S-NPH 1W

Code(d) **808228**
Code(e) **816226**

Refractive Index n_d	**1.808 09** 1.808 095	Abbe Number ν_d	**22.76**	Dispersion $n_F - n_C$	**0.035 504**
Refractive Index n_e	1.816 434	Abbe Number ν_e	22.57	Dispersion $n_{F'} - n_{C'}$	0.036 174

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.744 55
n_{1970}	1.970 09	1.752 26
n_{1530}	1.529 58	1.761 25
n_{1129}	1.128 64	1.770 84
n_t	1.013 98	1.774 59
n_s	0.852 11	1.781 87
$n_{A'}$	0.768 19	1.787 31
n_r	0.706 52	1.792 56
n_C	0.656 27	1.798 01
$n_{C'}$	0.643 85	1.799 57
$n_{He\text{-}Ne}$	0.632 8	1.801 05
n_D	0.589 29	1.807 79
n_d	0.587 56	1.808 09
n_e	0.546 07	1.816 43
n_F	0.486 13	1.833 51
$n_{F'}$	0.479 99	1.835 75
$n_{He\text{-}Cd}$	0.441 57	1.852 79
n_g	0.435 835	1.855 90
n_h	0.404 656	1.876 58
n_i	0.365 015	

Constants of Dispersion Formula	
A_1	1.751 566 23E+00
A_2	3.640 063 04E-01
A_3	2.478 741 41E+00
B_1	1.350 046 81E-02
B_2	6.682 451 47E-02
B_3	1.707 560 06E+02

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

Mechanical Properties		
Young's Modulus E (GPa)	89.3	
Rigidity Modulus G (GPa)	35.7	
Poisson's Ratio σ	0.250	
Knoop Hardness Hk[Class]	460	5
Abrasion Aa	320	

Partial Dispersions	
$n_C - n_t$	0.023 420
$n_C - n_{A'}$	0.010 701
$n_d - n_C$	0.010 086
$n_e - n_C$	0.018 425
$n_g - n_d$	0.047 809
$n_g - n_F$	0.022 391
$n_h - n_g$	0.020 676
$n_i - n_g$	
$n_{C'} - n_t$	0.024 983
$n_e - n_{C'}$	0.016 862
$n_{F'} - n_e$	0.019 312
$n_i - n_{F'}$	

Relative Partial Dispersions	
$\theta_{C,t}$	0.659 6
$\theta_{C,A'}$	0.301 4
$\theta_{d,C}$	0.284 1
$\theta_{e,C}$	0.519 0
$\theta_{g,d}$	1.346 6
$\theta_{g,F}$	0.630 7
$\theta_{h,g}$	0.582 4
$\theta_{i,g}$	
$\theta'_{C,t}$	0.690 6
$\theta'_{e,C'}$	0.466 1
$\theta'_{F,e}$	0.533 9
$\theta'_{i,F'}$	

Anomalous dispersion	
$\Delta\theta_{C,t}$	0.006 1
$\Delta\theta_{C,A'}$	-0.002 0
$\Delta\theta_{g,d}$	0.029 2
$\Delta\theta_{g,F}$	0.026 1
$\Delta\theta_{i,g}$	

Coloring			
λ_{80}	420	λ_5	375
λ_{70}			

Internal transmission			
$\lambda_{0.80}$	395	$\lambda_{0.05}$	372

CCI		
B	G	R
0.00	2.65	2.84

Internal Transmittance	
λ (nm)	τ_i (10 mm)
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	
380	0.28
390	0.67
400	0.87
420	0.956
440	0.972
460	0.978
480	0.983
500	0.986
550	0.993
600	0.996
650	0.997
700	0.998
800	0.999
900	0.999
1 000	0.999
1 200	0.999
1 400	0.996
1 600	0.994
1 800	0.986
2 000	0.973
2 200	0.932
2 400	0.88

Thermal Properties		
Strain Point StP (°C)		516
Annealing Point AP (°C)		547
Transformation Temperature Tg (°C)		556
Yield Point At (°C)		604
Softening Point SP (°C)		645
Expansion Coefficients	(-30 ℃ ~ 70 ℃)	84
α_l (10^{-7} K^{-1})	(100 °C ~ 300 °C)	106
Thermal Conductivity λ (W/(m·K))		0.882

Linear coefficient of thermal expansion	
Temperature range (°C)	α_l (10^{-7} K^{-1})
-100 ～ -90	66
-90 ～ -80	68
-80 ～ -70	70
-70 ～ -60	71
-60 ～ -50	73
-50 ～ -40	75
-40 ～ -30	76
-30 ～ -20	78
-20 ～ -10	80
-10 ～ 0	81
0 ～ 10	83
10 ～ 20	84
20 ～ 30	86
30 ～ 40	87
40 ～ 50	89
50 ～ 60	90
60 ～ 70	91
70 ～ 80	93
80 ～ 90	94
90 ～ 100	95
100 ～ 110	96
110 ～ 120	97
120 ～ 130	99
130 ～ 140	100
140 ～ 150	101
150 ～ 160	102
160 ～ 170	103
170 ～ 180	104
180 ～ 190	105
190 ～ 200	106
200 ～ 210	107
210 ～ 220	108
220 ～ 230	109
230 ～ 240	109
240 ～ 250	110
250 ～ 260	111
260 ～ 270	112
270 ～ 280	112
280 ～ 290	113
290 ～ 300	114

Other Properties	
Photoelastic Constant β nm/(cm·105Pa)	3.23
Specific Gravity d	3.29
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	-3.0	-2.9	-2.3	-2.1	-2.0	-1.7	-1.3	-0.2	-0.1	1.6	3.8	-
-60 ~ -40	-3.1	-2.9	-2.3	-2.1	-2.0	-1.6	-1.2	-0.1	0.1	1.8	4.2	-
-40 ~ -20	-3.1	-2.9	-2.3	-2.1	-2.0	-1.5	-1.0	0.1	0.3	2.2	4.7	-
-20 ~ 0	-3.1	-2.8	-2.1	-1.9	-1.8	-1.3	-0.9	0.3	0.5	2.5	5.2	-
0 ~ 20	-3.1	-2.7	-2.0	-1.7	-1.7	-1.2	-0.7	0.6	0.8	2.9	5.7	-
20 ~ 40	-2.9	-2.6	-1.9	-1.5	-1.5	-1.0	-0.4	0.9	1.1	3.3	6.3	-
40 ~ 60	-2.8	-2.5	-1.7	-1.4	-1.3	-0.8	-0.2	1.2	1.4	3.7	6.9	-
60 ~ 80	-2.8	-2.4	-1.6	-1.3	-1.2	-0.7	-0.1	1.5	1.7	4.1	7.4	-
80 ~ 100	-2.7	-2.3	-1.5	-1.2	-1.1	-0.5	0.2	1.7	1.9	4.5	7.9	-
100 ~ 120	-2.7	-2.3	-1.4	-1.1	-1.0	-0.4	0.3	1.9	2.2	4.7	8.3	-
120 ~ 140	-2.7	-2.3	-1.4	-1.0	-0.9	-0.3	0.4	2.1	2.3	5.0	8.7	-
140 ~ 160	-2.8	-2.4	-1.4	-1.0	-0.9	-0.2	0.5	2.2	2.5	5.3	9.2	-
160 ~ 180	-2.9	-2.5	-1.4	-1.1	-0.9	-0.3	0.5	2.4	2.7	5.6	9.5	-

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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.