

# S-NPH 1

Code(d) **808228**

Code(e) **816226**

Refractive Index $n_d$	<b>1.80809</b> 1.808095	Abbe Number $\nu_d$	<b>22.76</b>	Dispersion $n_F-n_C$	<b>0.035504</b>
Refractive Index $n_e$	1.816434	Abbe Number $\nu_e$	22.57	Dispersion $n_F-n_{C'}$	0.036174

Refractive Indices		
$\lambda(\mu\text{m})$		
$n_{2325}$	2.32542	1.74455
$n_{1970}$	1.97009	1.75226
$n_{1530}$	1.52958	1.76125
$n_{1129}$	1.12864	1.77084
$n_t$	1.01398	1.77459
$n_s$	0.85211	1.78187
$n_{A'}$	0.76819	1.78731
$n_r$	0.70652	1.79256
$n_C$	0.65627	1.79801
$n_{C'}$	0.64385	1.79957
$n_{\text{He-Ne}}$	0.6328	1.80105
$n_D$	0.58929	1.80779
$n_d$	0.58756	1.80809
$n_e$	0.54607	1.81643
$n_F$	0.48613	1.83351
$n_{F'}$	0.47999	1.83575
$n_{\text{He-Cd}}$	0.44157	1.85279
$n_g$	0.435835	1.85590
$n_h$	0.404656	1.87658
$n_i$	0.365015	

Constants of Dispersion Formula	
$A_1$	1.75156623E+00
$A_2$	3.64006304E-01
$A_3$	2.47874141E+00
$B_1$	1.35004681E-02
$B_2$	6.68245147E-02
$B_3$	1.70756006E+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 $\sigma$	0.250
Knoop Hardness Hk(Class)	470   5
Abrasion Aa	320

Partial Dispersions	
$n_C-n_t$	0.023420
$n_C-n_{A'}$	0.010701
$n_d-n_C$	0.010086
$n_e-n_C$	0.018425
$n_g-n_d$	0.047809
$n_g-n_F$	0.022391
$n_h-n_g$	0.020676
$n_i-n_g$	
$n_C-n_t$	0.024983
$n_e-n_{C'}$	0.016862
$n_{F'}-n_e$	0.019312
$n_i-n_{F'}$	

Relative Partial Dispersions	
$\theta_{C,t}$	0.6596
$\theta_{C,A'}$	0.3014
$\theta_{d,C}$	0.2841
$\theta_{e,C}$	0.5190
$\theta_{g,d}$	1.3466
$\theta_{g,F}$	0.6307
$\theta_{h,g}$	0.5824
$\theta_{i,g}$	
$\theta'_{C,t}$	0.6906
$\theta'_{e,C'}$	0.4661
$\theta'_{F',e}$	0.5339
$\theta'_{i,F'}$	

Deviation of Relative Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0061
$\Delta\theta_{C,A'}$	-0.0020
$\Delta\theta_{g,d}$	0.0292
$\Delta\theta_{g,F}$	0.0261
$\Delta\theta_{i,g}$	

Thermal Properties	
Strain Point StP (°C)	516
Annealing Point AP (°C)	547
Transformation Temperature Tg (°C)	552
Yield Point At (°C)	589
Softening Point SP (°C)	645
Expansion Coefficients (-30~+70°C)	83
$\alpha$ ( $10^{-7} \text{K}^{-1}$ ) (+100~+300°C)	104
Thermal Conductivity $\lambda$ W/(m·K)	0.882

Coloring			
$\lambda_{80}$	445	$\lambda_5$	375
$\lambda_{70}$			

Internal transmission			
$\lambda_{0.80}$	404	$\lambda_{0.05}$	378

CCI		
B	G	R
0.00	4.24	4.43

Internal Transmittance	
$\lambda(\text{nm})$	$\tau$ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	
380	0.14
390	0.53
400	0.77
420	0.917
440	0.952
460	0.967
480	0.975
500	0.982
550	0.992
600	0.994
650	0.995
700	0.996
800	0.997
900	0.997
1000	0.996
1200	0.997
1400	0.994
1600	0.992
1800	0.984
2000	0.973
2200	0.934
2400	0.88

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	-1.9	-1.2	-1.1	-0.7	-0.2	1.2	3.0
-20~ 0	-1.9	-1.1	-1.0	-0.6	0.0	1.5	3.4
0~20	-1.8	-0.9	-0.8	-0.4	0.2	1.8	3.8
20~40	-1.8	-0.8	-0.7	-0.3	0.4	2.1	4.3
40~60	-1.8	-0.7	-0.6	-0.1	0.6	2.4	4.7
60~80	-1.7	-0.5	-0.4	0.1	0.8	2.7	5.1

Other Properties	
Photoelastic Constant $\beta$ nm/(cm·10 <sup>5</sup> Pa)	3.23
Specific Gravity d	3.29
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.