S-FPM 3

Code(d) **538747**
Code(e) **539743**

Refractive Index n_d	**1.537 75** 1.537 750	Abbe Number ν_d	**74.70**	Dispersion $n_F - n_C$	**0.007 199**
Refractive Index n_e	1.539 469	Abbe Number ν_e	74.34	Dispersion $n_{F'} - n_{C'}$	0.007 257

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.517 38
n_{1970}	1.970 09	1.521 05
n_{1530}	1.529 58	1.525 00
n_{1129}	1.128 64	1.528 49
n_t	1.013 98	1.529 65
n_s	0.852 11	1.531 67
$n_{A'}$	0.768 19	1.533 04
n_r	0.706 52	1.534 30
n_C	0.656 27	1.535 55
$n_{C'}$	0.643 85	1.535 90
$n_{He\text{-}Ne}$	0.632 8	1.536 23
n_D	0.589 29	1.537 69
n_d	0.587 56	1.537 75
n_e	0.546 07	1.539 47
n_F	0.486 13	1.542 75
$n_{F'}$	0.479 99	1.543 16
$n_{He\text{-}Cd}$	0.441 57	1.546 12
n_g	0.435 835	1.546 64
n_h	0.404 656	1.549 84
n_i	0.365 015	1.555 25

Constants of Dispersion Formula	
A_1	8.094 072 86E-01
A_2	5.270 070 33E-01
A_3	9.091 277 04E-01
B_1	3.760 723 89E-03
B_2	1.356 548 95E-02
B_3	1.425 036 12E+02

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	5.1
Phosphate Resistance PR	4.1

Mechanical Properties		
Young's Modulus E (GPa)	80.6	
Rigidity Modulus G (GPa)	31.2	
Poisson's Ratio σ	0.291	
Knoop Hardness Hk[Class]	400	4
Abrasion Aa	418	

Partial Dispersions	
$n_C - n_t$	0.005 905
$n_C - n_{A'}$	0.002 510
$n_d - n_C$	0.002 196
$n_e - n_C$	0.003 915
$n_g - n_d$	0.008 885
$n_g - n_F$	0.003 882
$n_h - n_g$	0.003 203
$n_i - n_g$	0.008 618
$n_{C'} - n_t$	0.006 255
$n_e - n_{C'}$	0.003 565
$n_{F'} - n_e$	0.003 692
$n_i - n_{F'}$	0.012 092

Relative Partial Dispersions	
$\theta_{C,t}$	0.820 3
$\theta_{C,A'}$	0.348 7
$\theta_{d,C}$	0.305 0
$\theta_{e,C}$	0.543 8
$\theta_{g,d}$	1.234 2
$\theta_{g,F}$	0.539 2
$\theta_{h,g}$	0.444 9
$\theta_{i,g}$	1.197 1
$\theta'_{C',t}$	0.861 9
$\theta'_{e,C'}$	0.491 2
$\theta'_{F',e}$	0.508 8
$\theta'_{i,F'}$	1.666 3

Anomalous dispersion	
$\Delta\theta_{C,t}$	-0.076 9
$\Delta\theta_{C,A'}$	-0.017 7
$\Delta\theta_{g,d}$	0.024 6
$\Delta\theta_{g,F}$	0.018 6
$\Delta\theta_{i,g}$	0.097 6

Coloring			
λ_{80}	345	λ_5	
λ_{70}			

Internal transmission			
$\lambda_{0.80}$	336	$\lambda_{0.05}$	284

CCI		
B	G	R
0.00	0.28	0.23

Internal Transmittance	
λ (nm)	τ_i (10 mm)
280	0.03
290	0.08
300	0.19
310	0.36
320	0.55
330	0.72
340	0.85
350	0.924
360	0.962
370	0.981
380	0.990
390	0.992
400	0.992
420	0.989
440	0.990
460	0.992
480	0.995
500	0.996
550	0.998
600	0.997
650	0.996
700	0.996
800	0.994
900	0.995
1 000	0.996
1 200	0.997
1 400	0.997
1 600	0.996
1 800	0.995
2 000	0.993
2 200	0.987
2 400	0.984

Thermal Properties		
Strain Point StP (℃)		-
Annealing Point AP (℃)		-
Transformation Temperature Tg (℃)		505
Yield Point At (℃)		533
Softening Point SP (℃)		-
Expansion Coefficients α_l (10^{-7} K^{-1})	(-30 ℃ ~ 70 ℃)	117
	(100 ℃ ~ 300 ℃)	138
Thermal Conductivity λ (W/(m·K))		0.805

Linear coefficient of thermal expansion	
Temperature range (℃)	α_l (10^{-7} K^{-1})
-100 ~ -90	96
-90 ~ -80	98
-80 ~ -70	100
-70 ~ -60	102
-60 ~ -50	104
-50 ~ -40	105
-40 ~ -30	107
-30 ~ -20	109
-20 ~ -10	111
-10 ~ 0	112
0 ~ 10	114
10 ~ 20	116
20 ~ 30	117
30 ~ 40	119
40 ~ 50	120
50 ~ 60	122
60 ~ 70	123
70 ~ 80	124
80 ~ 90	126
90 ~ 100	127
100 ~ 110	128
110 ~ 120	130
120 ~ 130	131
130 ~ 140	132
140 ~ 150	133
150 ~ 160	134
160 ~ 170	135
170 ~ 180	136
180 ~ 190	137
190 ~ 200	138
200 ~ 210	139
210 ~ 220	140
220 ~ 230	141
230 ~ 240	142
240 ~ 250	143
250 ~ 260	143
260 ~ 270	144
270 ~ 280	145
280 ~ 290	146
290 ~ 300	146

Other Properties	
Photoelastic Constant β nm/(cm·105Pa)	0.85
Specific Gravity d	3.64
Remarks	

Temperature Coefficients of Refractive Index

Range of Temperature (℃)	$\Delta n_{rel}/\Delta T$ (10^{-6} K^{-1})											
	1550	t	r	C	C'	d	e	F	F'	g	h	i
-80 ~ -60	-3.8	-3.8	-3.6	-3.6	-3.6	-3.5	-3.5	-3.4	-3.4	-3.2	-3.0	-2.7
-60 ~ -40	-4.2	-4.2	-4.0	-4.0	-4.0	-3.9	-3.8	-3.7	-3.7	-3.6	-3.4	-3.0
-40 ~ -20	-4.5	-4.4	-4.3	-4.2	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.6	-3.2
-20 ~ 0	-4.7	-4.6	-4.4	-4.4	-4.4	-4.3	-4.3	-4.1	-4.1	-3.9	-3.7	-3.3
0 ~ 20	-4.8	-4.7	-4.6	-4.6	-4.6	-4.5	-4.4	-4.3	-4.2	-4.0	-3.8	-3.4
20 ~ 40	-4.9	-4.9	-4.7	-4.7	-4.7	-4.5	-4.4	-4.3	-4.2	-4.0	-3.9	-3.5
40 ~ 60	-4.9	-4.9	-4.7	-4.7	-4.6	-4.6	-4.5	-4.3	-4.3	-4.1	-3.9	-3.5
60 ~ 80	-5.0	-5.0	-4.8	-4.8	-4.7	-4.7	-4.5	-4.3	-4.3	-4.1	-3.8	-3.4
80 ~ 100	-5.1	-5.0	-4.8	-4.8	-4.8	-4.7	-4.6	-4.4	-4.4	-4.0	-3.8	-3.4
100 ~ 120	-5.1	-5.0	-4.9	-4.8	-4.8	-4.7	-4.5	-4.4	-4.4	-4.0	-3.8	-3.3
120 ~ 140	-5.1	-5.1	-4.8	-4.7	-4.7	-4.6	-4.5	-4.3	-4.3	-4.0	-3.8	-3.3
140 ~ 160	-5.1	-5.0	-4.8	-4.7	-4.7	-4.6	-4.5	-4.3	-4.3	-4.0	-3.8	-3.3
160 ~ 180	-5.1	-5.1	-4.9	-4.8	-4.8	-4.7	-4.6	-4.3	-4.3	-4.0	-3.8	-3.2

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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.