

# S-NPH 5

Code(d) **859227**

Code(e) **868225**

Refractive Index $n_d$	<b>1.85896</b> 1.858956	Abbe Number $\nu_d$	<b>22.73</b>	Dispersion $n_F-n_C$	<b>0.037792</b>
Refractive Index $n_e$	1.867836	Abbe Number $\nu_e$	22.54	Dispersion $n_F-n_{C'}$	0.038499

Refractive Indices		
$\lambda(\mu\text{m})$		
$n_{2325}$	2.32542	1.79247
$n_{1970}$	1.97009	1.80027
$n_{1530}$	1.52958	1.80944
$n_{1129}$	1.12864	1.81938
$n_t$	1.01398	1.82333
$n_s$	0.85211	1.83103
$n_{A'}$	0.76819	1.83681
$n_r$	0.70652	1.84240
$n_C$	0.65627	1.84821
$n_{C'}$	0.64385	1.84987
$n_{\text{He-Ne}}$	0.6328	1.85145
$n_D$	0.58929	1.85863
$n_d$	0.58756	1.85896
$n_e$	0.54607	1.86784
$n_F$	0.48613	1.88600
$n_{F'}$	0.47999	1.88837
$n_{\text{He-Cd}}$	0.44157	1.90645
$n_g$	0.435835	1.90975
$n_h$	0.404656	1.93160
$n_i$	0.365015	

Constants of Dispersion Formula	
$A_1$	1.89108996E+00
$A_2$	3.95220126E-01
$A_3$	2.20492127E+00
$B_1$	1.41164499E-02
$B_2$	6.62834445E-02
$B_3$	1.48680700E+02

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

Mechanical Properties	
Young's Modulus E (GPa)	92.9
Rigidity Modulus G (GPa)	37.0
Poisson's Ratio $\sigma$	0.256
Knoop Hardness Hk(Class)	460   5
Abrasion Aa	277

Partial Dispersions	
$n_C-n_t$	0.024883
$n_C-n_{A'}$	0.011397
$n_d-n_C$	0.010747
$n_e-n_C$	0.019627
$n_g-n_d$	0.050792
$n_g-n_F$	0.023747
$n_h-n_g$	0.021851
$n_i-n_g$	
$n_C-n_t$	0.026548
$n_e-n_{C'}$	0.017962
$n_{F'}-n_e$	0.020537
$n_i-n_{F'}$	

Relative Partial Dispersions	
$\theta_{C,t}$	0.6584
$\theta_{C,A'}$	0.3016
$\theta_{d,C}$	0.2844
$\theta_{e,C}$	0.5193
$\theta_{g,d}$	1.3440
$\theta_{g,F}$	0.6284
$\theta_{h,g}$	0.5782
$\theta_{i,g}$	
$\theta'_{C,t}$	0.6896
$\theta'_{e,C'}$	0.4666
$\theta'_{F',e}$	0.5334
$\theta'_{i,F'}$	

Deviation of Relative Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0051
$\Delta\theta_{C,A'}$	-0.0018
$\Delta\theta_{g,d}$	0.0265
$\Delta\theta_{g,F}$	0.0237
$\Delta\theta_{i,g}$	

Thermal Properties	
Strain Point StP (°C)	573
Annealing Point AP (°C)	599
Transformation Temperature Tg (°C)	609
Yield Point At (°C)	651
Softening Point SP (°C)	704
Expansion Coefficients (-30~+70°C)	76
$\alpha$ ( $10^{-7} \text{K}^{-1}$ ) (+100~+300°C)	84
Thermal Conductivity $\lambda$ W/(m·K)	0.877

Coloring			
$\lambda_{80}$		$\lambda_5$	370
$\lambda_{70}$	400		

Internal transmission			
$\lambda_{0.80}$	397	$\lambda_{0.05}$	364

CCI		
B	G	R
0.00	3.38	3.62

Internal Transmittance	
$\lambda(\text{nm})$	$\tau$ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	0.03
370	0.08
380	0.41
390	0.72
400	0.84
420	0.924
440	0.949
460	0.962
480	0.971
500	0.979
550	0.991
600	0.994
650	0.995
700	0.996
800	0.998
900	0.998
1000	0.998
1200	0.999
1400	0.996
1600	0.993
1800	0.984
2000	0.972
2200	0.944
2400	0.915

Temperature Coefficients of Refractive Index							
Range of Temperature (°C)	$\Delta n / \Delta T$ relative ( $10^{-6} \text{K}^{-1}$ )						
	t	C'	He-Ne	D	e	F'	g
-40~-20	0.0	1.0	1.1	1.5	2.0	3.5	5.3
-20~ 0	0.0	1.1	1.2	1.6	2.2	3.8	5.8
0~20	0.0	1.2	1.3	1.7	2.4	4.1	6.2
20~40	0.1	1.3	1.4	1.9	2.6	4.4	6.6
40~60	0.2	1.5	1.6	2.1	2.8	4.7	7.0
60~80	0.3	1.7	1.8	2.3	3.1	5.1	7.6

Other Properties	
Photoelastic Constant $\beta$ nm/(cm·10 <sup>5</sup> Pa)	3.18
Specific Gravity d	3.71
Remarks	

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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.