.5077
$\theta'_{i,F'}$	1.6699

Coloring	
λ 80／λ 5	35/30

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	0.06
310	0.27
320	0.53
330	0.73
340	0.85
350	0.922
360	0.956
370	0.975
380	0.984
390	0.989
400	0.992
420	0.993
440	0.993
460	0.995
480	0.996
500	0.998
550	0.999
600	0.998
650	0.998
700	0.998
800	0.999
900	0.998
1000	0.997
1200	0.997
1400	0.991
1600	0.994
1800	0.989
2000	0.978
2200	0.934
2400	0.81

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	3.9	4.3	4.3	4.4	4.5	4.8	5.1
−20 ~ 0	3.9	4.3	4.3	4.5	4.6	4.9	5.2
0 ~ 20	4.0	4.4	4.4	4.5	4.7	5.0	5.3
20 ~ 40	4.0	4.4	4.5	4.6	4.7	5.1	5.4
40 ~ 60	4.1	4.5	4.5	4.7	4.8	5.2	5.5
60 ~ 80	4.1	4.5	4.6	4.8	4.9	5.2	5.6

L–BAL42

583594
585591

Refractive Index	n_d	**1.58313** 1.583126	Abbe Number ν_d	**59.4** 59.38	Dispersion $n_F - n_C$	**0.00982** 0.009820
Refractive Index	n_e	1.585468	Abbe Number ν_e	59.13	Dispersion $n_{F'} - n_{C'}$	0.009901

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.55402
n_{1970}	1.97009	1.55949
n_{1530}	1.52958	1.56533
n_{1129}	1.12864	1.57038
n_t	1.01398	1.57201
n_s	0.85211	1.57482
$n_{A'}$	0.76819	1.57671
n_r	0.70652	1.57843
n_C	0.65627	**1.58013**
$n_{C'}$	0.64385	1.58061
n_{He-Ne}	0.6328	1.58106
n_D	0.58929	1.58304
n_d	0.58756	**1.58313**
n_e	0.54607	1.58547
n_F	0.48613	**1.58995**
$n_{F'}$	0.47999	1.59051
n_{He-Cd}	0.44157	1.59457
n_g	0.435835	**1.59528**
n_h	0.404656	1.59969
n_i	0.365015	1.60719

Partial Dispersions	
$n_C - n_t$	0.008122
$n_C - n_{A'}$	0.003426
$n_d - n_C$	0.002992
$n_e - n_C$	0.005334
$n_g - n_d$	0.012153
$n_g - n_F$	0.005325
$n_h - n_g$	0.004412
$n_i - n_g$	0.011910
$n_{C'} - n_t$	0.008599
$n_e - n_{C'}$	0.004857
$n_{F'} - n_e$	0.005044
$n_i - n_{F'}$	0.016677

Relative Partial Dispersions	
$\theta_{C,t}$	0.8271
$\theta_{C,A'}$	0.3489
$\theta_{d,C}$	0.3047
$\theta_{e,C}$	0.5432
$\theta_{g,d}$	1.2376
$\theta_{g,F}$	0.5423
$\theta_{h,g}$	0.4493
$\theta_{i,g}$	1.2128
$\theta'_{C',t}$	0.8685
$\theta'_{e,C'}$	0.4906
$\theta'_{F',e}$	0.5094
$\theta'_{i,F'}$	1.6844

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0018
$\Delta\theta_{C,A'}$	0.0010
$\Delta\theta_{g,d}$	-0.0038
$\Delta\theta_{g,F}$	-0.0031
$\Delta\theta_{i,g}$	-0.0150

Thermal Properties		
Strain Point	StP (℃)	467
Annealing Point	AP (℃)	494
Transformation Temperature	Tg (℃)	506
Yield Point	At (℃)	538
Softening Point	SP (℃)	607
Expansion Coefficients (−30～+70℃)		72
α (10^{-7}/℃) (+100～+300℃)		88
Thermal Conductivity	k(W/m·K)	1.028

Coloring	
λ 80／λ 5	34/29

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	0.05
300	0.19
310	0.41
320	0.63
330	0.79
340	0.89
350	0.940
360	0.968
370	0.981
380	0.987
390	0.992
400	0.994
420	0.994
440	0.995
460	0.996
480	0.997
500	0.998
550	0.999
600	0.998
650	0.998
700	0.998
800	0.999
900	0.998
1000	
1200	
1400	
1600	
1800	
2000	
2200	
2400	

Constants of Dispersion Formula	
A_1	1.39528097
A_2	$7.25519520 \cdot 10^{-2}$
A_3	1.66335848
B_1	$1.11862030 \cdot 10^{-2}$
B_2	$-2.46748575 \cdot 10^{-2}$
B_3	$1.67717958 \cdot 10^{2}$

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	891
Rigidity Modulus G	(10^8N/m^2)	357
Poisson's Ratio	σ	0.247
Knoop Hardness	Hk	590[6]
Abrasion	Aa	113
Photoelastic Constant (nm/cm/10^5Pa)	β	

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1～2
Acid Resistance (Surface) Group	SR	5.2
Phosphate Resistance	PR	2.0

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.05
Remarks		FG

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20		3.2	3.2	3.3	3.4	3.8	4.1
−20 ～ 0		3.2	3.2	3.3	3.5	3.8	4.1
0 ～ 20		3.2	3.2	3.3	3.5	3.8	4.2
20 ～ 40		3.2	3.2	3.3	3.5	3.8	4.2
40 ～ 60		3.2	3.2	3.3	3.5	3.9	4.2
60 ～ 80		3.2	3.2	3.3	3.5	3.9	4.3

L-TIM28

689311
694308

Refractive Index	n_d	**1.68893** 1.688931	Abbe Number ν_d	**31.1** 31.08	Dispersion $n_F - n_C$	**0.02217** 0.022168
Refractive Index	n_e	1.694169	Abbe Number ν_e	30.84	Dispersion $n_{F'} - n_{C'}$	0.022511

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.64569
n_{1970}	1.97009	1.65134
n_{1530}	1.52958	1.65780
n_{1129}	1.12864	1.66448
n_t	1.01398	1.66704
n_s	0.85211	1.67193
$n_{A'}$	0.76819	1.67552
n_r	0.70652	1.67896
n_C	0.65627	**1.68249**
$n_{C'}$	0.64385	1.68350
n_{He-Ne}	0.6328	1.68444
n_D	0.58929	1.68874
n_d	0.58756	**1.68893**
n_e	0.54607	1.69417
n_F	0.48613	**1.70466**
$n_{F'}$	0.47999	1.70601
n_{He-Cd}	0.44157	1.71611
n_g	0.435835	**1.71793**
n_h	0.404656	1.72970
n_i	0.365015	1.75177

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0044
$\Delta\theta_{C,A'}$	0.0007
$\Delta\theta_{g,d}$	0.0078
$\Delta\theta_{g,F}$	0.0074
$\Delta\theta_{i,g}$	0.0619

Constants of Dispersion Formula

A_1	1.58039099
A_2	$1.78294323 \cdot 10^{-1}$
A_3	1.14876204
B_1	$1.25270147 \cdot 10^{-2}$
B_2	$6.02807505 \cdot 10^{-2}$
B_3	$1.16215055 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.88
Remarks		FG

Partial Dispersions

$n_C - n_t$	0.015448
$n_C - n_{A'}$	0.006965
$n_d - n_C$	0.006441
$n_e - n_C$	0.011679
$n_g - n_d$	0.028996
$n_g - n_F$	0.013269
$n_h - n_g$	0.011773
$n_i - n_g$	0.033843
$n_{C'} - n_t$	0.016453
$n_e - n_{C'}$	0.010674
$n_{F'} - n_e$	0.011837
$n_i - n_{F'}$	0.045764

Thermal Properties

Strain Point	StP (℃)	453
Annealing Point	AP (℃)	484
Transformation Temperature	Tg (℃)	504
Yield Point	At (℃)	539
Softening Point	SP (℃)	582
Expansion Coefficients (−30～+70℃)		101
α (10^{-7}/℃) (+100～+300℃)		130
Thermal Conductivity	k (W/m·K)	1.020

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	845
Rigidity Modulus G	(10^8N/m^2)	337
Poisson's Ratio	σ	0.254
Knoop Hardness	Hk	530[5]
Abrasion	Aa	197
Photoelastic Constant (nm/cm/10^5Pa)	β	

Chemical Properties

Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1～2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.6969
$\theta_{C,A'}$	0.3142
$\theta_{d,C}$	0.2906
$\theta_{e,C}$	0.5268
$\theta_{g,d}$	1.3080
$\theta_{g,F}$	0.5986
$\theta_{h,g}$	0.5311
$\theta_{i,g}$	1.5267
$\theta'_{C',t}$	0.7309
$\theta'_{e,C'}$	0.4742
$\theta'_{F',e}$	0.5258
$\theta'_{i,F'}$	2.0330

Coloring

λ 80／λ 5	40/36

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.16
370	0.57
380	0.80
390	0.89
400	0.929
420	0.964
440	0.974
460	0.980
480	0.984
500	0.989
550	0.997
600	0.996
650	
700	
800	
900	
1000	
1200	
1400	
1600	
1800	
2000	
2200	
2400	

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g
−40 ～ −20		-0.3	-0.2	0.1	0.4	1.3	2.3
−20 ～ 0		-0.3	-0.2	0.1	0.5	1.4	2.5
0 ～ 20		-0.3	-0.2	0.1	0.5	1.5	2.6
20 ～ 40		-0.3	-0.2	0.1	0.5	1.5	2.7
40 ～ 60		-0.3	-0.2	0.1	0.5	1.6	2.9
60 ～ 80		-0.3	-0.3	0.1	0.6	1.7	3.0

L-LAL12

678549
681546

Refractive Index	n_d	**1.67790** 1.677900	Abbe Number	ν_d	**54.9** 54.89	Dispersion	$n_F - n_C$ **0.01235** 0.012351
Refractive Index	n_e	1.680844	Abbe Number	ν_e	54.64	Dispersion	$n_{F'} - n_{C'}$ 0.012460

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.64243
n_{1970}	1.97009	1.64903
n_{1530}	1.52958	1.65602
n_{1129}	1.12864	1.66209
n_t	1.01398	1.66408
n_s	0.85211	1.66753
$n_{A'}$	0.76819	1.66987
n_r	0.70652	1.67202
n_C	0.65627	**1.67415**
$n_{C'}$	0.64385	1.67475
n_{He-Ne}	0.6328	1.67530
n_D	0.58929	1.67779
n_d	0.58756	**1.67790**
n_e	0.54607	1.68084
n_F	0.48613	**1.68650**
$n_{F'}$	0.47999	1.68721
n_{He-Cd}	0.44157	1.69235
n_g	0.435835	**1.69324**
n_h	0.404656	1.69885
n_i	0.365015	1.70845

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0110
$\Delta\theta_{C,A'}$	0.0038
$\Delta\theta_{g,d}$	−0.0085
$\Delta\theta_{g,F}$	−0.0069
$\Delta\theta_{i,g}$	−0.0345

Constants of Dispersion Formula

A_1	1.28516283
A_2	$4.78333797 \cdot 10^{-1}$
A_3	1.21605301
B_1	$6.41062082 \cdot 10^{-3}$
B_2	$2.14815099 \cdot 10^{-2}$
B_3	$1.00243378 \cdot 10^{2}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.48
Remarks		FG

Partial Dispersions

$n_C - n_t$	0.010069
$n_C - n_{A'}$	0.004276
$n_d - n_C$	0.003750
$n_e - n_C$	0.006694
$n_g - n_d$	0.015342
$n_g - n_F$	0.006741
$n_h - n_g$	0.005610
$n_i - n_g$	0.015203
$n_{C'} - n_t$	0.010665
$n_e - n_{C'}$	0.006098
$n_{F'} - n_e$	0.006362
$n_i - n_{F'}$	0.021239

Thermal Properties

Strain Point	StP (℃)	528
Annealing Point	AP (℃)	546
Transformation Temperature	Tg (℃)	562
Yield Point	At (℃)	600
Softening Point	SP (℃)	633
Expansion Coefficients (α (10^{-7}/℃)	(−30～+70℃)	76
	(+100～+300℃)	90
Thermal Conductivity	k (W/m·K)	0.925

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	1096
Rigidity Modulus G	(10^8N/m^2)	428
Poisson's Ratio	σ	0.280
Knoop Hardness	Hk	600[6]
Abrasion	Aa	112
Photoelastic Constant (nm/cm/10^5Pa)	β	1.80

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	4
Weathering Resistance (Surface) Group	W (S)	3～4
Acid Resistance (Surface) Group	SR	53.2
Phosphate Resistance	PR	4.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8152
$\theta_{C,A'}$	0.3462
$\theta_{d,C}$	0.3036
$\theta_{e,C}$	0.5420
$\theta_{g,d}$	1.2422
$\theta_{g,F}$	0.5458
$\theta_{h,g}$	0.4542
$\theta_{i,g}$	1.2309
$\theta'_{C',t}$	0.8559
$\theta'_{e,C'}$	0.4894
$\theta'_{F',e}$	0.5106
$\theta'_{i,F'}$	1.7046

Coloring

λ 80／λ 5	37/30

Internal Transmittance

λ (nm)	τ 10mm
280	
290	
300	0.10
310	0.21
320	0.37
330	0.55
340	0.70
350	0.81
360	0.89
370	0.938
380	0.962
390	0.975
400	0.982
420	0.987
440	0.990
460	0.992
480	0.995
500	0.997
550	0.998
600	0.996
650	0.997
700	0.998
800	0.999
900	0.998
1000	0.998
1200	0.999
1400	0.997
1600	0.996
1800	0.989
2000	0.972
2200	0.922
2400	0.736

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ~ −20	2.0	2.4	2.4	2.6	2.7	3.1	3.4
−20 ~ 0	2.0	2.4	2.4	2.6	2.8	3.1	3.5
0 ~ 20	2.0	2.4	2.5	2.6	2.8	3.2	3.6
20 ~ 40	1.9	2.4	2.5	2.6	2.8	3.2	3.6
40 ~ 60	1.9	2.5	2.5	2.6	2.8	3.3	3.7
60 ~ 80	1.9	2.5	2.5	2.6	2.9	3.3	3.8

L–LAL13

694532
697529

Refractive Index	n_d	**1.69350** 1.693500	Abbe Number ν_d	**53.2** 53.18	Dispersion $n_F - n_C$	**0.01304** 0.013040
Refractive Index	n_e	1.696607	Abbe Number ν_e	52.93	Dispersion $n_{F'} - n_{C'}$	0.013160

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.65737
n_{1970}	1.97009	1.66392
n_{1530}	1.52958	1.67089
n_{1129}	1.12864	1.67702
n_t	1.01398	1.67906
n_s	0.85211	1.68263
$n_{A'}$	0.76819	1.68507
n_r	0.70652	1.68731
n_C	0.65627	**1.68955**
$n_{C'}$	0.64385	1.69018
$n_{He\text{-}Ne}$	0.6328	1.69076
n_D	0.58929	1.69338
n_d	0.58756	**1.69350**
n_e	0.54607	1.69661
n_F	0.48613	**1.70259**
$n_{F'}$	0.47999	1.70334
$n_{He\text{-}Cd}$	0.44157	1.70879
n_g	0.435835	**1.70974**
n_h	0.404656	1.71570
n_i	0.365015	1.72592

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0082
$\Delta\theta_{C,A'}$	0.0033
$\Delta\theta_{g,d}$	−0.0090
$\Delta\theta_{g,F}$	−0.0072
$\Delta\theta_{i,g}$	−0.0390

Constants of Dispersion Formula	
A_1	1.17776146
A_2	$6.34591345 \cdot 10^{-1}$
A_3	1.20435649
B_1	$5.57618243 \cdot 10^{-3}$
B_2	$2.06821469 \cdot 10^{-2}$
B_3	$9.96322776 \cdot 10^{1}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.69
Remarks		FG

Partial Dispersions	
$n_C - n_t$	0.010490
$n_C - n_{A'}$	0.004481
$n_d - n_C$	0.003949
$n_e - n_C$	0.007056
$n_g - n_d$	0.016239
$n_g - n_F$	0.007148
$n_h - n_g$	0.005962
$n_i - n_g$	0.016179
$n_{C'} - n_t$	0.011117
$n_e - n_{C'}$	0.006429
$n_{F'} - n_e$	0.006731
$n_i - n_{F'}$	0.022580

Thermal Properties		
Strain Point	StP (℃)	503
Annealing Point	AP (℃)	522
Transformation Temperature	Tg (℃)	534
Yield Point	At (℃)	575
Softening Point	SP (℃)	615
Expansion Coefficients (−30～+70℃)		76
α (10^{-7}/℃) (+100～+300℃)		92
Thermal Conductivity	k (W/m·K)	0.887

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	1078
Rigidity Modulus G	(10^8N/m^2)	419
Poisson's Ratio	σ	0.285
Knoop Hardness	Hk	620[6]
Abrasion	Aa	115
Photoelastic Constant (nm/cm/10^5Pa)	β	

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	4
Weathering Resistance (Surface) Group	W (S)	2
Acid Resistance (Surface) Group	SR	53.2
Phosphate Resistance	PR	4.0

Relative Partial Dispersions	
$\theta_{C,t}$	0.8044
$\theta_{C,A'}$	0.3436
$\theta_{d,C}$	0.3028
$\theta_{e,C}$	0.5411
$\theta_{g,d}$	1.2453
$\theta_{g,F}$	0.5482
$\theta_{h,g}$	0.4572
$\theta_{i,g}$	1.2407
$\theta'_{C',t}$	0.8448
$\theta'_{e,C'}$	0.4885
$\theta'_{F',e}$	0.5115
$\theta'_{i,F'}$	1.7158

Coloring	
λ 80／λ 5	36/29

Internal Transmittance	
λ (nm)	τ 10mm
280	0.01
290	0.06
300	0.15
310	0.28
320	0.45
330	0.61
340	0.74
350	0.84
360	0.913
370	0.949
380	0.969
390	0.979
400	0.984
420	0.989
440	0.991
460	0.993
480	0.995
500	0.997
550	0.998
600	0.997
650	0.997
700	0.998
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.996
1600	0.995
1800	0.988
2000	0.969
2200	0.918
2400	0.72

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.5	3.0	3.0	3.1	3.3	3.8	4.2
−20 ～ 0	2.5	3.0	3.0	3.2	3.4	3.8	4.3
0 ～ 20	2.5	3.0	3.1	3.2	3.4	3.9	4.3
20 ～ 40	2.5	3.1	3.1	3.3	3.5	4.0	4.4
40 ～ 60	2.5	3.1	3.1	3.3	3.5	4.0	4.5
60 ～ 80	2.5	3.1	3.2	3.3	3.6	4.1	4.6

L–LAM69

731405
735403

Refractive Index	n_d	**1.73077** 1.730770	Abbe Number ν_d	**40.5** 40.51	Dispersion $n_F - n_C$	**0.01804** 0.018040
Refractive Index	n_e	1.735051	Abbe Number ν_e	40.25	Dispersion $n_{F'} - n_{C'}$	0.018262

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.68805
n_{1970}	1.97009	1.69488
n_{1530}	1.52958	1.70237
n_{1129}	1.12864	1.70939
n_t	1.01398	1.71185
n_s	0.85211	1.71632
$n_{A'}$	0.76819	1.71948
n_r	0.70652	1.72243
n_C	0.65627	**1.72542**
$n_{C'}$	0.64385	1.72626
n_{He-Ne}	0.6328	1.72705
n_D	0.58929	1.73061
n_d	0.58756	**1.73077**
n_e	0.54607	1.73505
n_F	0.48613	**1.74346**
$n_{F'}$	0.47999	1.74452
n_{He-Cd}	0.44157	1.75240
n_g	0.435835	**1.75379**
n_h	0.404656	1.76267
n_i	0.365015	1.77858

Partial Dispersions	
$n_C - n_t$	0.013567
$n_C - n_{A'}$	0.005939
$n_d - n_C$	0.005354
$n_e - n_C$	0.009635
$n_g - n_d$	0.023019
$n_g - n_F$	0.010333
$n_h - n_g$	0.008885
$n_i - n_g$	0.024789
$n_{C'} - n_t$	0.014410
$n_e - n_{C'}$	0.008792
$n_{F'} - n_e$	0.009470
$n_i - n_{F'}$	0.034057

Relative Partial Dispersions	
$\theta_{C,t}$	0.7521
$\theta_{C,A'}$	0.3292
$\theta_{d,C}$	0.2968
$\theta_{e,C}$	0.5341
$\theta_{g,d}$	1.2760
$\theta_{g,F}$	0.5728
$\theta_{h,g}$	0.4925
$\theta_{i,g}$	1.3741
$\theta'_{C',t}$	0.7891
$\theta'_{e,C'}$	0.4814
$\theta'_{F',e}$	0.5186
$\theta'_{i,F'}$	1.8649

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0154
$\Delta\theta_{C,A'}$	0.0042
$\Delta\theta_{g,d}$	-0.0046
$\Delta\theta_{g,F}$	-0.0031
$\Delta\theta_{i,g}$	-0.0117

Thermal Properties		
Strain Point	StP (℃)	461
Annealing Point	AP (℃)	489
Transformation Temperature	Tg (℃)	497
Yield Point	At (℃)	529
Softening Point	SP (℃)	574
Expansion Coefficients (−30～+70℃)		86
α (10^{-7}/℃) (+100～+300℃)		105
Thermal Conductivity	k(W/m·K)	1.114

Coloring	
λ 80／λ 5	41/34

Constants of Dispersion Formula	
A_1	1.74038960
A_2	$1.76996917 \cdot 10^{-1}$
A_3	1.76775413
B_1	$1.03398870 \cdot 10^{-2}$
B_2	$4.84822765 \cdot 10^{-2}$
B_3	$1.36671996 \cdot 10^{2}$

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	1133
Rigidity Modulus G	(10^8N/m^2)	445
Poisson's Ratio	σ	0.273
Knoop Hardness	Hk	630[6]
Abrasion	Aa	118
Photoelastic Constant (nm/cm/10^5Pa)	β	2.03

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.02
350	0.22
360	0.50
370	0.70
380	0.81
390	0.87
400	0.912
420	0.950
440	0.964
460	0.974
480	0.982
500	0.989
550	0.996
600	0.994
650	0.995
700	0.998
800	0.998
900	0.998
1000	
1200	
1400	
1600	
1800	
2000	
2200	
2400	

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	3
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	52.2
Phosphate Resistance	PR	3.1

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.24
Remarks		FG

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20	2.1	2.8	2.8	3.0	3.3	4.0	4.7
−20 ～ 0	2.1	2.8	2.8	3.1	3.4	4.0	4.8
0 ～ 20	2.1	2.8	2.8	3.1	3.4	4.1	4.9
20 ～ 40	2.0	2.8	2.9	3.1	3.4	4.2	5.0
40 ～ 60	2.0	2.8	2.9	3.1	3.5	4.3	5.1
60 ～ 80	2.0	2.8	2.9	3.1	3.5	4.3	5.3

L–LAH53

806409
811406

Refractive Index	n_d	**1.80610** 1.806098	Abbe Number ν_d	**40.9** 40.88	Dispersion $n_F - n_C$	**0.01972** 0.019718
Refractive Index	n_e	1.810782	Abbe Number ν_e	40.63	Dispersion $n_{F'} - n_{C'}$	0.019954

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.76076
n_{1970}	1.97009	1.76780
n_{1530}	1.52958	1.77552
n_{1129}	1.12864	1.78286
n_t	1.01398	1.78549
n_s	0.85211	1.79031
$n_{A'}$	0.76819	1.79375
n_r	0.70652	1.79697
n_C	0.65627	1.80024
$n_{C'}$	0.64385	1.80116
$n_{He\text{-}Ne}$	0.6328	1.80203
n_D	0.58929	1.80592
n_d	0.58756	1.80610
n_e	0.54607	1.81078
n_F	0.48613	1.81996
$n_{F'}$	0.47999	1.82112
$n_{He\text{-}Cd}$	0.44157	1.82967
n_g	0.435835	1.83117
n_h	0.404656	1.84075
n_i	0.365015	1.85768

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0094
$\Delta\theta_{C,A'}$	0.0037
$\Delta\theta_{g,d}$	−0.0082
$\Delta\theta_{g,F}$	−0.0065
$\Delta\theta_{i,g}$	−0.0385

Constants of Dispersion Formula	
A_1	1.90781372
A_2	$2.63500130 \cdot 10^{-1}$
A_3	1.28144614
B_1	$1.03413285 \cdot 10^{-2}$
B_2	$4.19041155 \cdot 10^{-2}$
B_3	$9.57068567 \cdot 10^{1}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	4.49
Remarks		

Partial Dispersions	
$n_C - n_t$	0.014747
$n_C - n_{A'}$	0.006489
$n_d - n_C$	0.005860
$n_e - n_C$	0.010544
$n_g - n_d$	0.025074
$n_g - n_F$	0.011216
$n_h - n_g$	0.009575
$n_i - n_g$	0.026505
$n_{C'} - n_t$	0.015670
$n_e - n_{C'}$	0.009621
$n_{F'} - n_e$	0.010333
$n_i - n_{F'}$	0.036562

Thermal Properties		
Strain Point	StP (℃)	534
Annealing Point	AP (℃)	558
Transformation Temperature	Tg (℃)	574
Yield Point	At (℃)	607
Softening Point	SP (℃)	646
Expansion Coefficients (−30～+70℃)		59
α (10^{-7}/℃) (+100～+300℃)		72
Thermal Conductivity	k(W/m·K)	0.862

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	1151
Rigidity Modulus G	(10^8N/m^2)	443
Poisson's Ratio	σ	0.298
Knoop Hardness	Hk	660[7]
Abrasion	Aa	76
Photoelastic Constant (nm/cm/10^5Pa)	β	

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	2.0

Relative Partial Dispersions	
$\theta_{C,t}$	0.7479
$\theta_{C,A'}$	0.3291
$\theta_{d,C}$	0.2972
$\theta_{e,C}$	0.5347
$\theta_{g,d}$	1.2716
$\theta_{g,F}$	0.5688
$\theta_{h,g}$	0.4856
$\theta_{i,g}$	1.3442
$\theta'_{C',t}$	0.7853
$\theta'_{e,C'}$	0.4822
$\theta'_{F',e}$	0.5178
$\theta'_{i,F'}$	1.8323

Coloring	
λ 80／λ 5	40/34

Internal Transmittance	
λ (nm)	τ 10mm
280	
290	
300	
310	
320	
330	
340	0.13
350	0.48
360	0.70
370	0.84
380	0.908
390	0.940
400	0.959
420	0.976
440	0.983
460	0.988
480	0.991
500	0.995
550	0.998
600	0.998
650	0.999
700	0.999
800	
900	
1000	
1200	
1400	
1600	
1800	
2000	
2200	
2400	

Temperature Coefficients of Refractive Index							
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)						
	t	C′	He-Ne	D	e	F′	g
−40 ～ −20							
−20 ～ 0							
0 ～ 20							
20 ～ 40							
40 ～ 60							
60 ～ 80							

EXPLANATION FOR TABLE OF i-LINE GLASSES

1.INTERNAL TRANSMITTANCE (Ti)

Internaltransmittance of the glass is indicated as guaranteed transmittance at 365nm through 10mm thickness. Please note this is internal transmittance, and reflection loss is not included.

2.SOLARIZATION

The degree of solarization is indicated as transmittance decrease caused by radiation from a super high pressure mercury-vapor lamp. The detailed measurement method is described in "Japanese Optical Glass Industrial Standard (JOGIS)"

3.OPTICAL HOMOGENEITY

Homogeneity (n) is guaranteed by our He-Ne laser interferometers. n specifications is indicated with three different sizes (ø120 , ø150 , and ø200) because n varies according to glass type, size, and shape.

If the ordered thickness is less than 25mm, we use a 25mm thick test piece for n measurement.

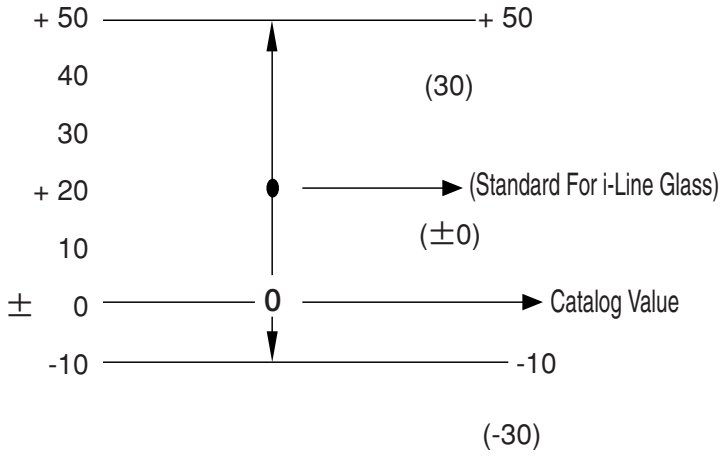
When better n is required, please consult us.

4.REFRACTIVE INDEX (ni) VARIATION IN ONE LOT (Sn STANDARD)

Indicated value is refractive index variation after annealing within a single batch.(Same melt, same anneal.)

5.REFRACTIVE INDEX TOLERANCE

The standard refractive index (ni) for i-Line glass is higher than our catalog nominal value because longer anneal times cause an increase in refractive index.



Example: +20+30(x10-5)

+20 means the increase against our catalog constants and tolerance of +30 is from the new nominal value. I.E. a glass has tolerance of +20+30 can vary from -10 to +50(x10-5) against normal catalog

List of i－Line Glasses

1998-6-1

Glass Type	Internal Transmittance τ 10mm (365nm)	Solarization Resistance	Optical Homogeneity Guaranteed (×10⁻⁶)			Deviation of ni within a single lot (×10⁻⁵)	Tolerance of Refractive Index (×10⁻⁵)	REMARKS
			Dia160or less	Dia 210or less	Dia260 or less improvement type			
S-FPL51Y	0.997	Good	±1.0	—	—	±2	+20 ±20	Please consult us about lot size
S-FSL 5Y	0.999	Good	±0.5	±0.8	±1.0	±2	+15 ±20	
BSL 7Y	0.998	Good	±0.5	±0.8	±1.0	±1	+20 ±20	
BAL15Y	0.994	Good	±0.5	±0.8	±1.0	±1	+10 ±20	
BAL35Y	0.996	Good	±0.5	±0.8	±1.0	±1	+20 ±20	
BSM51Y	0.995	Good	±0.5	±0.8	±1.0	±1	+30 ±20	
PBL 1Y	0.997	Good	±0.5	±0.8	±1.0	±1	+10 ±20	
PBL 6Y	0.998	Good	±0.5	±0.8	±1.0	±1	+10 ±20	
PBL25Y	0.995	Good	±0.5	±0.8	±1.0	±1	+10 ±20	
PBL26Y	0.996	Good	±0.5	±0.8	±1.0	±1	+10 ±20	
PBM 2Y	0.986	Good	±0.5	±0.8	±1.0	±1	+10 ±20	
PBM 8Y	0.991	Good	±0.5	±0.8	±1.0	±1	+10 ±20	
PBM18Y	0.993	Good	±0.5	±0.8	±1.0	±1	+10 ±20	improvement PBM8Y on Transmittance

(Notice)

Optical Homogeneity Guaranteed ：

Please consult us if you need tighter specification.In case the thickness ofthe material is 25mm or less,we will guarantee the Optical Homogeneity by measurement using 25mm or more thick material.

Tolerance of Refractive Index ：

Please consult us if you need tighter specification

OHARA
株式会社 オハラ

S-FPL51Y

497811
498808

Refractive Index	n_d	**1.49700** 1.497003	Abbe Number	ν_d	**81.1** 81.14	Dispersion	n_F-n_C **0.00613** 0.006125
Refractive Index	n_e	1.498466	Abbe Number	ν_e	80.74	Dispersion	$n_{F'}-n_{C'}$ 0.006174

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.47980
n_{1970}	1.97009	1.48286
n_{1530}	1.52958	1.48617
n_{1129}	1.12864	1.48913
n_t	1.01398	1.49011
n_s	0.85211	1.49182
$n_{A'}$	0.76819	1.49299
n_r	0.70652	1.49407
n_C	0.65627	**1.49513**
$n_{C'}$	0.64385	1.49543
n_{He-Ne}	0.6328	1.49571
n_D	0.58929	1.49695
n_d	0.58756	**1.49700**
n_e	0.54607	1.49847
n_F	0.48613	**1.50126**
$n_{F'}$	0.47999	1.50160
n_{He-Cd}	0.44157	1.50412
n_g	0.435835	**1.50455**
n_h	0.404656	1.50727
n_i	0.365015	1.51185
n_{334}	0.334148	1.51673
n_{326}	0.326106	1.51826

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	−0.1067
$\Delta\theta_{C,A'}$	−0.0251
$\Delta\theta_{g,d}$	0.0366
$\Delta\theta_{g,F}$	0.0279
$\Delta\theta_{i,g}$	0.1462

Constants of Dispersion Formula ※1	
A_1	1.14031443
A_2	$7.71496272\cdot10^{-2}$
A_3	1.43721957
B_1	$5.95466872\cdot10^{-3}$
B_2	$2.23953953\cdot10^{-2}$
B_3	$2.74290057\cdot10^{2}$

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.66
Remarks		

Partial Dispersions	
n_C-n_t	0.005027
$n_C-n_{A'}$	0.002139
n_d-n_C	0.001870
n_e-n_C	0.003333
n_g-n_d	0.007551
n_g-n_F	0.003296
n_h-n_g	0.002716
n_i-n_g	0.007300
$n_{C'}-n_t$	0.005325
$n_e-n_{C'}$	0.003035
$n_{F'}-n_e$	0.003139
$n_i-n_{F'}$	0.010249

Thermal Properties		
Strain Point	StP (℃)	–
Annealing Point	AP (℃)	–
Transformation Temperature	Tg (℃)	448
Yield Point	At (℃)	471
Softening Point	SP (℃)	–
Expansion Coefficients (−30~+70℃)		136
α (10^{-7}/℃) (+100~+300℃)		161
Thermal Conductivity	k(W/m·K)	0.780

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	716
Rigidity Modulus G	(10^8N/m^2)	275
Poisson's Ratio	σ	0.302
Knoop Hardness	Hk	380[4]
Abrasion	Aa	476
Photoelastic Constant (nm/cm/10^5Pa)	β	

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	1
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	2~3
Acid Resistance (Surface) Group	SR	51.0
Phosphate Resistance	PR	4.2

Relative Partial Dispersions	
$\theta_{C,t}$	0.8207
$\theta_{C,A'}$	0.3492
$\theta_{d,C}$	0.3053
$\theta_{e,C}$	0.5442
$\theta_{g,d}$	1.2328
$\theta_{g,F}$	0.5381
$\theta_{h,g}$	0.4434
$\theta_{i,g}$	1.1918
$\theta'_{C',t}$	0.8625
$\theta'_{e,C'}$	0.4916
$\theta'_{F',e}$	0.5084
$\theta'_{i,F'}$	1.6600

Coloring	
λ 80／λ 5	31/–

Internal Transmittance		
λ (nm)	τ 10mm	τ 25mm
240	0.04	
250	0.07	
260	0.21	0.02
270	0.34	0.06
280	0.51	0.19
290	0.67	0.37
300	0.80	0.58
310	0.89	0.75
320	0.943	0.86
330	0.971	0.930
340	0.986	0.966
350	0.994	0.985
360	0.996	0.991
365	0.997	0.993
370	0.998	0.995
380	0.999	0.997
390	0.999	0.998
400	0.999	0.998
420	0.999	0.998
440	0.999	0.998
460	0.999	0.998
480	0.999	0.998
500	0.999	0.999
550	0.999	0.999
600	0.999	0.999
650	0.999	0.998
700	0.999	0.999
800	0.999	0.999
900	0.999	0.998
1000	0.998	0.996
1200	0.998	0.996
1400	0.999	0.998
1600	0.999	0.997
1800	0.998	0.995
2000	0.998	0.995
2200	0.996	0.991
2400	0.995	0.987

Temperature Coefficients of Refractive Index								
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ~ −20	−6.4	−6.3	−6.3	−6.3	−6.2	−6.0	−5.9	−5.5
−20 ~ 0	−6.7	−6.6	−6.6	−6.5	−6.4	−6.3	−6.1	−5.7
0 ~ 20	−6.9	−6.8	−6.8	−6.7	−6.7	−6.5	−6.4	−5.9
20 ~ 40	−7.2	−7.0	−7.0	−7.0	−6.9	−6.7	−6.6	−6.1
40 ~ 60	−7.4	−7.3	−7.3	−7.2	−7.1	−7.0	−6.8	−6.3
60 ~ 80	−7.7	−7.5	−7.5	−7.4	−7.4	−7.2	−7.0	−6.6

S-FSL 5Y

487703
489702

Refractive Index	n_d	**1.48749** 1.487490	Abbe Number ν_d	**70.3** 70.36	Dispersion $n_F - n_C$	**0.00693** 0.006929
Refractive Index	n_e	1.489145	Abbe Number ν_e	70.17	Dispersion $n_{F'} - n_{C'}$	0.006971

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.46218
n_{1970}	1.97009	1.46761
n_{1530}	1.52958	1.47323
n_{1129}	1.12864	1.47778
n_t	1.01398	1.47915
n_s	0.85211	1.48138
$n_{A'}$	0.76819	1.48282
n_r	0.70652	1.48410
n_C	0.65627	**1.48535**
$n_{C'}$	0.64385	1.48569
$n_{He\text{-}Ne}$	0.6328	1.48601
n_D	0.58929	1.48743
n_d	0.58756	**1.48749**
n_e	0.54607	1.48915
n_F	0.48613	**1.49228**
$n_{F'}$	0.47999	1.49266
$n_{He\text{-}Cd}$	0.44157	1.49546
n_g	0.435835	**1.49594**
n_h	0.404656	1.49896
n_i	0.365015	1.50404
n_{334}	0.334148	1.50946
n_{326}	0.326106	1.51116

Partial Dispersions

$n_C - n_t$	0.006201
$n_C - n_{A'}$	0.002523
$n_d - n_C$	0.002144
$n_e - n_C$	0.003799
$n_g - n_d$	0.008455
$n_g - n_F$	0.003670
$n_h - n_g$	0.003015
$n_i - n_g$	0.008099
$n_{C'} - n_t$	0.006546
$n_e - n_{C'}$	0.003454
$n_{F'} - n_e$	0.003517
$n_i - n_{F'}$	0.011382

Relative Partial Dispersions

$\theta_{C,t}$	0.8949
$\theta_{C,A'}$	0.3641
$\theta_{d,C}$	0.3094
$\theta_{e,C}$	0.5483
$\theta_{g,d}$	1.2202
$\theta_{g,F}$	0.5297
$\theta_{h,g}$	0.4351
$\theta_{i,g}$	1.1689
$\theta'_{C',t}$	0.9390
$\theta'_{e,C'}$	0.4955
$\theta'_{F',e}$	0.5045
$\theta'_{i,F'}$	1.6328

Thermal Properties

Strain Point	StP (℃)	465
Annealing Point	AP (℃)	502
Transformation Temperature	Tg (℃)	500
Yield Point	At (℃)	567
Softening Point	SP (℃)	676
Expansion Coefficients	(−30∼+70℃)	89
α (10^{-7}/℃)	(+100∼+300℃)	97
Thermal Conductivity	k(W/m·K)	1.002

Coloring

λ 80／λ 5	30/27

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0181
$\Delta\theta_{C,A'}$	0.0029
$\Delta\theta_{g,d}$	0.0016
$\Delta\theta_{g,F}$	0.0021
$\Delta\theta_{i,g}$	0.0331

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	622
Rigidity Modulus G	(10^8N/m^2)	253
Poisson's Ratio	σ	0.229
Knoop Hardness	Hk	530[5]
Abrasion	Aa	113
Photoelastic Constant (nm/cm/10^5Pa)	β	2.87

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280	0.19	0.01
290	0.61	0.29
300	0.86	0.68
310	0.954	0.89
320	0.984	0.961
330	0.993	0.983
340	0.997	0.993
350	0.998	0.995
360	0.998	0.996
365	0.999	0.997
370	0.999	0.998
380	0.999	0.998
390	0.999	0.998
400	0.999	0.999
420	0.999	0.999
440	0.999	0.999
460	0.999	0.999
480	0.999	0.999
500	0.999	0.999
550	0.999	0.999
600	0.999	0.999
650	0.999	0.998
700	0.999	0.999
800	0.999	0.999
900	0.999	0.997
1000	0.998	0.994
1200	0.997	0.992
1400	0.981	0.952
1600	0.991	0.977
1800	0.983	0.958
2000	0.968	0.921
2200	0.86	0.70
2400	0.85	0.67

Constants of Dispersion Formula ※1

A_1	$9.77409944 \cdot 10^{-1}$
A_2	$2.10950834 \cdot 10^{-1}$
A_3	1.37142848
B_1	$5.57649364 \cdot 10^{-3}$
B_2	$1.77000313 \cdot 10^{-2}$
B_3	$1.49211443 \cdot 10^{2}$

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group RW(P)	3
Acid Resistance (Powder) Group RA(P)	4
Weathering Resistance (Surface) Group W(S)	2
Acid Resistance (Surface) Group SR	3.0
Phosphate Resistance PR	2.0

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.46
Remarks		

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g	i
−40 ∼ −20	−1.2	−1.2	−1.2	−1.1	−1.1	−0.9	−0.7	−0.3
−20 ∼ 0	−1.2	−1.1	−1.1	−1.0	−1.0	−0.8	−0.6	−0.2
0 ∼ 20	−1.2	−1.0	−1.0	−0.9	−0.8	−0.7	−0.5	0.0
20 ∼ 40	−1.1	−0.9	−0.9	−0.8	−0.7	−0.6	−0.4	0.1
40 ∼ 60	−1.0	−0.8	−0.8	−0.7	−0.6	−0.5	−0.3	0.3
60 ∼ 80	−1.0	−0.7	−0.7	−0.6	−0.5	−0.3	−0.1	0.4

BSL 7Y

516643
518641

Refractive Index	n_d	**1.51633** 1.516330	Abbe Number ν_d	**64.3** 64.24	Dispersion $n_F - n_C$	**0.00803** 0.008037
Refractive Index	n_e	1.518248	Abbe Number ν_e	64.04	Dispersion $n_{F'} - n_{C'}$	0.008092

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.48829
n_{1970}	1.97009	1.49417
n_{1530}	1.52958	1.50028
n_{1129}	1.12864	1.50528
n_t	1.01398	1.50681
n_s	0.85211	1.50933
$n_{A'}$	0.76819	1.51096
n_r	0.70652	1.51242
n_C	0.65627	**1.51386**
$n_{C'}$	0.64385	1.51425
$n_{He\text{-}Ne}$	0.6328	1.51462
n_D	0.58929	1.51626
n_d	0.58756	**1.51633**
n_e	0.54607	1.51825
n_F	0.48613	**1.52189**
$n_{F'}$	0.47999	1.52234
$n_{He\text{-}Cd}$	0.44157	1.52562
n_g	0.435835	**1.52619**
n_h	0.404656	1.52973
n_i	0.365015	1.53574
n_{334}	0.334148	1.54218
n_{326}	0.326106	1.54422

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0286
$\Delta\theta_{C,A'}$	0.0059
$\Delta\theta_{g,d}$	−0.0048
$\Delta\theta_{g,F}$	−0.0031
$\Delta\theta_{i,g}$	0.0014

Constants of Dispersion Formula ※1

A_1	1.13329383
A_2	$1.36897201 \cdot 10^{-1}$
A_3	$7.03456004 \cdot 10^{-1}$
B_1	$6.69407868 \cdot 10^{-3}$
B_2	$2.37391760 \cdot 10^{-2}$
B_3	$7.07030316 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	2.50
Remarks		

Partial Dispersions

$n_C - n_t$	0.007046
$n_C - n_{A'}$	0.002891
$n_d - n_C$	0.002475
$n_e - n_C$	0.004393
$n_g - n_d$	0.009857
$n_g - n_F$	0.004295
$n_h - n_g$	0.003543
$n_i - n_g$	0.009552
$n_{C'} - n_t$	0.007443
$n_e - n_{C'}$	0.003996
$n_{F'} - n_e$	0.004096
$n_i - n_{F'}$	0.013395

Thermal Properties

Strain Point	StP (℃)	527
Annealing Point	AP (℃)	559
Transformation Temperature	Tg (℃)	577
Yield Point	At (℃)	616
Softening Point	SP (℃)	714
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	68
	(+100～+300℃)	81
Thermal Conductivity	k (W/m·K)	1.182

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	811
Rigidity Modulus G	(10^8N/m^2)	336
Poisson's Ratio	σ	0.207
Knoop Hardness	Hk	570[6]
Abrasion	Aa	87
Photoelastic Constant ($nm/cm/10^5Pa$)	β	

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	2
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.8767
$\theta_{C,A'}$	0.3597
$\theta_{d,C}$	0.3080
$\theta_{e,C}$	0.5466
$\theta_{g,d}$	1.2265
$\theta_{g,F}$	0.5344
$\theta_{h,g}$	0.4408
$\theta_{i,g}$	1.1885
$\theta'_{C',t}$	0.9198
$\theta'_{e,C'}$	0.4938
$\theta'_{F',e}$	0.5062
$\theta'_{i,F'}$	1.6553

Coloring

λ 80／λ 5	32/29

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280		
290	0.06	
300	0.43	0.12
310	0.78	0.54
320	0.932	0.83
330	0.978	0.945
340	0.991	0.978
350	0.996	0.990
360	0.997	0.992
365	0.998	0.995
370	0.998	0.996
380	0.998	0.996
390	0.999	0.997
400	0.999	0.998
420	0.999	0.998
440	0.999	0.998
460	0.999	0.998
480	0.999	0.998
500	0.999	0.999
550	0.999	0.999
600	0.999	0.998
650	0.999	0.998
700	0.999	0.999
800	0.999	0.999
900	0.999	0.997
1000	0.997	0.993
1200	0.997	0.993
1400	0.969	0.924
1600	0.990	0.975
1800	0.981	0.952
2000	0.962	0.908
2200	0.86	0.68
2400	0.80	0.58

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g	i
−40 ～ −20	2.3	2.6	2.6	2.7	2.8	3.0	3.2	3.8
−20 ～ 0	2.4	2.7	2.7	2.8	2.9	3.2	3.4	4.0
0 ～ 20	2.5	2.8	2.9	3.0	3.1	3.3	3.6	4.2
20 ～ 40	2.6	3.0	3.0	3.1	3.2	3.5	3.7	4.4
40 ～ 60	2.8	3.1	3.1	3.2	3.3	3.6	3.9	4.6
60 ～ 80	2.9	3.2	3.2	3.3	3.4	3.7	4.0	4.8

BAL15Y

557587
559585

Refractive Index	n_d	**1.55671** 1.556711	Abbe Number ν_d	**58.7** 58.68	Dispersion $n_F - n_C$	**0.00948** 0.009488
Refractive Index	n_e	1.558973	Abbe Number ν_e	58.41	Dispersion $n_{F'} - n_{C'}$	0.009569

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.52907
n_{1970}	1.97009	1.53423
n_{1530}	1.52958	1.53972
n_{1129}	1.12864	1.54449
n_t	1.01398	1.54604
n_s	0.85211	1.54872
$n_{A'}$	0.76819	1.55053
n_r	0.70652	1.55218
n_C	0.65627	**1.55383**
$n_{C'}$	0.64385	1.55429
$n_{He\text{-}Ne}$	0.6328	1.55471
n_D	0.58929	1.55663
n_d	0.58756	**1.55671**
n_e	0.54607	1.55897
n_F	0.48613	**1.56331**
$n_{F'}$	0.47999	1.56385
$n_{He\text{-}Cd}$	0.44157	1.56779
n_g	0.435835	**1.56848**
n_h	0.404656	1.57277
n_i	0.365015	1.58012
n_{334}	0.334148	1.58807
n_{326}	0.326106	1.59060

Partial Dispersions	
$n_C - n_t$	0.007785
$n_C - n_{A'}$	0.003296
$n_d - n_C$	0.002885
$n_e - n_C$	0.005147
$n_g - n_d$	0.011768
$n_g - n_F$	0.005165
$n_h - n_g$	0.004295
$n_i - n_g$	0.011636
$n_{C'} - n_t$	0.008244
$n_e - n_{C'}$	0.004688
$n_{F'} - n_e$	0.004881
$n_i - n_{F'}$	0.016261

Relative Partial Dispersions	
$\theta_{C,t}$	0.8205
$\theta_{C,A'}$	0.3474
$\theta_{d,C}$	0.3041
$\theta_{e,C}$	0.5425
$\theta_{g,d}$	1.2403
$\theta_{g,F}$	0.5444
$\theta_{h,g}$	0.4527
$\theta_{i,g}$	1.2264
$\theta'_{C',t}$	0.8615
$\theta'_{e,C'}$	0.4899
$\theta'_{F',e}$	0.5101
$\theta'_{i,F'}$	1.6993

Thermal Properties		
Strain Point	StP (℃)	–
Annealing Point	AP (℃)	–
Transformation Temperature	Tg (℃)	507
Yield Point	At (℃)	547
Softening Point	SP (℃)	642
Expansion Coefficients (−30∼+70℃)		76
α (10^{-7}/℃) (+100∼+300℃)		90
Thermal Conductivity	k (W/m·K)	1.000

Coloring	
λ 80／λ 5	32/30

Deviation of Relative Partial Dispersions Δθ from "Normal"	
$\Delta\theta_{C,t}$	−0.0015
$\Delta\theta_{C,A'}$	0.0004
$\Delta\theta_{g,d}$	−0.0026
$\Delta\theta_{g,F}$	−0.0021
$\Delta\theta_{i,g}$	−0.0073

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	783
Rigidity Modulus G	(10^8N/m^2)	317
Poisson's Ratio	σ	0.236
Knoop Hardness	Hk	560[6]
Abrasion	Aa	113
Photoelastic Constant (nm/cm/10^5Pa)	β	

Constants of Dispersion Formula ※1	
A_1	1.28348331
A_2	$1.02800765 \cdot 10^{-1}$
A_3	$4.04609885 \cdot 10^{-1}$
B_1	$7.90900515 \cdot 10^{-3}$
B_2	$3.05971274 \cdot 10^{-2}$
B_3	$4.65268356 \cdot 10^{1}$

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	2.90
Remarks		

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1∼2
Acid Resistance (Surface) Group	SR	1.2
Phosphate Resistance	PR	1.0

Internal Transmittance		
λ (nm)	τ 10mm	τ 25mm
280		
290		
300	0.17	0.01
310	0.59	0.27
320	0.84	0.65
330	0.937	0.85
340	0.971	0.929
350	0.985	0.963
360	0.992	0.979
365	0.994	0.984
370	0.995	0.988
380	0.996	0.990
390	0.997	0.993
400	0.998	0.994
420	0.998	0.995
440	0.998	0.995
460	0.998	0.996
480	0.998	0.996
500	0.999	0.997
550	0.999	0.997
600	0.999	0.997
650	0.998	0.996
700	0.999	0.997
800	0.999	0.997
900	0.998	0.995
1000	0.996	0.990
1200	0.995	0.988
1400	0.989	0.972
1600	0.992	0.980
1800	0.984	0.961
2000	0.972	0.932
2200	0.927	0.82
2400	0.89	0.75

Temperature Coefficients of Refractive Index								
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ∼ −20	2.2	2.5	2.5	2.6	2.8	3.0	3.3	4.2
−20 ∼ 0	2.2	2.5	2.6	2.7	2.8	3.1	3.5	4.3
0 ∼ 20	2.3	2.6	2.6	2.8	2.9	3.2	3.6	4.5
20 ∼ 40	2.4	2.7	2.7	2.8	3.0	3.3	3.7	4.6
40 ∼ 60	2.4	2.8	2.8	2.9	3.1	3.4	3.8	4.8
60 ∼ 80	2.4	2.8	2.9	3.0	3.1	3.5	3.9	4.9

BAL35Y

589612
591610

Refractive Index	n_d	**1.58913** 1.589130	Abbe Number ν_d	**61.2** 61.23	Dispersion $n_F - n_C$	**0.00962** 0.009621
Refractive Index	n_e	1.591426	Abbe Number ν_e	60.99	Dispersion $n_{F'} - n_{C'}$	0.009697

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.55937
n_{1970}	1.97009	1.56517
n_{1530}	1.52958	1.57128
n_{1129}	1.12864	1.57646
n_t	1.01398	1.57811
n_s	0.85211	1.58093
$n_{A'}$	0.76819	1.58280
n_r	0.70652	1.58451
n_C	0.65627	**1.58619**
$n_{C'}$	0.64385	1.58666
$n_{He\text{-}Ne}$	0.6328	1.58710
n_D	0.58929	1.58904
n_d	0.58756	**1.58913**
n_e	0.54607	1.59143
n_F	0.48613	**1.59581**
$n_{F'}$	0.47999	1.59636
$n_{He\text{-}Cd}$	0.44157	1.60032
n_g	0.435835	**1.60100**
n_h	0.404656	1.60530
n_i	0.365015	1.61261
n_{334}	0.334148	1.62045
n_{326}	0.326106	1.62293

Partial Dispersions	
$n_C - n_t$	0.008076
$n_C - n_{A'}$	0.003385
$n_d - n_C$	0.002940
$n_e - n_C$	0.005236
$n_g - n_d$	0.011874
$n_g - n_F$	0.005193
$n_h - n_g$	0.004298
$n_i - n_g$	0.011602
$n_{C'} - n_t$	0.008545
$n_e - n_{C'}$	0.004767
$n_{F'} - n_e$	0.004930
$n_i - n_{F'}$	0.016250

Relative Partial Dispersions	
$\theta_{C,t}$	0.8394
$\theta_{C,A'}$	0.3518
$\theta_{d,C}$	0.3056
$\theta_{e,C}$	0.5442
$\theta_{g,d}$	1.2342
$\theta_{g,F}$	0.5398
$\theta_{h,g}$	0.4467
$\theta_{i,g}$	1.2059
$\theta'_{C',t}$	0.8812
$\theta'_{e,C'}$	0.4916
$\theta'_{F',e}$	0.5084
$\theta'_{i,F'}$	1.6758

Thermal Properties		
Strain Point	StP (℃)	–
Annealing Point	AP (℃)	–
Transformation Temperature	Tg (℃)	590
Yield Point	At (℃)	628
Softening Point	SP (℃)	697
Expansion Coefficients (−30∼+70℃)		57
α (10^{-7}/℃) (+100∼+300℃)		72
Thermal Conductivity	k (W/m·K)	0.991

Coloring	
λ 80／λ 5	32/29

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0054
$\Delta\theta_{C,A'}$	0.0017
$\Delta\theta_{g,d}$	−0.0034
$\Delta\theta_{g,F}$	−0.0026
$\Delta\theta_{i,g}$	−0.0064

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	881
Rigidity Modulus G	(10^8N/m^2)	354
Poisson's Ratio	σ	0.244
Knoop Hardness	Hk	550[6]
Abrasion	Aa	118
Photoelastic Constant ($nm/cm/10^5Pa$)	β	

Constants of Dispersion Formula ※1	
A_1	1.26231429
A_2	$2.25154210 \cdot 10^{-1}$
A_3	$6.39119345 \cdot 10^{-1}$
B_1	$6.95586355 \cdot 10^{-3}$
B_2	$2.21310699 \cdot 10^{-2}$
B_3	$6.31662736 \cdot 10^{1}$

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.23
Remarks		

Chemical Properties		
Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	3
Weathering Resistance (Surface) Group	W (S)	2∼3
Acid Resistance (Surface) Group	SR	4.2
Phosphate Resistance	PR	1.0

Internal Transmittance		
λ (nm)	τ 10mm	τ 25mm
280		
290	0.11	
300	0.50	0.17
310	0.79	0.56
320	0.920	0.81
330	0.966	0.918
340	0.984	0.960
350	0.991	0.978
360	0.994	0.986
365	0.996	0.990
370	0.996	0.991
380	0.997	0.993
390	0.998	0.995
400	0.998	0.996
420	0.999	0.997
440	0.999	0.997
460	0.999	0.997
480	0.999	0.998
500	0.999	0.998
550	0.999	0.998
600	0.999	0.998
650	0.999	0.998
700	0.999	0.998
800	0.999	0.998
900	0.999	0.997
1000	0.997	0.993
1200	0.997	0.993
1400	0.985	0.963
1600	0.993	0.982
1800	0.986	0.966
2000	0.973	0.934
2200	0.904	0.77
2400	0.82	0.61

Temperature Coefficients of Refractive Index								
Range of Temperature (℃)	dn / dt relative (10^{-6} / ℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ∼ −20	3.2	3.4	3.4	3.5	3.7	3.9	4.2	4.9
−20 ∼ 0	3.2	3.5	3.5	3.6	3.8	4.0	4.3	5.0
0 ∼ 20	3.3	3.6	3.6	3.7	3.9	4.2	4.4	5.2
20 ∼ 40	3.3	3.7	3.7	3.9	4.0	4.3	4.6	5.4
40 ∼ 60	3.4	3.8	3.8	4.0	4.1	4.4	4.7	5.6
60 ∼ 80	3.5	3.9	3.9	4.1	4.2	4.5	4.9	5.7

BSM 51Y

603606
605604

Refractive Index	n_d	**1.60311** 1.603109	Abbe Number ν_d	**60.6** 60.65	Dispersion $n_F - n_C$	**0.00995** 0.009944
Refractive Index	n_e	1.605481	Abbe Number ν_e	60.40	Dispersion $n_{F'} - n_{C'}$	0.010024

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.57281
n_{1970}	1.97009	1.57865
n_{1530}	1.52958	1.58482
n_{1129}	1.12864	1.59008
n_t	1.01398	1.59177
n_s	0.85211	1.59465
$n_{A'}$	0.76819	1.59658
n_r	0.70652	1.59834
n_C	0.65627	**1.60007**
$n_{C'}$	0.64385	1.60056
$n_{He\text{-}Ne}$	0.6328	1.60101
n_D	0.58929	1.60302
n_d	0.58756	**1.60311**
n_e	0.54607	1.60548
n_F	0.48613	**1.61002**
$n_{F'}$	0.47999	1.61058
$n_{He\text{-}Cd}$	0.44157	1.61468
n_g	0.435835	**1.61539**
n_h	0.404656	1.61985
n_i	0.365015	1.62743
n_{334}	0.334148	1.63557
n_{326}	0.326106	1.63815

Partial Dispersions

$n_C - n_t$	0.008303
$n_C - n_{A'}$	0.003489
$n_d - n_C$	0.003035
$n_e - n_C$	0.005407
$n_g - n_d$	0.012286
$n_g - n_F$	0.005377
$n_h - n_g$	0.004454
$n_i - n_g$	0.012031
$n_{C'} - n_t$	0.008787
$n_e - n_{C'}$	0.004923
$n_{F'} - n_e$	0.005101
$n_i - n_{F'}$	0.016844

Relative Partial Dispersions

$\theta_{C,t}$	0.8350
$\theta_{C,A'}$	0.3509
$\theta_{d,C}$	0.3052
$\theta_{e,C}$	0.5437
$\theta_{g,d}$	1.2355
$\theta_{g,F}$	0.5407
$\theta_{h,g}$	0.4479
$\theta_{i,g}$	1.2099
$\theta'_{C',t}$	0.8766
$\theta'_{e,C'}$	0.4911
$\theta'_{F',e}$	0.5089
$\theta'_{i,F'}$	1.6804

Thermal Properties

Strain Point	StP (℃)	538
Annealing Point	AP (℃)	568
Transformation Temperature	Tg (℃)	585
Yield Point	At (℃)	617
Softening Point	SP (℃)	684
Expansion Coefficients	(−30∼+70℃)	63
α (10^{-7}/℃)	(+100∼+300℃)	77
Thermal Conductivity	k(W/m·K)	0.961

Coloring

λ 80／λ 5	32/29

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0037
$\Delta\theta_{C,A'}$	0.0015
$\Delta\theta_{g,d}$	−0.0033
$\Delta\theta_{g,F}$	−0.0026
$\Delta\theta_{i,g}$	−0.0073

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	901
Rigidity Modulus G	(10^8N/m^2)	359
Poisson's Ratio	σ	0.256
Knoop Hardness	Hk	570[6]
Abrasion	Aa	117
Photoelastic Constant ($nm/cm/10^5Pa$)	β	

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280		
290	0.03	
300	0.33	0.06
310	0.69	0.40
320	0.88	0.72
330	0.950	0.87
340	0.977	0.944
350	0.988	0.970
360	0.993	0.983
365	0.995	0.987
370	0.996	0.990
380	0.997	0.993
390	0.998	0.995
400	0.998	0.996
420	0.998	0.996
440	0.998	0.996
460	0.999	0.997
480	0.999	0.998
500	0.999	0.998
550	0.999	0.998
600	0.999	0.998
650	0.999	0.998
700	0.999	0.998
800	0.999	0.998
900	0.999	0.997
1000	0.997	0.993
1200	0.997	0.993
1400	0.985	0.963
1600	0.992	0.980
1800	0.983	0.959
2000	0.967	0.920
2200	0.89	0.74
2400	0.78	0.54

Constants of Dispersion Formula ※1

A_1	1.22393171
A_2	$3.06482383 \cdot 10^{-1}$
A_3	$8.23950901 \cdot 10^{-1}$
B_1	$6.49521083 \cdot 10^{-3}$
B_2	$2.08194161 \cdot 10^{-2}$
B_3	$7.95168951 \cdot 10^{1}$

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	4
Weathering Resistance (Surface) Group	W(S)	3
Acid Resistance (Surface) Group	SR	51.2
Phosphate Resistance	PR	2.2

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.36
Remarks		

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ∼ −20	2.5	2.8	2.8	2.9	3.1	3.3	3.6	4.3
−20 ∼ 0	2.6	2.9	2.9	3.0	3.1	3.4	3.7	4.4
0 ∼ 20	2.6	2.9	2.9	3.1	3.2	3.5	3.8	4.6
20 ∼ 40	2.6	3.0	3.0	3.1	3.3	3.6	3.9	4.7
40 ∼ 60	2.7	3.0	3.0	3.2	3.3	3.6	4.0	4.8
60 ∼ 80	2.7	3.1	3.1	3.3	3.4	3.7	4.1	4.9

PBL 1Y

548457
551455

Refractive Index	n_d	**1.54814** 1.548141	Abbe Number	ν_d	**45.7** 45.73	Dispersion	$n_F - n_C$ **0.01199** 0.011986
Refractive Index	n_e	1.550989	Abbe Number	ν_e	45.45	Dispersion	$n_{F'} - n_{C'}$ 0.012123

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.51892
n_{1970}	1.97009	1.52371
n_{1530}	1.52958	1.52892
n_{1129}	1.12864	1.53374
n_t	1.01398	1.53542
n_s	0.85211	1.53845
$n_{A'}$	0.76819	1.54058
n_r	0.70652	1.54256
n_C	0.65627	**1.54456**
$n_{C'}$	0.64385	1.54513
$n_{He\text{-}Ne}$	0.6328	1.54566
n_D	0.58929	1.54804
n_d	0.58756	**1.54814**
n_e	0.54607	1.55099
n_F	0.48613	**1.55655**
$n_{F'}$	0.47999	1.55725
$n_{He\text{-}Cd}$	0.44157	1.56242
n_g	0.435835	**1.56333**
n_h	0.404656	1.56911
n_i	0.365015	1.57931
n_{334}	0.334148	1.59092
n_{326}	0.326106	1.59476

Partial Dispersions	
$n_C - n_t$	0.009141
$n_C - n_{A'}$	0.003985
$n_d - n_C$	0.003576
$n_e - n_C$	0.006424
$n_g - n_d$	0.015189
$n_g - n_F$	0.006779
$n_h - n_g$	0.005775
$n_i - n_g$	0.015976
$n_{C'} - n_t$	0.009705
$n_e - n_{C'}$	0.005860
$n_{F'} - n_e$	0.006263
$n_i - n_{F'}$	0.022054

Relative Partial Dispersions	
$\theta_{C,t}$	0.7626
$\theta_{C,A'}$	0.3325
$\theta_{d,C}$	0.2983
$\theta_{e,C}$	0.5360
$\theta_{g,d}$	1.2672
$\theta_{g,F}$	0.5656
$\theta_{h,g}$	0.4818
$\theta_{i,g}$	1.3329
$\theta'_{C',t}$	0.8005
$\theta'_{e,C'}$	0.4834
$\theta'_{F',e}$	0.5166
$\theta'_{i,F'}$	1.8192

Thermal Properties		
Strain Point	StP (℃)	361
Annealing Point	AP (℃)	396
Transformation Temperature	Tg (℃)	406
Yield Point	At (℃)	453
Softening Point	SP (℃)	567
Expansion Coefficients (−30∼+70℃)		93
α (10^{-7}/℃) (+100∼+300℃)		106
Thermal Conductivity	k(W/m·K)	0.951

Coloring	
λ 80／λ 5	32/30

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0014
$\Delta\theta_{C,A'}$	0.0012
$\Delta\theta_{g,d}$	−0.0025
$\Delta\theta_{g,F}$	−0.0019
$\Delta\theta_{i,g}$	−0.0092

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	613
Rigidity Modulus G	(10^8N/m^2)	252
Poisson's Ratio	σ	0.217
Knoop Hardness	Hk	420[4]
Abrasion	Aa	124
Photoelastic Constant (nm/cm/10^5Pa)	β	2.94

Internal Transmittance		
λ (nm)	τ 10mm	τ 25mm
280		
290		
300		
310	0.29	0.04
320	0.80	0.57
330	0.954	0.88
340	0.988	0.970
350	0.995	0.988
360	0.997	0.993
365	0.997	0.994
370	0.998	0.995
380	0.998	0.996
390	0.999	0.997
400	0.999	0.998
420	0.999	0.998
440	0.999	0.998
460	0.999	0.998
480	0.999	0.998
500	0.999	0.999
550	0.999	0.999
600	0.999	0.999
650	0.999	0.999
700	0.999	0.999
800	0.999	0.999
900	0.999	0.999
1000	0.999	0.999
1200	0.999	0.999
1400	0.998	0.996
1600	0.996	0.991
1800	0.983	0.958
2000	0.960	0.903
2200	0.919	0.81
2400	0.88	0.73

Constants of Dispersion Formula ※1	
A_1	1.24772961
A_2	$1.01954909 \cdot 10^{-1}$
A_3	$3.50479619 \cdot 10^{-1}$
B_1	$9.26606623 \cdot 10^{-3}$
B_2	$4.51754311 \cdot 10^{-2}$
B_3	$4.50186705 \cdot 10^{1}$

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	2
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.1

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	2.95
Remarks		

Temperature Coefficients of Refractive Index								
Range of Temperature (℃)	dn / dt relative (10^{-6} / ℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ∼ −20	1.2	1.6	1.7	1.8	2.0	2.5	3.0	4.5
−20 ∼ 0	1.2	1.7	1.7	1.9	2.1	2.6	3.1	4.7
0 ∼ 20	1.2	1.7	1.8	1.9	2.2	2.7	3.2	4.9
20 ∼ 40	1.3	1.8	1.8	2.0	2.2	2.8	3.3	5.0
40 ∼ 60	1.3	1.8	1.9	2.1	2.3	2.9	3.4	5.2
60 ∼ 80	1.3	1.9	1.9	2.1	2.4	2.9	3.5	5.4

PBL 6Y

532490
534487

Refractive Index	n_d	**1.53172** 1.531717	Abbe Number ν_d	**49.0** 48.95	Dispersion $n_F - n_C$	**0.01086** 0.010862
Refractive Index	n_e	1.534301	Abbe Number ν_e	48.67	Dispersion $n_{F'} - n_{C'}$	0.010977

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.50343
n_{1970}	1.97009	1.50833
n_{1530}	1.52958	1.51361
n_{1129}	1.12864	1.51837
n_t	1.01398	1.51998
n_s	0.85211	1.52282
$n_{A'}$	0.76819	1.52480
n_r	0.70652	1.52663
n_C	0.65627	**1.52846**
$n_{C'}$	0.64385	1.52897
$n_{He\text{-}Ne}$	0.6328	1.52946
n_D	0.58929	1.53162
n_d	0.58756	**1.53172**
n_e	0.54607	1.53430
n_F	0.48613	**1.53932**
$n_{F'}$	0.47999	1.53995
$n_{He\text{-}Cd}$	0.44157	1.54459
n_g	0.435835	**1.54540**
n_h	0.404656	1.55056
n_i	0.365015	1.55959
n_{334}	0.334148	1.56978
n_{326}	0.326106	1.57312

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0046
$\Delta\theta_{C,A'}$	0.0018
$\Delta\theta_{g,d}$	−0.0031
$\Delta\theta_{g,F}$	−0.0024
$\Delta\theta_{i,g}$	−0.0087

Constants of Dispersion Formula ※1

A_1	1.22310794
A_2	$8.11217929 \cdot 10^{-2}$
A_3	$3.21400939 \cdot 10^{-1}$
B_1	$8.97805333 \cdot 10^{-3}$
B_2	$4.45756957 \cdot 10^{-2}$
B_3	$4.05962247 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	B
Specific Gravity	d	2.79
Remarks		

Partial Dispersions

$n_C - n_t$	0.008482
$n_C - n_{A'}$	0.003660
$n_d - n_C$	0.003258
$n_e - n_C$	0.005842
$n_g - n_d$	0.013686
$n_g - n_F$	0.006082
$n_h - n_g$	0.005153
$n_i - n_g$	0.014190
$n_{C'} - n_t$	0.008998
$n_e - n_{C'}$	0.005326
$n_{F'} - n_e$	0.005651
$n_i - n_{F'}$	0.019641

Thermal Properties

Strain Point	StP (℃)	398
Annealing Point	AP (℃)	436
Transformation Temperature	Tg (℃)	453
Yield Point	At (℃)	501
Softening Point	SP (℃)	637
Expansion Coefficients α (10^{-7}/℃)	(−30～+70℃)	83
	(+100～+300℃)	90
Thermal Conductivity	k(W/m·K)	1.016

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	605
Rigidity Modulus G	(10^8N/m^2)	251
Poisson's Ratio	σ	0.205
Knoop Hardness	Hk	450[5]
Abrasion	Aa	113
Photoelastic Constant ($nm/cm/10^5Pa$)	β	3.07

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	1.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7809
$\theta_{C,A'}$	0.3370
$\theta_{d,C}$	0.2999
$\theta_{e,C}$	0.5378
$\theta_{g,d}$	1.2600
$\theta_{g,F}$	0.5599
$\theta_{h,g}$	0.4744
$\theta_{i,g}$	1.3064
$\theta'_{C',t}$	0.8197
$\theta'_{e,C'}$	0.4852
$\theta'_{F',e}$	0.5148
$\theta'_{i,F'}$	1.7893

Coloring

λ 80／λ 5	32/30

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280		
290		
300		
310	0.33	0.06
320	0.79	0.55
330	0.947	0.87
340	0.985	0.963
350	0.994	0.986
360	0.997	0.993
365	0.998	0.994
370	0.998	0.995
380	0.998	0.996
390	0.998	0.996
400	0.999	0.997
420	0.999	0.998
440	0.999	0.998
460	0.999	0.998
480	0.999	0.998
500	0.999	0.998
550	0.999	0.998
600	0.999	0.999
650	0.999	0.998
700	0.999	0.999
800	0.999	0.999
900	0.999	0.998
1000	0.998	0.996
1200	0.997	0.993
1400	0.996	0.990
1600	0.993	0.983
1800	0.973	0.934
2000	0.933	0.84
2200	0.86	0.69
2400	0.81	0.59

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6}/℃) t	C′	He-Ne	D	e	F′	g	i
−40 ～ −20	1.9	2.3	2.3	2.4	2.6	3.0	3.4	4.7
−20 ～ 0	1.9	2.4	2.4	2.5	2.7	3.1	3.6	4.9
0 ～ 20	2.0	2.5	2.5	2.6	2.8	3.3	3.7	5.1
20 ～ 40	2.1	2.6	2.6	2.7	2.9	3.4	3.9	5.3
40 ～ 60	2.1	2.7	2.7	2.9	3.1	3.5	4.0	5.6
60 ～ 80	2.2	2.8	2.8	3.0	3.2	3.7	4.2	5.8

PBL25Y

581408
585405

Refractive Index	n_d	**1.58144** 1.581439	Abbe Number ν_d	**40.8** 40.77	Dispersion $n_F - n_C$	**0.01426** 0.014263
Refractive Index	n_e	1.584824	Abbe Number ν_e	40.49	Dispersion $n_{F'} - n_{C'}$	0.014442

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.54936
n_{1970}	1.97009	1.55423
n_{1530}	1.52958	1.55961
n_{1129}	1.12864	1.56480
n_t	1.01398	1.56667
n_s	0.85211	1.57011
$n_{A'}$	0.76819	1.57256
n_r	0.70652	1.57487
n_C	0.65627	**1.57722**
$n_{C'}$	0.64385	1.57788
$n_{He\text{-}Ne}$	0.6328	1.57850
n_D	0.58929	1.58131
n_d	0.58756	**1.58144**
n_e	0.54607	1.58482
n_F	0.48613	**1.59148**
$n_{F'}$	0.47999	1.59232
$n_{He\text{-}Cd}$	0.44157	1.59856
n_g	0.435835	**1.59967**
n_h	0.404656	1.60670
n_i	0.365015	1.61928
n_{334}	0.334148	1.63387
n_{326}	0.326106	1.63876

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0014
$\Delta\theta_{C,A'}$	0.0011
$\Delta\theta_{g,d}$	−0.0021
$\Delta\theta_{g,F}$	−0.0016
$\Delta\theta_{i,g}$	−0.0081

Constants of Dispersion Formula ※1

A_1	1.31960626
A_2	$1.23752633 \cdot 10^{-1}$
A_3	$2.10055351 \cdot 10^{-1}$
B_1	$1.01863415 \cdot 10^{-2}$
B_2	$4.83593508 \cdot 10^{-2}$
B_3	$2.73272029 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.23
Remarks		

Partial Dispersions

$n_C - n_t$	0.010546
$n_C - n_{A'}$	0.004656
$n_d - n_C$	0.004222
$n_e - n_C$	0.007607
$n_g - n_d$	0.018226
$n_g - n_F$	0.008185
$n_h - n_g$	0.007038
$n_i - n_g$	0.019619
$n_{C'} - n_t$	0.011210
$n_e - n_{C'}$	0.006943
$n_{F'} - n_e$	0.007499
$n_i - n_{F'}$	0.026961

Thermal Properties

Strain Point	StP (℃)	381
Annealing Point	AP (℃)	420
Transformation Temperature	Tg (℃)	440
Yield Point	At (℃)	468
Softening Point	SP (℃)	590
Expansion Coefficients (−30~+70℃)		87
α (10^{-7}/℃) (+100~+300℃)		98
Thermal Conductivity	k (W/m·K)	0.899

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	585
Rigidity Modulus G	(10^8N/m^2)	240
Poisson's Ratio	σ	0.219
Knoop Hardness	Hk	460[5]
Abrasion	Aa	130
Photoelastic Constant (nm/cm/10^5Pa)	β	2.99

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group	RW (P)	2
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	2.0

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6} / ℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ~ −20	1.8	2.4	2.5	2.7	2.9	3.5	4.2	6.3
−20 ~ 0	1.9	2.5	2.6	2.8	3.1	3.7	4.4	6.5
0 ~ 20	1.9	2.6	2.7	2.9	3.2	3.8	4.5	6.8
20 ~ 40	2.0	2.7	2.8	3.0	3.3	4.0	4.7	7.0
40 ~ 60	2.1	2.8	2.9	3.1	3.4	4.1	4.9	7.3
60 ~ 80	2.1	2.9	3.0	3.2	3.5	4.3	5.1	7.5

Relative Partial Dispersions

$\theta_{C,t}$	0.7394
$\theta_{C,A'}$	0.3264
$\theta_{d,C}$	0.2960
$\theta_{e,C}$	0.5333
$\theta_{g,d}$	1.2779
$\theta_{g,F}$	0.5739
$\theta_{h,g}$	0.4934
$\theta_{i,g}$	1.3755
$\theta'_{C',t}$	0.7762
$\theta'_{e,C'}$	0.4808
$\theta'_{F',e}$	0.5192
$\theta'_{i,F'}$	1.8668

Coloring

λ 80／λ 5	34/31

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280		
290		
300		
310	0.01	
320	0.35	0.07
330	0.78	0.54
340	0.940	0.85
350	0.981	0.954
360	0.993	0.982
365	0.995	0.986
370	0.996	0.990
380	0.997	0.993
390	0.998	0.995
400	0.998	0.996
420	0.998	0.996
440	0.998	0.996
460	0.999	0.997
480	0.999	0.998
500	0.999	0.998
550	0.999	0.998
600	0.999	0.998
650	0.999	0.998
700	0.999	0.999
800	0.999	0.999
900	0.999	0.998
1000	0.998	0.996
1200	0.998	0.995
1400	0.996	0.990
1600	0.994	0.984
1800	0.979	0.948
2000	0.953	0.88
2200	0.905	0.78
2400	0.87	0.70

PBL26Y

567428
570426

Refractive Index	n_d	**1.56732** 1.567322	Abbe Number ν_d	**42.8** 42.86	Dispersion $n_F - n_C$	**0.01324** 0.013238
Refractive Index	n_e	1.570466	Abbe Number ν_e	42.58	Dispersion $n_{F'} - n_{C'}$	0.013399

Refractive Indices		
	λ (μm)	
n_{2325}	2.32542	1.53658
n_{1970}	1.97009	1.54138
n_{1530}	1.52958	1.54668
n_{1129}	1.12864	1.55170
n_t	1.01398	1.55348
n_s	0.85211	1.55673
$n_{A'}$	0.76819	1.55904
n_r	0.70652	1.56120
n_C	0.65627	**1.56339**
$n_{C'}$	0.64385	1.56401
$n_{He\text{-}Ne}$	0.6328	1.56459
n_D	0.58929	1.56721
n_d	0.58756	**1.56732**
n_e	0.54607	1.57047
n_F	0.48613	**1.57663**
$n_{F'}$	0.47999	1.57741
$n_{He\text{-}Cd}$	0.44157	1.58317
n_g	0.435835	**1.58418**
n_h	0.404656	1.59065
n_i	0.365015	1.60217
n_{334}	0.334148	1.61543
n_{326}	0.326106	1.61986

Partial Dispersions	
$n_C - n_t$	0.009910
$n_C - n_{A'}$	0.004353
$n_d - n_C$	0.003931
$n_e - n_C$	0.007075
$n_g - n_d$	0.016861
$n_g - n_F$	0.007554
$n_h - n_g$	0.006471
$n_i - n_g$	0.017986
$n_{C'} - n_t$	0.010529
$n_e - n_{C'}$	0.006456
$n_{F'} - n_e$	0.006943
$n_i - n_{F'}$	0.024760

Relative Partial Dispersions	
$\theta_{C,t}$	0.7486
$\theta_{C,A'}$	0.3288
$\theta_{d,C}$	0.2969
$\theta_{e,C}$	0.5344
$\theta_{g,d}$	1.2737
$\theta_{g,F}$	0.5706
$\theta_{h,g}$	0.4888
$\theta_{i,g}$	1.3587
$\theta'_{C',t}$	0.7858
$\theta'_{e,C'}$	0.4818
$\theta'_{F',e}$	0.5182
$\theta'_{i,F'}$	1.8479

Thermal Properties		
Strain Point	StP (℃)	380
Annealing Point	AP (℃)	418
Transformation Temperature	Tg (℃)	432
Yield Point	At (℃)	471
Softening Point	SP (℃)	591
Expansion Coefficients (−30∼+70℃)		89
α (10^{-7}/℃) (+100∼+300℃)		100
Thermal Conductivity	k(W/m·K)	0.912

Coloring	
λ 80／λ 5	33/31

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0008
$\Delta\theta_{C,A'}$	0.0010
$\Delta\theta_{g,d}$	−0.0020
$\Delta\theta_{g,F}$	−0.0015
$\Delta\theta_{i,g}$	−0.0074

Mechanical Properties		
Young's Modulus E	(10^8N/m^2)	589
Rigidity Modulus G	(10^8N/m^2)	242
Poisson's Ratio	σ	0.220
Knoop Hardness	Hk	420[4]
Abrasion	Aa	136
Photoelastic Constant ($nm/cm/10^5Pa$)	β	

Constants of Dispersion Formula ※1	
A_1	1.29471773
A_2	$1.08880981 \cdot 10^{-1}$
A_3	$2.20322964 \cdot 10^{-1}$
B_1	$9.86579479 \cdot 10^{-3}$
B_2	$4.77568828 \cdot 10^{-2}$
B_3	$2.88509863 \cdot 10^{1}$

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Other Properties		
Bubble Quality Group	B	
Specific Gravity	d	3.10
Remarks		

Chemical Properties		
Water Resistance (Powder) Group	RW(P)	2
Acid Resistance (Powder) Group	RA(P)	1
Weathering Resistance (Surface) Group	W(S)	1
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	2.0

Internal Transmittance		
λ (nm)	τ 10mm	τ 25mm
280		
290		
300		
310	0.04	
320	0.47	0.15
330	0.84	0.65
340	0.957	0.89
350	0.985	0.963
360	0.994	0.986
365	0.996	0.989
370	0.997	0.992
380	0.998	0.995
390	0.998	0.996
400	0.998	0.996
420	0.999	0.997
440	0.999	0.997
460	0.999	0.998
480	0.999	0.998
500	0.999	0.998
550	0.999	0.998
600	0.999	0.998
650	0.999	0.998
700	0.999	0.999
800	0.999	0.999
900	0.999	0.997
1000	0.998	0.994
1200	0.997	0.993
1400	0.996	0.990
1600	0.994	0.984
1800	0.979	0.948
2000	0.950	0.87
2200	0.89	0.76
2400	0.85	0.67

Temperature Coefficients of Refractive Index								
Range of Temperature (℃)	dn / dt relative (10^{-6}/℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ∼ −20	0.9	1.5	1.5	1.7	2.0	2.5	3.0	4.9
−20 ∼ 0	1.0	1.6	1.7	1.8	2.1	2.6	3.2	5.1
0 ∼ 20	1.1	1.7	1.8	2.0	2.2	2.8	3.4	5.4
20 ∼ 40	1.2	1.9	1.9	2.1	2.4	3.0	3.6	5.7
40 ∼ 60	1.3	2.0	2.0	2.2	2.5	3.1	3.8	5.9
60 ∼ 80	1.4	2.1	2.1	2.4	2.6	3.3	4.0	6.2

PBM 2Y

620363
624360

Refractive Index	n_d	**1.62004** 1.620041	Abbe Number ν_d	**36.3** 36.27	Dispersion $n_F - n_C$	**0.01709** 0.017095
Refractive Index	n_e	1.624093	Abbe Number ν_e	36.01	Dispersion $n_{F'} - n_{C'}$	0.017330

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.58471
n_{1970}	1.97009	1.58959
n_{1530}	1.52958	1.59510
n_{1129}	1.12864	1.60067
n_t	1.01398	1.60275
n_s	0.85211	1.60668
$n_{A'}$	0.76819	1.60953
n_r	0.70652	1.61225
n_C	0.65627	**1.61502**
$n_{C'}$	0.64385	1.61581
$n_{He\text{-}Ne}$	0.6328	1.61655
n_D	0.58929	1.61989
n_d	0.58756	**1.62004**
n_e	0.54607	1.62409
n_F	0.48613	**1.63211**
$n_{F'}$	0.47999	1.63314
$n_{He\text{-}Cd}$	0.44157	1.64072
n_g	0.435835	**1.64207**
n_h	0.404656	1.65071
n_i	0.365015	1.66635
n_{334}	0.334148	1.68482
n_{326}	0.326106	1.69111

Deviation of Relative Partial Dispersions $\Delta\theta$ from "Normal"

$\Delta\theta_{C,t}$	0.0007
$\Delta\theta_{C,A'}$	0.0011
$\Delta\theta_{g,d}$	−0.0007
$\Delta\theta_{g,F}$	−0.0003
$\Delta\theta_{i,g}$	−0.0011

Constants of Dispersion Formula ※1

A_1	1.39446503
A_2	$1.59230985 \cdot 10^{-1}$
A_3	$2.45470216 \cdot 10^{-1}$
B_1	$1.10571872 \cdot 10^{-2}$
B_2	$5.07194882 \cdot 10^{-2}$
B_3	$3.14440142 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.61
Remarks		

Partial Dispersions

$n_C - n_t$	0.012265
$n_C - n_{A'}$	0.005485
$n_d - n_C$	0.005022
$n_e - n_C$	0.009074
$n_g - n_d$	0.022030
$n_g - n_F$	0.009957
$n_h - n_g$	0.008640
$n_i - n_g$	0.024279
$n_{C'} - n_t$	0.013052
$n_e - n_{C'}$	0.008287
$n_{F'} - n_e$	0.009043
$n_i - n_{F'}$	0.033214

Thermal Properties

Strain Point	StP (℃)	385
Annealing Point	AP (℃)	418
Transformation Temperature	Tg (℃)	436
Yield Point	At (℃)	470
Softening Point	SP (℃)	580
Expansion Coefficients	(−30∼+70℃)	86
α (10^{-7}/℃)	(+100∼+300℃)	97
Thermal Conductivity	k(W/m·K)	0.814

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	571
Rigidity Modulus G	(10^8N/m^2)	234
Poisson's Ratio	σ	0.223
Knoop Hardness	Hk	420[4]
Abrasion	Aa	140
Photoelastic Constant ($nm/cm/10^5Pa$)	β	

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group RW(P)	2
Acid Resistance (Powder) Group RA(P)	1
Weathering Resistance (Surface) Group W(S)	1
Acid Resistance (Surface) Group SR	1.0
Phosphate Resistance PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7175
$\theta_{C,A'}$	0.3209
$\theta_{d,C}$	0.2938
$\theta_{e,C}$	0.5308
$\theta_{g,d}$	1.2887
$\theta_{g,F}$	0.5825
$\theta_{h,g}$	0.5054
$\theta_{i,g}$	1.4202
$\theta'_{C',t}$	0.7531
$\theta'_{e,C'}$	0.4782
$\theta'_{F',e}$	0.5218
$\theta'_{i,F'}$	1.9166

Coloring

λ 80／λ 5	35/32

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280		
290		
300		
310		
320	0.04	
330	0.44	0.12
340	0.81	0.59
350	0.944	0.86
360	0.980	0.951
365	0.986	0.965
370	0.991	0.978
380	0.995	0.987
390	0.996	0.991
400	0.997	0.993
420	0.998	0.995
440	0.998	0.995
460	0.998	0.996
480	0.998	0.996
500	0.999	0.997
550	0.999	0.998
600	0.999	0.998
650	0.999	0.997
700	0.999	0.998
800	0.999	0.998
900	0.999	0.998
1000	0.998	0.995
1200	0.998	0.995
1400	0.996	0.990
1600	0.994	0.985
1800	0.980	0.951
2000	0.962	0.908
2200	0.921	0.81
2400	0.89	0.75

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6} / ℃) t	C′	He-Ne	D	e	F′	g	i
−40 ∼ −20	2.1	2.9	3.0	3.3	3.6	4.4	5.3	8.2
−20 ∼ 0	2.3	3.1	3.1	3.5	3.8	4.6	5.5	8.6
0 ∼ 20	2.5	3.3	3.3	3.6	4.0	4.8	5.8	8.9
20 ∼ 40	2.5	3.4	3.5	3.8	4.2	5.1	6.0	9.3
40 ∼ 60	2.7	3.6	3.7	4.0	4.4	5.3	6.3	9.6
60 ∼ 80	2.9	3.8	3.8	4.2	4.6	5.5	6.6	10.0

PBM 8Y

596393
599390

Refractive Index	n_d	**1.59551** 1.595509	Abbe Number ν_d	**39.3** 39.26	Dispersion $n_F - n_C$	**0.01517** 0.015169
Refractive Index	n_e	1.599108	Abbe Number ν_e	38.99	Dispersion $n_{F'} - n_{C'}$	0.015365

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.56224
n_{1970}	1.97009	1.56716
n_{1530}	1.52958	1.57263
n_{1129}	1.12864	1.57797
n_t	1.01398	1.57992
n_s	0.85211	1.58352
$n_{A'}$	0.76819	1.58611
n_r	0.70652	1.58855
n_C	0.65627	**1.59103**
$n_{C'}$	0.64385	1.59173
n_{He-Ne}	0.6328	1.59239
n_D	0.58929	1.59538
n_d	0.58756	**1.59551**
n_e	0.54607	1.59911
n_F	0.48613	**1.60620**
$n_{F'}$	0.47999	1.60710
n_{He-Cd}	0.44157	1.61377
n_g	0.435835	**1.61495**
n_h	0.404656	1.62249
n_i	0.365015	1.63604
n_{334}	0.334148	1.65185
n_{326}	0.326106	1.65718

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0014
$\Delta\theta_{C,A'}$	0.0011
$\Delta\theta_{g,d}$	−0.0018
$\Delta\theta_{g,F}$	−0.0012
$\Delta\theta_{i,g}$	−0.0060

Constants of Dispersion Formula ※1

A_1	1.35351322
A_2	$1.30212912 \cdot 10^{-1}$
A_3	$1.58337266 \cdot 10^{-1}$
B_1	$1.05624626 \cdot 10^{-2}$
B_2	$4.96606652 \cdot 10^{-2}$
B_3	$2.07965806 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.36
Remarks		

Partial Dispersions

$n_C - n_t$	0.011109
$n_C - n_{A'}$	0.004923
$n_d - n_C$	0.004479
$n_e - n_C$	0.008078
$n_g - n_d$	0.019438
$n_g - n_F$	0.008748
$n_h - n_g$	0.007545
$n_i - n_g$	0.021090
$n_{C'} - n_t$	0.011813
$n_e - n_{C'}$	0.007374
$n_{F'} - n_e$	0.007991
$n_i - n_{F'}$	0.028938

Thermal Properties

Strain Point	StP (℃)	390
Annealing Point	AP (℃)	426
Transformation Temperature	Tg (℃)	445
Yield Point	At (℃)	485
Softening Point	SP (℃)	590
Expansion Coefficients (−30~+70℃)		85
α (10^{-7}/℃) (+100~+300℃)		96
Thermal Conductivity	k(W/m·K)	0.878

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	588
Rigidity Modulus G	(10^8N/m^2)	241
Poisson's Ratio	σ	0.222
Knoop Hardness	Hk	400[4]
Abrasion	Aa	151
Photoelastic Constant (nm/cm/10^5Pa)	β	2.87

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group RW(P)	2
Acid Resistance (Powder) Group RA(P)	1
Weathering Resistance (Surface) Group W(S)	1
Acid Resistance (Surface) Group SR	1.0
Phosphate Resistance PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7323
$\theta_{C,A'}$	0.3245
$\theta_{d,C}$	0.2953
$\theta_{e,C}$	0.5325
$\theta_{g,d}$	1.2814
$\theta_{g,F}$	0.5767
$\theta_{h,g}$	0.4974
$\theta_{i,g}$	1.3903
$\theta'_{C',t}$	0.7688
$\theta'_{e,C'}$	0.4799
$\theta'_{F',e}$	0.5201
$\theta'_{i,F'}$	1.8834

Coloring

λ 80／λ 5	34/32

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280		
290		
300		
310		
320	0.17	0.01
330	0.65	0.34
340	0.89	0.75
350	0.966	0.918
360	0.987	0.968
365	0.991	0.977
370	0.993	0.983
380	0.996	0.990
390	0.997	0.993
400	0.998	0.995
420	0.998	0.996
440	0.998	0.996
460	0.998	0.996
480	0.999	0.997
500	0.999	0.998
550	0.999	0.998
600	0.999	0.998
650	0.999	0.998
700	0.999	0.998
800	0.999	0.998
900	0.999	0.998
1000	0.998	0.995
1200	0.998	0.995
1400	0.995	0.988
1600	0.994	0.986
1800	0.981	0.953
2000	0.960	0.903
2200	0.916	0.80
2400	0.88	0.74

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6} / ℃)							
	t	C′	He-Ne	D	e	F′	g	i
−40 ~ −20	1.9	2.6	2.7	2.9	3.2	3.8	4.6	6.8
−20 ~ 0	2.0	2.7	2.8	3.0	3.3	4.0	4.8	7.1
0 ~ 20	2.1	2.9	2.9	3.2	3.5	4.2	5.0	7.4
20 ~ 40	2.2	3.0	3.0	3.3	3.6	4.4	5.2	7.7
40 ~ 60	2.3	3.1	3.2	3.4	3.8	4.5	5.4	8.0
60 ~ 80	2.5	3.3	3.3	3.5	3.9	4.7	5.6	8.3

PBM 18Y

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Refractive Index	n_d	**1.59551** 1.595509	Abbe Number ν_d	**38.7** 38.77	Dispersion $n_F - n_C$	**0.01537** 0.015361
Refractive Index	n_e	1.599153	Abbe Number ν_e	38.50	Dispersion $n_{F'} - n_{C'}$	0.015561

Refractive Indices

	λ (μm)	
n_{2325}	2.32542	1.56207
n_{1970}	1.97009	1.56696
n_{1530}	1.52958	1.57243
n_{1129}	1.12864	1.57779
n_t	1.01398	1.57975
n_s	0.85211	1.58338
$n_{A'}$	0.76819	1.58599
n_r	0.70652	1.58846
n_C	0.65627	**1.59097**
$n_{C'}$	0.64385	1.59169
n_{He-Ne}	0.6328	1.59236
n_D	0.58929	1.59537
n_d	0.58756	**1.59551**
n_e	0.54607	1.59915
n_F	0.48613	**1.60634**
$n_{F'}$	0.47999	1.60725
n_{He-Cd}	0.44157	1.61400
n_g	0.435835	**1.61520**
n_h	0.404656	1.62284
n_i	0.365015	1.63656
n_{334}	0.334148	1.65255
n_{326}	0.326106	1.65795

Deviation of Relative Partial Dispersions Δθ from "Normal"

$\Delta\theta_{C,t}$	0.0023
$\Delta\theta_{C,A'}$	0.0015
$\Delta\theta_{g,d}$	−0.0024
$\Delta\theta_{g,F}$	−0.0018
$\Delta\theta_{i,g}$	−0.0099

Constants of Dispersion Formula ※1

A_1	1.34660215
A_2	$1.36322343 \cdot 10^{-1}$
A_3	$1.83371587 \cdot 10^{-1}$
B_1	$1.06313733 \cdot 10^{-2}$
B_2	$4.91403013 \cdot 10^{-2}$
B_3	$2.39154655 \cdot 10^{1}$

Other Properties

Bubble Quality Group	B	
Specific Gravity	d	3.37
Remarks		

Partial Dispersions

$n_C - n_t$	0.011228
$n_C - n_{A'}$	0.004982
$n_d - n_C$	0.004534
$n_e - n_C$	0.008178
$n_g - n_d$	0.019689
$n_g - n_F$	0.008862
$n_h - n_g$	0.007643
$n_i - n_g$	0.021360
$n_{C'} - n_t$	0.011940
$n_e - n_{C'}$	0.007466
$n_{F'} - n_e$	0.008095
$n_i - n_{F'}$	0.029310

Thermal Properties

Strain Point	StP (℃)	377
Annealing Point	AP (℃)	419
Transformation Temperature	Tg (℃)	441
Yield Point	At (℃)	478
Softening Point	SP (℃)	565
Expansion Coefficients α (10^{-7}/℃)	(−30~+70℃)	88
	(+100~+300℃)	100
Thermal Conductivity	k (W/m·K)	0.865

Mechanical Properties

Young's Modulus E	(10^8N/m^2)	598
Rigidity Modulus G	(10^8N/m^2)	244
Poisson's Ratio	σ	0.223
Knoop Hardness	Hk	410[4]
Abrasion	Aa	132
Photoelastic Constant (nm/cm/10^5Pa)	β	2.79

※1 By using these constants, refractive indices for any wavelength between 326 and 1129nm can be calculated. When calculateing refractive indices for any wavelength between 1129 and 2325nm, please refer to us.

Chemical Properties

Water Resistance (Powder) Group	RW (P)	1
Acid Resistance (Powder) Group	RA (P)	1
Weathering Resistance (Surface) Group	W (S)	2~3
Acid Resistance (Surface) Group	SR	1.0
Phosphate Resistance	PR	2.0

Relative Partial Dispersions

$\theta_{C,t}$	0.7309
$\theta_{C,A'}$	0.3243
$\theta_{d,C}$	0.2952
$\theta_{e,C}$	0.5324
$\theta_{g,d}$	1.2818
$\theta_{g,F}$	0.5769
$\theta_{h,g}$	0.4976
$\theta_{i,g}$	1.3905
$\theta'_{C',t}$	0.7673
$\theta'_{e,C'}$	0.4798
$\theta'_{F',e}$	0.5202
$\theta'_{i,F'}$	1.8836

Coloring

λ 80／λ 5	34/31

Internal Transmittance

λ (nm)	τ 10mm	τ 25mm
280		
290		
300		
310		
320	0.22	0.02
330	0.68	0.39
340	0.912	0.79
350	0.975	0.939
360	0.990	0.976
365	0.993	0.983
370	0.995	0.988
380	0.997	0.992
390	0.998	0.994
400	0.998	0.995
420	0.998	0.996
440	0.999	0.997
460	0.999	0.997
480	0.999	0.998
500	0.999	0.998
550	0.999	0.998
600	0.999	0.998
650	0.999	0.998
700	0.999	0.998
800	0.999	0.998
900	0.999	0.998
1000	0.998	0.996
1200	0.998	0.996
1400	0.996	0.990
1600	0.994	0.986
1800	0.979	0.948
2000	0.956	0.89
2200	0.907	0.78
2400	0.87	0.71

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	dn / dt relative (10^{-6} / ℃) t	C′	He-Ne	D	e	F′	g	i
−40 ~ −20	2.5	3.1	3.2	3.4	3.7	4.4	5.2	7.6
−20 ~ 0	2.5	3.3	3.3	3.5	3.9	4.6	5.4	7.9
0 ~ 20	2.6	3.4	3.4	3.7	4.0	4.7	5.5	8.1
20 ~ 40	2.7	3.5	3.5	3.8	4.1	4.9	5.7	8.4
40 ~ 60	2.8	3.6	3.6	3.9	4.2	5.0	5.9	8.7
60 ~ 80	2.8	3.7	3.7	4.0	4.3	5.2	6.1	8.9

The Constants of Dispersion

(1129nm～2325nm)

Glass Type	S-FPL51Y
A_1	$7.65663766 \cdot 10^{-1}$
A_2	$4.51879777 \cdot 10^{-1}$
A_3	1.13199134
B_1	$3.48152533 \cdot 10^{-3}$
B_2	$1.28720516 \cdot 10^{-2}$
B_3	$2.14351131 \cdot 10^{2}$

Glass Type	BSM51Y
A_1	1.12268320
A_2	$4.07804849 \cdot 10^{-1}$
A_3	1.16161178
B_1	$5.79521544 \cdot 10^{-3}$
B_2	$1.91303182 \cdot 10^{-2}$
B_3	$1.11113962 \cdot 10^{2}$

Glass Type	PBM2Y
A_1	1.37920265
A_2	$1.74908080 \cdot 10^{-1}$
A_3	$9.72480533 \cdot 10^{-1}$
B_1	$1.06616552 \cdot 10^{-2}$
B_2	$4.96089256 \cdot 10^{-2}$
B_3	$1.16926659 \cdot 10^{2}$

Glass Type	S-FSL5Y
A_1	$8.79731455 \cdot 10^{-1}$
A_2	$3.08634219 \cdot 10^{-1}$
A_3	1.02136885
B_1	$4.90947559 \cdot 10^{-3}$
B_2	$1.57419667 \cdot 10^{-2}$
B_3	$1.11412218 \cdot 10^{2}$

Glass Type	PBL1Y
A_1	1.23587282
A_2	$1.14028206 \cdot 10^{-1}$
A_3	$9.21822183 \cdot 10^{-1}$
B_1	$8.98302029 \cdot 10^{-3}$
B_2	$4.39009973 \cdot 10^{-2}$
B_3	$1.14338154 \cdot 10^{2}$

Glass Type	PBM8Y
A_1	1.33265695
A_2	$1.51642865 \cdot 10^{-1}$
A_3	1.00238959
B_1	$1.00208464 \cdot 10^{-2}$
B_2	$4.78779669 \cdot 10^{-2}$
B_3	$1.19439670 \cdot 10^{2}$

Glass Type	BSL7Y
A_1	1.01218580
A_2	$2.58122629 \cdot 10^{-1}$
A_3	1.13916089
B_1	$5.66358122 \cdot 10^{-3}$
B_2	$1.96285352 \cdot 10^{-2}$
B_3	$1.12904303 \cdot 10^{2}$

Glass Type	PBL6Y
A_1	1.20208094
A_2	$1.02467101 \cdot 10^{-1}$
A_3	1.01797415
B_1	$8.49251346 \cdot 10^{-3}$
B_2	$4.19306973 \cdot 10^{-2}$
B_3	$1.22687120 \cdot 10^{2}$

Glass Type	PBM18Y
A_1	1.32558993
A_2	$1.57859674 \cdot 10^{-1}$
A_3	1.03396744
B_1	$1.01008566 \cdot 10^{-2}$
B_2	$4.74276657 \cdot 10^{-2}$
B_3	$1.23686168 \cdot 10^{2}$

Glass Type	BAL15Y
A_1	1.18261390
A_2	$2.03921973 \cdot 10^{-1}$
A_3	1.11763340
B_1	$6.85280751 \cdot 10^{-3}$
B_2	$2.50893634 \cdot 10^{-2}$
B_3	$1.24101415 \cdot 10^{2}$

Glass Type	PBL25Y
A_1	1.29915001
A_2	$1.44676555 \cdot 10^{-1}$
A_3	1.00019303
B_1	$9.67218844 \cdot 10^{-3}$
B_2	$4.65408008 \cdot 10^{-2}$
B_3	$1.20780522 \cdot 10^{2}$

Glass Type	BAL35Y
A_1	1.09972335
A_2	$3.87872537 \cdot 10^{-1}$
A_3	1.11247378
B_1	$5.82303457 \cdot 10^{-3}$
B_2	$1.88745144 \cdot 10^{-2}$
B_3	$1.08214962 \cdot 10^{2}$

Glass Type	PBL26Y
A_1	1.27520167
A_2	$1.28823528 \cdot 10^{-1}$
A_3	1.01138010
B_1	$9.37656096 \cdot 10^{-3}$
B_2	$4.58001584 \cdot 10^{-2}$
B_3	$1.23589724 \cdot 10^{2}$

＊ Notice ： Please feel free to contact us if you have any questions and orders.