S-LAL20

Code(d) **699511**
Code(e) **703508**

Refractive Index n_d	**1.699 30** 1.699 300	Abbe Number ν_d	**51.11**	Dispersion $n_F - n_C$	**0.013 682**
Refractive Index n_e	1.702 559	Abbe Number ν_e	50.82	Dispersion $n_{F'} - n_{C'}$	0.013 825

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.668 04
n_{1970}	1.970 09	1.672 70
n_{1530}	1.529 58	1.677 91
n_{1129}	1.128 64	1.682 97
n_t	1.013 98	1.684 81
n_s	0.852 11	1.688 20
$n_{A'}$	0.768 19	1.690 63
n_r	0.706 52	1.692 90
n_C	0.656 27	1.695 20
$n_{C'}$	0.643 85	1.695 84
$n_{He\text{-}Ne}$	0.632 8	1.696 45
n_D	0.589 29	1.699 18
n_d	0.587 56	1.699 30
n_e	0.546 07	1.702 56
n_F	0.486 13	1.708 88
$n_{F'}$	0.479 99	1.709 67
$n_{He\text{-}Cd}$	0.441 57	1.715 46
n_g	0.435 835	1.716 47
n_h	0.404 656	1.722 83
n_i	0.365 015	1.733 76

Constants of Dispersion Formula	
A_1	1.067 884 67E+00
A_2	7.587 353 50E-01
A_3	1.028 046 82E+00
B_1	5.188 960 58E-03
B_2	2.040 043 57E-02
B_3	1.208 263 20E+02

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	53.1
Phosphate Resistance PR	4.2

Mechanical Properties		
Young's Modulus E (GPa)	78.7	
Rigidity Modulus G (GPa)	30.2	
Poisson's Ratio σ	0.302	
Knoop Hardness Hk[Class]	490	5
Abrasion Aa	254	

Partial Dispersions	
$n_C - n_t$	0.010 389
$n_C - n_{A'}$	0.004 570
$n_d - n_C$	0.004 104
$n_e - n_C$	0.007 363
$n_g - n_d$	0.017 174
$n_g - n_F$	0.007 596
$n_h - n_g$	0.006 359
$n_i - n_g$	0.017 290
$n_{C'} - n_t$	0.011 038
$n_e - n_{C'}$	0.006 714
$n_{F'} - n_e$	0.007 111
$n_i - n_{F'}$	0.024 094

Relative Partial Dispersions	
$\theta_{C,t}$	0.759 3
$\theta_{C,A'}$	0.334 0
$\theta_{d,C}$	0.300 0
$\theta_{e,C}$	0.538 2
$\theta_{g,d}$	1.255 2
$\theta_{g,F}$	0.555 2
$\theta_{h,g}$	0.464 8
$\theta_{i,g}$	1.263 7
$\theta'_{C',t}$	0.798 4
$\theta'_{e,C'}$	0.485 6
$\theta'_{F',e}$	0.514 4
$\theta'_{i,F'}$	1.742 8

Anomalous dispersion	
$\Delta\theta_{C,t}$	-0.027 2
$\Delta\theta_{C,A'}$	-0.003 8
$\Delta\theta_{g,d}$	-0.003 4
$\Delta\theta_{g,F}$	-0.003 6
$\Delta\theta_{i,g}$	-0.033 3

Coloring			
λ_{80}	370	λ_5	310
λ_{70}			

Internal transmission			
$\lambda_{0.80}$	350	$\lambda_{0.05}$	305

CCI		
B	G	R
0.00	0.40	0.36

Internal Transmittance	
λ (nm)	τ_i (10 mm)
280	
290	
300	0.01
310	0.09
320	0.27
330	0.49
340	0.67
350	0.80
360	0.88
370	0.934
380	0.960
390	0.974
400	0.982
420	0.987
440	0.987
460	0.989
480	0.992
500	0.994
550	0.996
600	0.995
650	0.994
700	0.996
800	0.998
900	0.997
1 000	0.997
1 200	0.998
1 400	0.997
1 600	0.995
1 800	0.985
2 000	0.969
2 200	0.935
2 400	0.84

Thermal Properties		
Strain Point StP (℃)		593
Annealing Point AP (℃)		621
Transformation Temperature Tg (℃)		633
Yield Point At (℃)		680
Softening Point SP (℃)		717
Expansion Coefficients	(-30 ℃ ~ 70 ℃)	93
α_l (10^{-7} K^{-1})	(100 ℃ ~ 300 ℃)	107
Thermal Conductivity λ (W/(m·K))		0.602

Linear coefficient of thermal expansion	
Temperature range (℃)	α_l (10^{-7} K^{-1})
-100 ~ -90	81
-90 ~ -80	82
-80 ~ -70	83
-70 ~ -60	84
-60 ~ -50	85
-50 ~ -40	86
-40 ~ -30	87
-30 ~ -20	88
-20 ~ -10	89
-10 ~ 0	90
0 ~ 10	91
10 ~ 20	92
20 ~ 30	93
30 ~ 40	94
40 ~ 50	95
50 ~ 60	96
60 ~ 70	97
70 ~ 80	98
80 ~ 90	99
90 ~ 100	99
100 ~ 110	100
110 ~ 120	101
120 ~ 130	102
130 ~ 140	103
140 ~ 150	103
150 ~ 160	104
160 ~ 170	105
170 ~ 180	105
180 ~ 190	106
190 ~ 200	107
200 ~ 210	107
210 ~ 220	108
220 ~ 230	108
230 ~ 240	109
240 ~ 250	110
250 ~ 260	110
260 ~ 270	111
270 ~ 280	111
280 ~ 290	112
290 ~ 300	112

Other Properties	
Photoelastic Constant β nm/(cm·105Pa)	1.23
Specific Gravity *d*	4.38
Remarks	

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	Δn_{rel} / ΔT (10^{-6} K^{-1})											
	1550	t	r	C	C'	d	e	F	F'	g	h	i
-80 ~ -60	-2.5	-2.3	-2.0	-1.9	-1.8	-1.7	-1.5	-1.2	-1.1	-0.7	-0.3	0.6
-60 ~ -40	-2.5	-2.4	-2.1	-2.0	-2.0	-1.8	-1.6	-1.2	-1.2	-0.8	-0.4	0.5
-40 ~ -20	-2.6	-2.4	-2.1	-2.0	-2.0	-1.8	-1.6	-1.3	-1.3	-0.8	-0.3	0.5
-20 ~ 0	-2.6	-2.4	-2.0	-1.9	-1.9	-1.7	-1.5	-1.2	-1.2	-0.7	-0.3	0.6
0 ~ 20	-2.4	-2.3	-2.0	-1.9	-1.8	-1.7	-1.5	-1.1	-1.1	-0.7	-0.1	0.7
20 ~ 40	-2.4	-2.3	-1.9	-1.8	-1.7	-1.6	-1.4	-1.0	-1.0	-0.5	-0.1	0.9
40 ~ 60	-2.3	-2.1	-1.8	-1.7	-1.7	-1.5	-1.3	-0.9	-0.9	-0.4	0.1	1.0
60 ~ 80	-2.2	-2.1	-1.7	-1.5	-1.6	-1.3	-1.1	-0.8	-0.7	-0.3	0.2	1.1
80 ~ 100	-2.1	-2.0	-1.7	-1.5	-1.5	-1.3	-1.0	-0.7	-0.6	-0.1	0.3	1.2
100 ~ 120	-2.1	-1.9	-1.6	-1.5	-1.4	-1.2	-1.1	-0.7	-0.6	-0.1	0.4	1.3
120 ~ 140	-2.0	-1.9	-1.5	-1.4	-1.4	-1.2	-1.0	-0.6	-0.6	0.0	0.5	1.4
140 ~ 160	-2.1	-1.9	-1.4	-1.3	-1.3	-1.1	-0.9	-0.5	-0.4	0.0	0.5	1.5
160 ~ 180	-2.0	-1.8	-1.5	-1.4	-1.3	-1.1	-0.9	-0.5	-0.5	0.0	0.5	1.5

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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.