

S-NPH 7

Code(d) 778239

Code(e) 786237

Refractive Index n_d	1.778 30 1.778 300	Abbe Number ν_d	23.91	Dispersion $n_F - n_C$	0.032 549
Refractive Index n_e	1.785 954	Abbe Number ν_e	23.71	Dispersion $n_{F'} - n_{C'}$	0.033 147

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.720 77
n_{1970}	1.970 09	1.727 50
n_{1530}	1.529 58	1.735 44
n_{1129}	1.128 64	1.744 06
n_t	1.013 98	1.747 49
n_s	0.852 11	1.754 17
$n_{A'}$	0.768 19	1.759 17
n_F	0.706 52	1.764 00
n_C	0.656 27	1.769 02
$n_{C'}$	0.643 85	1.770 46
n_{He-Ne}	0.632 8	1.771 82
n_D	0.589 29	1.778 02
n_d	0.587 56	1.778 30
n_e	0.546 07	1.785 95
n_F	0.486 13	1.801 57
$n_{F'}$	0.479 99	1.803 61
n_{He-Cd}	0.441 57	1.819 09
n_g	0.435 835	1.821 91
n_h	0.404 656	1.840 53
n_i	0.365 015	

Constants of Dispersion Formula	
A_1	1.682 365 54E+00
A_2	3.396 496 44E-01
A_3	2.250 492 08E+00
B_1	1.314 316 82E-02
B_2	6.450 400 12E-02
B_3	1.813 863 00E+02

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

Mechanical Properties	
Young's Modulus E (GPa)	75.3
Rigidity Modulus G (GPa)	29.6
Poisson's Ratio σ	0.269
Knoop Hardness Hk[Class]	380 4
Abrasion Aa	448

Partial Dispersions	
$n_C - n_t$	0.021 538
$n_C - n_{A'}$	0.009 855
$n_d - n_C$	0.009 276
$n_e - n_C$	0.016 930
$n_g - n_d$	0.043 611
$n_g - n_F$	0.020 338
$n_h - n_g$	0.018 622
$n_i - n_g$	
$n_{C'} - n_t$	0.022 976
$n_e - n_{C'}$	0.015 492
$n_{F'} - n_e$	0.017 655
$n_i - n_{F'}$	

Relative Partial Dispersions	
$\theta_{C,t}$	0.661 7
$\theta_{C,A'}$	0.302 8
$\theta_{d,C}$	0.285 0
$\theta_{e,C}$	0.520 1
$\theta_{g,d}$	1.339 9
$\theta_{g,F}$	0.624 8
$\theta_{h,g}$	0.572 1
$\theta_{i,g}$	
$\theta'_{C,t}$	0.693 2
$\theta'_{e,C'}$	0.467 4
$\theta'_{F',e}$	0.532 6
$\theta'_{i,F'}$	

Anomalous dispersion	
$\Delta\theta_{C,t}$	0.002 9
$\Delta\theta_{C,A'}$	-0.002 0
$\Delta\theta_{g,d}$	0.024 9
$\Delta\theta_{g,F}$	0.022 0
$\Delta\theta_{i,g}$	

Coloring			
λ_{80}	420	λ_5	370
λ_{70}			
Internal transmission			
$\lambda_{0.80}$	395	$\lambda_{0.05}$	365
CCI			
B	G	R	
0.00	2.61	2.69	

Internal Transmittance	
λ (nm)	τ_i (10 mm)
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	0.11
380	0.45
390	0.74
400	0.87
420	0.949
440	0.971
460	0.980
480	0.986
500	0.990
550	0.996
600	0.997
650	0.997
700	0.997
800	0.998
900	0.998
1 000	0.998
1 200	0.999
1 400	0.999
1 600	0.995
1 800	0.984
2 000	0.970
2 200	0.951
2 400	0.920

Thermal Properties	
Strain Point StP (°C)	520
Annealing Point AP (°C)	541
Transformation Temperature Tg (°C)	570
Yield Point At (°C)	598
Softening Point SP (°C)	630
Expansion Coefficients (-30 °C ~ 70 °C)	109
α_i (10 ⁻⁷ K ⁻¹) (100 °C ~ 300 °C)	132
Thermal Conductivity λ (W/(mK))	0.826

Linear coefficient of thermal expansion	
Temperature range (°C)	α_i (10 ⁻⁷ K ⁻¹)
-100 ~ -90	89
-90 ~ -80	91
-80 ~ -70	93
-70 ~ -60	95
-60 ~ -50	97
-50 ~ -40	99
-40 ~ -30	100
-30 ~ -20	102
-20 ~ -10	104
-10 ~ 0	106
0 ~ 10	107
10 ~ 20	109
20 ~ 30	110
30 ~ 40	112
40 ~ 50	113
50 ~ 60	115
60 ~ 70	116
70 ~ 80	118
80 ~ 90	119
90 ~ 100	121
100 ~ 110	122
110 ~ 120	123
120 ~ 130	124
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	137
250 ~ 260	137
260 ~ 270	138
270 ~ 280	139
280 ~ 290	140
290 ~ 300	140

Other Properties	
Photoelastic Constant β nm/(cm ³ 105Pa)	3.45
Specific Gravity d	3.30
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	-5.8	-5.6	-5.1	-5.0	-4.9	-4.5	-4.1	-3.3	-3.1	-1.6	0.4	-
-60 ~ -40	-6.0	-5.8	-5.3	-5.1	-5.0	-4.6	-4.3	-3.3	-3.2	-1.6	0.5	-
-40 ~ -20	-6.1	-5.9	-5.3	-5.1	-5.1	-4.7	-4.3	-3.2	-3.1	-1.5	0.7	-
-20 ~ 0	-6.2	-6.0	-5.3	-5.2	-5.1	-4.6	-4.2	-3.2	-3.0	-1.3	1.1	-
0 ~ 20	-6.2	-6.0	-5.3	-5.0	-5.0	-4.6	-4.1	-3.0	-2.8	-1.0	1.5	-
20 ~ 40	-6.2	-5.9	-5.3	-5.1	-5.0	-4.5	-4.0	-2.8	-2.6	-0.8	1.8	-
40 ~ 60	-6.2	-5.9	-5.2	-4.9	-4.8	-4.4	-3.9	-2.6	-2.5	-0.5	2.1	-
60 ~ 80	-6.1	-5.8	-5.1	-4.9	-4.8	-4.3	-3.8	-2.5	-2.3	-0.2	2.6	-
80 ~ 100	-6.2	-5.9	-5.0	-4.8	-4.7	-4.2	-3.6	-2.3	-2.1	0.0	2.9	-
100 ~ 120	-6.2	-5.9	-5.0	-4.7	-4.6	-4.1	-3.5	-2.1	-1.9	0.3	3.3	-
120 ~ 140	-6.2	-5.8	-5.0	-4.7	-4.6	-4.1	-3.5	-2.0	-1.8	0.5	3.6	-
140 ~ 160	-6.2	-5.8	-5.0	-4.7	-4.6	-4.0	-3.4	-1.9	-1.7	0.7	3.9	-
160 ~ 180	-6.3	-5.9	-5.1	-4.7	-4.6	-4.1	-3.4	-1.9	-1.6	0.9	4.2	-

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