

S-NBM51

Code(d) **613443**
Code(e) **617440**

Refractive Index n_d	1.613 40 1.613 397	Abbe Number ν_d	44.27	Dispersion $n_F - n_C$	0.013 857
Refractive Index n_e	1.616 690	Abbe Number ν_e	44.02	Dispersion $n_{F'} - n_{C'}$	0.014 008

Refractive Indices		
λ (μm)		
n_{2325}	2.325 42	1.576 60
n_{1970}	1.970 09	1.583 13
n_{1530}	1.529 58	1.590 12
n_{1129}	1.128 64	1.596 33
n_t	1.013 98	1.598 41
n_s	0.852 11	1.602 06
$n_{A'}$	0.768 19	1.604 59
n_F	0.706 52	1.606 91
n_C	0.656 27	1.609 25
$n_{C'}$	0.643 85	1.609 90
n_{He-Ne}	0.632 8	1.610 52
n_D	0.589 29	1.613 28
n_d	0.587 56	1.613 40
n_e	0.546 07	1.616 69
n_F	0.486 13	1.623 11
$n_{F'}$	0.479 99	1.623 91
n_{He-Cd}	0.441 57	1.629 86
n_g	0.435 835	1.630 91
n_h	0.404 656	1.637 55
n_i	0.365 015	1.649 27

Constants of Dispersion Formula	
A_1	1.370 231 01E+00
A_2	1.776 655 68E-01
A_3	1.305 154 71E+00
B_1	8.719 203 42E-03
B_2	4.057 255 52E-02
B_3	1.127 030 58E+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)	81.7
Rigidity Modulus G (GPa)	32.9
Poisson's Ratio σ	0.243
Knoop Hardness Hk[Class]	560
Abrasion Aa	125

Partial Dispersions	
$n_C - n_t$	0.010 843
$n_C - n_{A'}$	0.004 663
$n_d - n_C$	0.004 149
$n_e - n_C$	0.007 442
$n_g - n_d$	0.017 514
$n_g - n_F$	0.007 806
$n_h - n_g$	0.006 644
$n_i - n_g$	0.018 359
$n_{C'} - n_t$	0.011 500
$n_e - n_{C'}$	0.006 785
$n_{F'} - n_e$	0.007 223
$n_i - n_{F'}$	0.025 357

Relative Partial Dispersions	
$\theta_{C,t}$	0.782 5
$\theta_{C,A'}$	0.336 5
$\theta_{d,C}$	0.299 4
$\theta_{e,C}$	0.537 1
$\theta_{g,d}$	1.263 9
$\theta_{g,F}$	0.563 3
$\theta_{h,g}$	0.479 5
$\theta_{i,g}$	1.324 9
$\theta'_{C,t}$	0.821 0
$\theta'_{e,C'}$	0.484 4
$\theta'_{F',e}$	0.515 6
$\theta'_{i,F'}$	1.810 2

Anomalous dispersion	
$\Delta\theta_{C,t}$	0.028 1
$\Delta\theta_{C,A'}$	0.007 0
$\Delta\theta_{g,d}$	-0.008 9
$\Delta\theta_{g,F}$	-0.006 5
$\Delta\theta_{i,g}$	-0.029 4

Coloring			
λ_{80}	350	λ_5	320
λ_{70}			
Internal transmission			
$\lambda_{0.80}$	344	$\lambda_{0.05}$	319
CCI			
B	G	R	
0.00	0.38	0.40	

Internal Transmittance	
λ (nm)	τ_i (10 mm)
280	
290	
300	
310	
320	0.08
330	0.48
340	0.75
350	0.87
360	0.925
370	0.953
380	0.968
390	0.978
400	0.984
420	0.989
440	0.992
460	0.993
480	0.995
500	0.997
550	0.999
600	0.999
650	0.999
700	0.999
800	0.999
900	0.999
1 000	0.999
1 200	0.999
1 400	0.998
1 600	0.994
1 800	0.987
2 000	0.972
2 200	0.89
2 400	0.76

Thermal Properties	
Strain Point StP (°C)	509
Annealing Point AP (°C)	531
Transformation Temperature Tg (°C)	559
Yield Point At (°C)	620
Softening Point SP (°C)	693
Expansion Coefficients (-30 °C ~ 70 °C)	65
α_i (10 ⁻⁷ K ⁻¹) (100 °C ~ 300 °C)	80
Thermal Conductivity λ (W/(mK))	0.904

Linear coefficient of thermal expansion	
Temperature range (°C)	α_i (10 ⁻⁷ K ⁻¹)
-100 ~ -90	53
-90 ~ -80	54
-80 ~ -70	55
-70 ~ -60	57
-60 ~ -50	58
-50 ~ -40	59
-40 ~ -30	60
-30 ~ -20	61
-20 ~ -10	62
-10 ~ 0	63
0 ~ 10	64
10 ~ 20	65
20 ~ 30	66
30 ~ 40	67
40 ~ 50	68
50 ~ 60	69
60 ~ 70	70
70 ~ 80	71
80 ~ 90	72
90 ~ 100	73
100 ~ 110	73
110 ~ 120	74
120 ~ 130	75
130 ~ 140	76
140 ~ 150	77
150 ~ 160	77
160 ~ 170	78
170 ~ 180	79
180 ~ 190	79
190 ~ 200	80
200 ~ 210	81
210 ~ 220	81
220 ~ 230	82
230 ~ 240	82
240 ~ 250	83
250 ~ 260	84
260 ~ 270	84
270 ~ 280	85
280 ~ 290	85
290 ~ 300	85

Other Properties	
Photoelastic Constant β nm/(cm ³ 105Pa)	3.47
Specific Gravity d	2.93
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	2.2	2.3	2.6	2.7	2.7	2.8	3.1	3.4	3.4	3.8	4.3	5.3
-60 ~ -40	2.2	2.3	2.6	2.7	2.8	2.9	3.0	3.4	3.4	3.9	4.4	5.4
-40 ~ -20	2.2	2.5	2.8	2.8	2.9	3.0	3.2	3.5	3.6	4.0	4.6	5.6
-20 ~ 0	2.4	2.5	2.8	3.0	3.0	3.2	3.4	3.7	3.8	4.2	4.7	5.8
0 ~ 20	2.6	2.7	3.0	3.1	3.1	3.3	3.5	3.9	3.9	4.5	5.0	6.1
20 ~ 40	2.7	2.9	3.2	3.3	3.3	3.5	3.7	4.0	4.1	4.6	5.2	6.3
40 ~ 60	2.8	3.0	3.3	3.4	3.4	3.6	3.8	4.3	4.3	4.8	5.4	6.5
60 ~ 80	2.9	3.1	3.4	3.5	3.6	3.8	3.9	4.4	4.4	4.9	5.5	6.8
80 ~ 100	3.0	3.2	3.5	3.7	3.7	3.9	4.1	4.5	4.5	5.1	5.6	6.9
100 ~ 120	3.1	3.2	3.6	3.7	3.7	3.9	4.1	4.6	4.6	5.2	5.8	7.0
120 ~ 140	3.0	3.2	3.6	3.7	3.7	3.9	4.1	4.6	4.6	5.2	5.8	7.1
140 ~ 160	3.0	3.2	3.5	3.7	3.7	3.9	4.1	4.6	4.6	5.2	5.9	7.2
160 ~ 180	2.9	3.1	3.5	3.7	3.7	3.9	4.1	4.6	4.7	5.2	5.9	7.2

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