S-FPM 5

Code(d) **552708**
Code(e) **554703**

Refractive Index n_d	**1.552 00** 1.552 000	Abbe Number ν_d	**70.70**	Dispersion $n_F - n_C$	**0.007 808**
Refractive Index n_e	1.553 863	Abbe Number ν_e	70.33	Dispersion $n_{F'} - n_{C'}$	0.007 875

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.530 66
n_{1970}	1.970 09	1.534 41
n_{1530}	1.529 58	1.538 45
n_{1129}	1.128 64	1.542 08
n_t	1.013 98	1.543 30
n_s	0.852 11	1.545 45
$n_{A'}$	0.768 19	1.546 92
n_r	0.706 52	1.548 28
n_C	0.656 27	1.549 63
$n_{C'}$	0.643 85	1.550 00
$n_{He\text{-}Ne}$	0.632 8	1.550 36
n_D	0.589 29	1.551 93
n_d	0.587 56	1.552 00
n_e	0.546 07	1.553 86
n_F	0.486 13	1.557 43
$n_{F'}$	0.479 99	1.557 88
$n_{He\text{-}Cd}$	0.441 57	1.561 11
n_g	0.435 835	1.561 67
n_h	0.404 656	1.565 17
n_i	0.365 015	1.571 11

Constants of Dispersion Formula	
A_1	8.398 997 64E-01
A_2	5.377 213 12E-01
A_3	9.532 477 59E-01
B_1	3.764 482 95E-03
B_2	1.480 226 22E-02
B_3	1.456 755 50E+02

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	52.1
Phosphate Resistance PR	4.0

Mechanical Properties		
Young's Modulus E (GPa)	76.9	
Rigidity Modulus G (GPa)	29.7	
Poisson's Ratio σ	0.296	
Knoop Hardness Hk[Class]	390	4
Abrasion Aa	413	

Partial Dispersions	
$n_C - n_t$	0.006 321
$n_C - n_{A'}$	0.002 702
$n_d - n_C$	0.002 375
$n_e - n_C$	0.004 238
$n_g - n_d$	0.009 666
$n_g - n_F$	0.004 233
$n_h - n_g$	0.003 502
$n_i - n_g$	0.009 440
$n_{C'} - n_t$	0.006 699
$n_e - n_{C'}$	0.003 860
$n_{F'} - n_e$	0.004 015
$n_i - n_{F'}$	0.013 228

Relative Partial Dispersions	
$\theta_{C,t}$	0.809 6
$\theta_{C,A'}$	0.346 1
$\theta_{d,C}$	0.304 2
$\theta_{e,C}$	0.542 8
$\theta_{g,d}$	1.238 0
$\theta_{g,F}$	0.542 1
$\theta_{h,g}$	0.448 5
$\theta_{i,g}$	1.209 0
$\theta'_{C',t}$	0.850 7
$\theta'_{e,C'}$	0.490 2
$\theta'_{F',e}$	0.509 8
$\theta'_{i,F'}$	1.679 7

Anomalous dispersion	
$\Delta\theta_{C,t}$	-0.068 8
$\Delta\theta_{C,A'}$	-0.015 5
$\Delta\theta_{g,d}$	0.020 1
$\Delta\theta_{g,F}$	0.015 0
$\Delta\theta_{i,g}$	0.076 0

Coloring			
λ_{80}	345	λ_5	
λ_{70}			

Internal transmission			
$\lambda_{0.80}$	335	$\lambda_{0.05}$	282

CCI		
B	G	R
0.00	0.14	0.12

Internal Transmittance	
λ (nm)	τ_i (10 mm)
280	0.04
290	0.10
300	0.20
310	0.35
320	0.56
330	0.73
340	0.86
350	0.929
360	0.967
370	0.984
380	0.992
390	0.995
400	0.996
420	0.995
440	0.995
460	0.996
480	0.998
500	0.998
550	0.999
600	0.999
650	0.998
700	0.998
800	0.998
900	0.998
1 000	0.998
1 200	0.998
1 400	0.999
1 600	0.998
1 800	0.998
2 000	0.997
2 200	0.994
2 400	0.993

Thermal Properties		
Strain Point StP (℃)		-
Annealing Point AP (℃)		-
Transformation Temperature Tg (℃)		474
Yield Point At (℃)		501
Softening Point SP (℃)		-
Expansion Coefficients α_l (10^{-7} K^{-1})	(-30 ℃ ~ 70 ℃)	111
	(100 ℃ ~ 300 ℃)	132
Thermal Conductivity λ (W/(m·K))		0.765

Linear coefficient of thermal expansion	
Temperature range (℃)	α_l (10^{-7} K^{-1})
-100 ~ -90	91
-90 ~ -80	93
-80 ~ -70	94
-70 ~ -60	96
-60 ~ -50	98
-50 ~ -40	100
-40 ~ -30	102
-30 ~ -20	103
-20 ~ -10	105
-10 ~ 0	107
0 ~ 10	108
10 ~ 20	110
20 ~ 30	111
30 ~ 40	113
40 ~ 50	114
50 ~ 60	116
60 ~ 70	117
70 ~ 80	118
80 ~ 90	120
90 ~ 100	121
100 ~ 110	122
110 ~ 120	124
120 ~ 130	125
130 ~ 140	126
140 ~ 150	127
150 ~ 160	128
160 ~ 170	129
170 ~ 180	130
180 ~ 190	131
190 ~ 200	132
200 ~ 210	133
210 ~ 220	134
220 ~ 230	135
230 ~ 240	136
240 ~ 250	136
250 ~ 260	137
260 ~ 270	138
270 ~ 280	139
280 ~ 290	139
290 ~ 300	140

Other Properties	
Photoelastic Constant β nm/(cm·105Pa)	1.29
Specific Gravity d	3.74
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	-2.6	-2.6	-2.5	-2.4	-2.4	-2.3	-2.3	-2.0	-2.0	-1.8	-1.6	-1.2
-60 ~ -40	-3.0	-2.8	-2.7	-2.6	-2.6	-2.6	-2.5	-2.3	-2.3	-2.0	-1.8	-1.4
-40 ~ -20	-3.0	-3.0	-2.9	-2.8	-2.8	-2.7	-2.6	-2.4	-2.4	-2.2	-1.9	-1.5
-20 ~ 0	-3.2	-3.1	-3.0	-2.9	-2.9	-2.8	-2.7	-2.5	-2.5	-2.3	-2.1	-1.5
0 ~ 20	-3.3	-3.2	-3.1	-2.9	-3.0	-2.8	-2.7	-2.5	-2.5	-2.3	-2.0	-1.6
20 ~ 40	-3.3	-3.3	-3.1	-3.0	-2.9	-2.8	-2.8	-2.6	-2.5	-2.3	-2.0	-1.6
40 ~ 60	-3.3	-3.2	-3.1	-3.0	-3.0	-2.9	-2.8	-2.6	-2.6	-2.3	-2.1	-1.5
60 ~ 80	-3.4	-3.3	-3.1	-3.0	-3.1	-2.9	-2.8	-2.6	-2.5	-2.3	-2.0	-1.5
80 ~ 100	-3.4	-3.3	-3.2	-3.1	-3.1	-3.0	-2.8	-2.6	-2.5	-2.3	-2.0	-1.4
100 ~ 120	-3.5	-3.4	-3.2	-3.1	-3.1	-3.0	-2.8	-2.6	-2.5	-2.3	-2.0	-1.4
120 ~ 140	-3.5	-3.3	-3.1	-3.1	-3.0	-2.9	-2.8	-2.6	-2.6	-2.3	-2.0	-1.4
140 ~ 160	-3.5	-3.4	-3.2	-3.2	-3.1	-3.0	-2.9	-2.7	-2.6	-2.3	-2.0	-1.4
160 ~ 180	-3.6	-3.5	-3.3	-3.3	-3.2	-3.1	-3.0	-2.8	-2.7	-2.4	-2.1	-1.4

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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.