S-LAH89

Code(d) **852408**
Code(e) **856405**

Refractive Index n_d	**1.851 50** 1.851 500	Abbe Number ν_d	**40.78**	Dispersion $n_F - n_C$	**0.020 880**
Refractive Index n_e	1.856 460	Abbe Number ν_e	40.53	Dispersion $n_{F'} - n_{C'}$	0.021 134

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.805 61
n_{1970}	1.970 09	1.812 33
n_{1530}	1.529 58	1.819 83
n_{1129}	1.128 64	1.827 18
n_t	1.013 98	1.829 87
n_s	0.852 11	1.834 87
$n_{A'}$	0.768 19	1.838 47
n_r	0.706 52	1.841 86
n_C	0.656 27	1.845 30
$n_{C'}$	0.643 85	1.846 28
$n_{He\text{-}Ne}$	0.632 8	1.847 19
n_D	0.589 29	1.851 32
n_d	0.587 56	1.851 50
n_e	0.546 07	1.856 46
n_F	0.486 13	1.866 18
$n_{F'}$	0.479 99	1.867 41
$n_{He\text{-}Cd}$	0.441 57	1.876 48
n_g	0.435 835	1.878 07
n_h	0.404 656	1.888 22
n_i	0.365 015	

Constants of Dispersion Formula	
A_1	1.951 188 27E+00
A_2	3.776 072 23E-01
A_3	1.477 572 62E+00
B_1	9.765 607 99E-03
B_2	3.822 320 43E-02
B_3	1.122 367 20E+02

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

Mechanical Properties		
Young's Modulus E (GPa)	120.8	
Rigidity Modulus G (GPa)	46.3	
Poisson's Ratio σ	0.303	
Knoop Hardness Hk[Class]	690	7
Abrasion Aa	68	

Partial Dispersions	
$n_C - n_t$	0.015 434
$n_C - n_{A'}$	0.006 834
$n_d - n_C$	0.006 196
$n_e - n_C$	0.011 156
$n_g - n_d$	0.026 575
$n_g - n_F$	0.011 891
$n_h - n_g$	0.010 143
$n_i - n_g$	
$n_{C'} - n_t$	0.016 409
$n_e - n_{C'}$	0.010 181
$n_{F'} - n_e$	0.010 953
$n_i - n_{F'}$	

Relative Partial Dispersions	
$\theta_{C,t}$	0.739 2
$\theta_{C,A'}$	0.327 3
$\theta_{d,C}$	0.296 7
$\theta_{e,C}$	0.534 3
$\theta_{g,d}$	1.272 7
$\theta_{g,F}$	0.569 5
$\theta_{h,g}$	0.485 8
$\theta_{i,g}$	
$\theta'_{C,t}$	0.776 4
$\theta'_{e,C'}$	0.481 7
$\theta'_{F,e}$	0.518 3
$\theta'_{i,F'}$	

Anomalous dispersion	
$\Delta\theta_{C,t}$	0.001 2
$\Delta\theta_{C,A'}$	0.002 0
$\Delta\theta_{g,d}$	-0.007 3
$\Delta\theta_{g,F}$	-0.006 0
$\Delta\theta_{i,g}$	

Coloring			
λ_{80}		λ_5	340
λ_{70}	380		

Internal transmission			
$\lambda_{0.80}$	376	$\lambda_{0.05}$	339

CCI		
B	G	R
0.00	1.47	1.52

Internal Transmittance	
λ (nm)	τ_i (10 mm)
280	
290	
300	
310	
320	
330	
340	0.07
350	0.31
360	0.57
370	0.74
380	0.84
390	0.89
400	0.930
420	0.962
440	0.975
460	0.983
480	0.989
500	0.993
550	0.998
600	0.999
650	0.998
700	0.999
800	0.999
900	0.999
1 000	0.999
1 200	0.999
1 400	0.998
1 600	0.997
1 800	0.992
2 000	0.975
2 200	0.938
2 400	0.78

Thermal Properties		
Strain Point StP (°C)		634
Annealing Point AP (°C)		660
Transformation Temperature Tg (°C)		680
Yield Point At (°C)		717
Softening Point SP (°C)		743
Expansion Coefficients α_l (10^{-7} K^{-1})	(-30 ℃ ~ 70 ℃)	68
	(100 °C ~ 300 °C)	81
Thermal Conductivity λ (W/(m·K))		0.861

Linear coefficient of thermal expansion	
Temperature range (°C)	α_l (10^{-7} K^{-1})
-100 ~ -90	55
-90 ~ -80	56
-80 ~ -70	57
-70 ~ -60	58
-60 ~ -50	60
-50 ~ -40	61
-40 ~ -30	62
-30 ~ -20	63
-20 ~ -10	64
-10 ~ 0	65
0 ~ 10	66
10 ~ 20	67
20 ~ 30	68
30 ~ 40	69
40 ~ 50	70
50 ~ 60	71
60 ~ 70	72
70 ~ 80	73
80 ~ 90	74
90 ~ 100	75
100 ~ 110	76
110 ~ 120	76
120 ~ 130	77
130 ~ 140	78
140 ~ 150	78
150 ~ 160	79
160 ~ 170	80
170 ~ 180	80
180 ~ 190	81
190 ~ 200	82
200 ~ 210	82
210 ~ 220	83
220 ~ 230	83
230 ~ 240	84
240 ~ 250	84
250 ~ 260	85
260 ~ 270	85
270 ~ 280	85
280 ~ 290	86
290 ~ 300	86

Other Properties	
Photoelastic Constant β nm/(cm·105Pa)	1.27
Specific Gravity *d*	4.70
Remarks	

Temperature Coefficients of Refractive Index

Range of Temperature (°C)	$\Delta n_{rel}/\Delta T$ (10^{-6} K^{-1})											
	1550	t	r	C	C'	d	e	F	F'	g	h	i
-80 ~ -60	2.8	3.0	3.5	3.7	3.8	4.0	4.3	4.9	5.0	5.7	6.6	-
-60 ~ -40	2.7	2.9	3.5	3.7	3.7	4.0	4.3	4.9	5.0	5.8	6.6	-
-40 ~ -20	2.7	3.0	3.5	3.7	3.8	4.1	4.3	5.1	5.1	5.9	6.7	-
-20 ~ 0	2.8	3.1	3.6	3.8	3.9	4.2	4.6	5.2	5.3	6.1	6.9	-
0 ~ 20	2.9	3.2	3.8	4.0	4.0	4.4	4.7	5.4	5.5	6.3	7.2	-
20 ~ 40	3.1	3.4	4.0	4.2	4.2	4.6	4.9	5.6	5.7	6.6	7.6	-
40 ~ 60	3.3	3.6	4.2	4.4	4.4	4.8	5.1	5.8	5.9	6.9	7.9	-
60 ~ 80	3.4	3.7	4.4	4.5	4.6	5.0	5.4	6.1	6.2	7.1	8.1	-
80 ~ 100	3.5	3.9	4.5	4.7	4.8	5.2	5.5	6.3	6.4	7.4	8.4	-
100 ~ 120	3.7	4.0	4.7	4.9	5.0	5.3	5.7	6.5	6.6	7.6	8.6	-
120 ~ 140	3.8	4.1	4.8	5.0	5.1	5.5	5.9	6.7	6.8	7.8	8.9	-
140 ~ 160	3.8	4.2	4.9	5.1	5.2	5.6	6.0	6.8	6.9	8.0	9.2	-
160 ~ 180	3.8	4.2	4.9	5.3	5.3	5.7	6.1	7.0	7.1	8.2	9.3	-

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※The name of the glass type is the model number assigned based on the main components of the composition: large, medium, small refractive index and serial number.