

# S-NPH 5

Code(d) **859227**

Code(e) **868225**

|                        |                |                     |              |                       |                 |
|------------------------|----------------|---------------------|--------------|-----------------------|-----------------|
| Refractive Index $n_d$ | <b>1.85896</b> | Abbe Number $\nu_d$ | <b>22.73</b> | Dispersion $n_F-n_C$  | <b>0.037792</b> |
|                        | 1.858956       |                     |              |                       |                 |
| 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) | 470   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.