

| | | | | |
|--------------|---------------|-----------------|---------------|------------------------------|
| H-ZF4 | 728283 | $n_d = 1.72825$ | $v_d = 28.32$ | $n_F - n_C = 0.025716$ |
| | | $n_e = 1.73432$ | $v_e = 28.10$ | $n_{F'} - n_{C'} = 0.026133$ |

| Refractive Indices | | |
|--------------------|----------------|-------------|
| | λ (nm) | n_λ |
| n_{2325} | 2325.42 | 1.67946 |
| n_{1970} | 1970.09 | 1.68559 |
| n_{1530} | 1529.58 | 1.69277 |
| n_{1129} | 1128.64 | 1.70031 |
| n_{1064} | 1064.00 | 1.70186 |
| n_t | 1013.98 | 1.70320 |
| n_s | 852.11 | 1.70875 |
| $n_{A'}$ | 768.19 | 1.71285 |
| n_r | 706.52 | 1.71677 |
| n_C | 656.27 | 1.72082 |
| $n_{C'}$ | 643.85 | 1.72198 |
| $n_{\text{He-Ne}}$ | 632.80 | 1.72307 |
| n_D | 589.29 | 1.72803 |
| n_d | 587.56 | 1.72825 |
| n_e | 546.07 | 1.73432 |
| n_F | 486.13 | 1.74654 |
| $n_{F'}$ | 479.99 | 1.74811 |
| n_g | 435.84 | 1.76215 |
| n_h | 404.66 | 1.77615 |
| n_i | 365.01 | 1.80264 |

| Relative Partial Dispersion | |
|-----------------------------|--------|
| $P_{d,C}$ | 0.2889 |
| $P_{e,d}$ | 0.2360 |
| $P_{g,F}$ | 0.6070 |
| $P'_{d,c'}$ | 0.2399 |
| $P'_{e,d}$ | 0.2323 |
| $P'_{g,F'}$ | 0.5373 |

| Chemical Properties (grade) | |
|-----------------------------|---|
| RC (S) | 1 |
| RA (S) | 1 |
| D_W | 1 |
| D_A | 1 |
| R_{OH} (S) | 1 |
| RP (S) | 1 |

| Internal Transmittance | | |
|------------------------|---------------------|----------------------|
| λ (nm) | $\tau_{5\text{mm}}$ | $\tau_{10\text{mm}}$ |
| 2400 | 0.942 | 0.887 |
| 2200 | 0.963 | 0.927 |
| 2000 | 0.994 | 0.989 |
| 1800 | 0.998 | 0.996 |
| 1600 | 0.998 | 0.996 |
| 1400 | 0.998 | 0.996 |
| 1200 | 0.998 | 0.996 |
| 1060 | 0.998 | 0.996 |
| 1000 | 0.998 | 0.996 |
| 950 | 0.998 | 0.996 |
| 900 | 0.998 | 0.996 |
| 850 | 0.998 | 0.996 |
| 800 | 0.998 | 0.996 |
| 750 | 0.998 | 0.996 |
| 700 | 0.998 | 0.996 |
| 650 | 0.998 | 0.996 |
| 600 | 0.996 | 0.992 |
| 550 | 0.994 | 0.989 |
| 500 | 0.992 | 0.985 |
| 480 | 0.990 | 0.980 |
| 460 | 0.987 | 0.976 |
| 440 | 0.981 | 0.966 |
| 420 | 0.969 | 0.942 |
| 400 | 0.930 | 0.867 |
| 390 | 0.876 | 0.769 |
| 380 | 0.748 | 0.563 |
| 370 | 0.460 | 0.213 |
| 360 | | |
| 350 | | |
| 340 | | |
| 330 | | |
| 320 | | |
| 310 | | |
| 300 | | |
| 290 | | |
| 280 | | |

| Deviation of Relative Partial Dispersions | |
|---|--------|
| $\Delta P_{F,e}$ | 0.0006 |
| $\Delta P_{g,F}$ | 0.0105 |
| $\Delta P_{C,t}$ | 0.0078 |
| $\Delta P_{C,s}$ | 0.0010 |

| Expansion Coefficient α ($\times 10^{-7}/\text{K}$) | |
|--|----------|
| $^{\circ}\text{C}$ | α |
| -50/-40 | 80 |
| -40/-30 | 82 |
| -30/-20 | 84 |
| -20/-10 | 86 |
| -10/0 | 88 |
| 0/10 | 89 |
| 10/20 | 90 |
| 20/30 | 91 |
| 30/40 | 91 |
| 40/50 | 92 |
| 50/60 | 92 |
| 60/70 | 93 |
| 70/80 | 95 |
| 80/90 | 96 |
| 90/100 | 97 |
| 100/110 | 98 |
| 110/120 | 99 |
| 120/130 | 100 |
| 130/140 | 101 |
| 140/150 | 103 |
| 150/160 | 104 |

| Thermal Properties | |
|---|------|
| T_g ($^{\circ}\text{C}$) | 610 |
| T_s ($^{\circ}\text{C}$) | 641 |
| $T_{10}^{14.5}$ ($^{\circ}\text{C}$) | 546 |
| T_{10}^{13} ($^{\circ}\text{C}$) | 575 |
| $\alpha_{50/80^{\circ}\text{C}}$ ($10^{-7}/\text{K}$) | 87 |
| $\alpha_{100/300^{\circ}\text{C}}$ ($10^{-7}/\text{K}$) | 107 |
| λ ($\text{W}/(\text{m}\cdot\text{K})$) | 1.18 |

| Mechanical Properties | |
|----------------------------|-------|
| HK (10^7Pa) | 548 |
| F_A | 158 |
| E (GPa) | 87.4 |
| G (GPa) | 34.8 |
| μ | 0.257 |
| σ_b (MPa) | 79 |
| B ($10^{-12}/\text{Pa}$) | 2.76 |

| Constants of Dispersion Formula | |
|---------------------------------|-----------------|
| A_0 | 2.87833860E+00 |
| A_1 | -1.18585043E-02 |
| A_2 | 3.41292688E-02 |
| A_3 | 1.67815401E-03 |
| A_4 | -5.56455694E-05 |
| A_5 | 1.43620134E-05 |

| Density | | Solarization | |
|-----------------------------------|------|---------------------|------|
| ρ (g/cm^3) | 3.05 | $\Delta\lambda$ (%) | -0.4 |

| Range of Temperature ($^{\circ}\text{C}$) | Temperature Coefficients of Refractive Index | | | | | | | | | |
|---|--|-----|-----|-----|-------|-----|-----|-----|-----|-----|
| | dn/dt relative ($\times 10^{-6}/^{\circ}\text{C}$) | | | | | | | | | |
| | t | s | C | C' | He-Ne | d | e | F | F' | g |
| -60~-40 | 0.4 | 0.7 | 1.1 | 1.2 | 1.3 | 1.6 | 2.0 | 3.1 | 3.2 | 3.9 |
| -40~-20 | 0.4 | 0.7 | 1.2 | 1.2 | 1.3 | 1.5 | 2.0 | 3.2 | 3.3 | 4.2 |
| -20~0 | 0.4 | 0.8 | 1.3 | 1.3 | 1.4 | 1.7 | 2.3 | 3.3 | 3.3 | 4.5 |
| 0~20 | 0.4 | 0.8 | 1.3 | 1.3 | 1.4 | 1.9 | 2.4 | 3.6 | 3.7 | 4.9 |
| 20~40 | 0.4 | 0.8 | 1.4 | 1.4 | 1.5 | 1.9 | 2.5 | 3.8 | 3.8 | 5.1 |
| 40~60 | 0.5 | 0.9 | 1.5 | 1.6 | 1.7 | 2.1 | 2.6 | 4.0 | 4.1 | 5.3 |
| 60~80 | 0.5 | 1.0 | 1.6 | 1.7 | 1.8 | 2.2 | 2.9 | 4.2 | 4.3 | 5.7 |
| 80~100 | 0.5 | 1.0 | 1.7 | 1.8 | 1.9 | 2.3 | 3.0 | 4.4 | 4.5 | 5.9 |
| 100~120 | 0.6 | 1.1 | 1.9 | 1.9 | 2.0 | 2.3 | 3.1 | 4.6 | 4.6 | 6.1 |
| 120~140 | 0.7 | 1.2 | 2.0 | 2.0 | 2.1 | 2.6 | 3.3 | 4.7 | 4.7 | 6.0 |
| 140~160 | 0.7 | 1.3 | 2.1 | 2.1 | 2.2 | 2.6 | 3.5 | 4.8 | 4.9 | 6.3 |

| Coloration Code | |
|--|---------|
| $\lambda_{80}(\lambda_{70})/\lambda_5$ | 415/365 |
| Coloration of Internal Transmittance | |
| $\lambda\tau_{80}/\lambda\tau_5$ | 392/364 |

| Constants of dn/dt | | |
|--------------------|----------|----------------|
| D_0 | D_1 | D_2 |
| -3.28E-06 | 1.15E-08 | -2.60E-11 |
| E_0 | E_1 | λ_{TK} |
| 1.09E-06 | 1.15E-09 | 2.56E-01 |