

S-NPH 4

Code(d) **893204**

Code(e) **903202**

Refractive Index n_d	1.89286 1.892860	Abbe Number ν_d	20.36	Dispersion n_F-n_C	0.043851
Refractive Index n_e	1.903144	Abbe Number ν_e	20.20	Dispersion $n_F-n_{C'}$	0.044721

Refractive Indices		
$\lambda(\mu\text{m})$		
n_{2325}	2.32542	1.81864
n_{1970}	1.97009	1.82694
n_{1530}	1.52958	1.83681
n_{1129}	1.12864	1.84777
n_t	1.01398	1.85218
n_s	0.85211	1.86088
$n_{A'}$	0.76819	1.86745
n_r	0.70652	1.87383
n_C	0.65627	1.88048
$n_{C'}$	0.64385	1.88240
$n_{\text{He-Ne}}$	0.6328	1.88420
n_D	0.58929	1.89249
n_d	0.58756	1.89286
n_e	0.54607	1.90314
n_F	0.48613	1.92433
$n_{F'}$	0.47999	1.92712
$n_{\text{He-Cd}}$	0.44157	1.94846
n_g	0.435835	1.95237
n_h	0.404656	1.97853
n_i	0.365015	

Constants of Dispersion Formula	
A_1	1.93563931E+00
A_2	4.49596478E-01
A_3	2.71828573E+00
B_1	1.52585289E-02
B_2	6.96815778E-02
B_3	1.70327149E+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 (10^9N/m^2)	945
Rigidity Modulus G (10^9N/m^2)	377
Poisson's Ratio σ	0.254
Knoop Hardness Hk[Class]	440 4
Abrasion Aa	268
Photoelastic Constant β nm/(cm · 10^5Pa)	3.39

Partial Dispersions	
n_C-n_t	0.028304
$n_C-n_{A'}$	0.013036
n_d-n_C	0.012376
n_e-n_C	0.022660
n_g-n_d	0.059511
n_g-n_F	0.028036
n_h-n_g	0.026158
n_i-n_g	
n_C-n_t	0.030217
$n_e-n_{C'}$	0.020747
n_F-n_e	0.023974
$n_i-n_{F'}$	

Relative Partial Dispersions	
$\theta_{C,t}$	0.6455
$\theta_{C,A'}$	0.2973
$\theta_{d,C}$	0.2822
$\theta_{e,C}$	0.5167
$\theta_{g,d}$	1.3571
$\theta_{g,F}$	0.6393
$\theta_{h,g}$	0.5965
$\theta_{i,g}$	
$\theta'_{C,t}$	0.6757
$\theta'_{e,C'}$	0.4639
$\theta'_{F,e}$	0.5361
$\theta'_{i,F'}$	

Deviation of Relative Dispersions $\Delta\theta$ from "Normal"	
$\Delta\theta_{C,t}$	0.0033
$\Delta\theta_{C,A'}$	-0.0032
$\Delta\theta_{g,d}$	0.0347
$\Delta\theta_{g,F}$	0.0308
$\Delta\theta_{i,g}$	

Thermal Properties	
Strain Point StP (°C)	
Annealing Point AP (°C)	
Transformation Temperature Tg (°C)	638
Yield Point At (°C)	668
Softening Point SP (°C)	711
Expansion Coefficients (-30~+70°C)	73
α ($10^{-7}/^\circ\text{C}$) (+100~+300°C)	88
Thermal Conductivity λ W/(m·K)	0.925

Coloring			
λ_{80}		λ_5	380
λ_{70}	410		

Internal transmission			
$\lambda_{0.80}$	409	$\lambda_{0.05}$	380

CCI		
B	G	R
0.00	4.93	5.17

Internal Transmittance	
$\lambda(\text{nm})$	τ 10mm
280	
290	
300	
310	
320	
330	
340	
350	
360	
370	
380	0.06
390	0.39
400	0.71
420	0.915
440	0.951
460	0.966
480	0.975
500	0.982
550	0.993
600	0.997
650	0.997
700	0.998
800	0.999
900	0.999
1000	0.999
1200	0.999
1400	0.999
1600	0.995
1800	0.984
2000	0.971
2200	0.948
2400	0.915

Temperature Coefficients of Refractive Index							
Range of Temperature (°C)	$\Delta n/\Delta T$ relative ($10^{-6}/^\circ\text{C}$)						
	t	C'	He-Ne	D	e	F'	g
-40~-20	-1.1	0.1	0.2	0.6	1.3	3.0	5.3
-20~ 0	-1.1	0.2	0.3	0.7	1.5	3.4	5.8
0~20	-1.0	0.3	0.4	0.9	1.7	3.7	6.3
20~40	-1.0	0.4	0.5	1.1	1.9	4.1	6.8
40~60	-0.9	0.6	0.7	1.3	2.1	4.4	7.4
60~80	-0.7	0.8	0.9	1.6	2.4	4.9	8.0

Other Properties	
Bubble Quality Group B	
Specific Gravity d	3.61
Remarks	

OHARA 17-04

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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.