S-PHM52

Code(d) **618634**
Code(e) **620630**

Refractive Index n_d	**1.618 00** 1.618 000	Abbe Number ν_d	**63.33**	Dispersion $n_F - n_C$	**0.009 758**
Refractive Index n_e	1.620 327	Abbe Number ν_e	63.02	Dispersion $n_{F'} - n_{C'}$	0.009 844

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.591 08
n_{1970}	1.970 09	1.595 87
n_{1530}	1.529 58	1.601 03
n_{1129}	1.128 64	1.605 61
n_t	1.013 98	1.607 14
n_s	0.852 11	1.609 83
$n_{A'}$	0.768 19	1.611 67
n_r	0.706 52	1.613 35
n_C	0.656 27	1.615 04
$n_{C'}$	0.643 85	1.615 51
$n_{He\text{-}Ne}$	0.632 8	1.615 95
n_D	0.589 29	1.617 91
n_d	0.587 56	1.618 00
n_e	0.546 07	1.620 33
n_F	0.486 13	1.624 79
$n_{F'}$	0.479 99	1.625 35
$n_{He\text{-}Cd}$	0.441 57	1.629 40
n_g	0.435 835	1.630 10
n_h	0.404 656	1.634 51
n_i	0.365 015	1.641 99

Constants of Dispersion Formula	
A_1	1.099 665 50E+00
A_2	4.781 254 22E-01
A_3	1.132 140 74E+00
B_1	1.327 185 59E-02
B_2	-6.016 496 85E-04
B_3	1.305 954 72E+02

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	5.0
Phosphate Resistance PR	4.0

Mechanical Properties		
Young's Modulus E (GPa)	71.5	
Rigidity Modulus G (GPa)	27.7	
Poisson's Ratio σ	0.292	
Knoop Hardness Hk[Class]	380	4
Abrasion Aa	468	

Partial Dispersions	
$n_C - n_t$	0.007 893
$n_C - n_{A'}$	0.003 370
$n_d - n_C$	0.002 964
$n_e - n_C$	0.005 291
$n_g - n_d$	0.012 103
$n_g - n_F$	0.005 309
$n_h - n_g$	0.004 403
$n_i - n_g$	0.011 891
$n_{C'} - n_t$	0.008 364
$n_e - n_{C'}$	0.004 820
$n_{F'} - n_e$	0.005 024
$n_i - n_{F'}$	0.016 643

Relative Partial Dispersions	
$\theta_{C,t}$	0.808 9
$\theta_{C,A'}$	0.345 4
$\theta_{d,C}$	0.303 8
$\theta_{e,C}$	0.542 2
$\theta_{g,d}$	1.240 3
$\theta_{g,F}$	0.544 1
$\theta_{h,g}$	0.451 2
$\theta_{i,g}$	1.218 6
$\theta'_{C',t}$	0.849 7
$\theta'_{e,C'}$	0.489 6
$\theta'_{F',e}$	0.510 4
$\theta'_{i,F'}$	1.690 7

Anomalous dispersion	
$\Delta\theta_{C,t}$	-0.034 9
$\Delta\theta_{C,A'}$	-0.007 2
$\Delta\theta_{g,d}$	0.007 1
$\Delta\theta_{g,F}$	0.005 1
$\Delta\theta_{i,g}$	0.023 9

Coloring			
λ_{80}	370	λ_5	325
λ_{70}			

Internal transmission			
$\lambda_{0.80}$	366	$\lambda_{0.05}$	330

CCI		
B	G	R
0.00	0.55	0.57

Internal Transmittance	
λ (nm)	τ_i (10 mm)
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
1 000	0.996
1 200	0.996
1 400	0.996
1 600	0.991
1 800	0.979
2 000	0.961
2 200	0.926
2 400	0.89

Thermal Properties		
Strain Point StP (℃)		-
Annealing Point AP (℃)		-
Transformation Temperature Tg (℃)		585
Yield Point At (℃)		626
Softening Point SP (℃)		-
Expansion Coefficients α_l (10^{-7} K^{-1})	(-30 ℃ ~ 70 ℃)	102
	(100 ℃ ~ 300 ℃)	120
Thermal Conductivity λ (W/(m·K))		0.599

Linear coefficient of thermal expansion	
Temperature range (℃)	α_l (10^{-7} K^{-1})
-100 ~ -90	86
-90 ~ -80	87
-80 ~ -70	89
-70 ~ -60	90
-60 ~ -50	92
-50 ~ -40	93
-40 ~ -30	95
-30 ~ -20	96
-20 ~ -10	97
-10 ~ 0	99
0 ~ 10	100
10 ~ 20	101
20 ~ 30	103
30 ~ 40	104
40 ~ 50	105
50 ~ 60	106
60 ~ 70	108
70 ~ 80	109
80 ~ 90	110
90 ~ 100	111
100 ~ 110	112
110 ~ 120	113
120 ~ 130	114
130 ~ 140	115
140 ~ 150	116
150 ~ 160	117
160 ~ 170	118
170 ~ 180	119
180 ~ 190	120
190 ~ 200	120
200 ~ 210	121
210 ~ 220	122
220 ~ 230	123
230 ~ 240	123
240 ~ 250	124
250 ~ 260	125
260 ~ 270	125
270 ~ 280	126
280 ~ 290	127
290 ~ 300	127

Other Properties	
Photoelastic Constant β nm/(cm·105Pa)	1.00
Specific Gravity *d*	3.67
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	-4.1	-4.0	-3.9	-3.8	-3.8	-3.7	-3.5	-3.4	-3.3	-3.1	-2.8	-2.4
-60 ~ -40	-4.3	-4.2	-4.0	-4.0	-4.0	-3.9	-3.8	-3.6	-3.6	-3.3	-3.0	-2.6
-40 ~ -20	-4.4	-4.2	-4.1	-4.0	-4.0	-3.9	-3.8	-3.6	-3.6	-3.4	-3.0	-2.6
-20 ~ 0	-4.4	-4.3	-4.1	-4.0	-4.0	-3.9	-3.8	-3.6	-3.6	-3.3	-3.1	-2.6
0 ~ 20	-4.3	-4.3	-4.1	-4.0	-4.0	-3.9	-3.8	-3.6	-3.6	-3.2	-3.0	-2.6
20 ~ 40	-4.3	-4.2	-4.0	-3.9	-3.9	-3.8	-3.7	-3.5	-3.5	-3.2	-2.9	-2.5
40 ~ 60	-4.2	-4.1	-3.9	-3.9	-3.9	-3.8	-3.6	-3.3	-3.3	-3.1	-2.8	-2.4
60 ~ 80	-4.1	-4.0	-3.8	-3.8	-3.7	-3.6	-3.5	-3.3	-3.3	-3.0	-2.8	-2.3
80 ~ 100	-4.0	-3.9	-3.7	-3.7	-3.6	-3.5	-3.4	-3.2	-3.2	-2.9	-2.7	-2.2
100 ~ 120	-4.0	-3.9	-3.7	-3.6	-3.6	-3.5	-3.3	-3.1	-3.1	-2.8	-2.6	-2.1
120 ~ 140	-3.9	-3.8	-3.6	-3.5	-3.5	-3.4	-3.3	-3.1	-3.0	-2.7	-2.5	-2.0
140 ~ 160	-3.9	-3.8	-3.6	-3.5	-3.5	-3.4	-3.3	-3.0	-3.0	-2.7	-2.3	-1.8
160 ~ 180	-3.9	-3.7	-3.5	-3.4	-3.4	-3.3	-3.2	-2.9	-2.9	-2.6	-2.3	-1.8

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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.