

# E-FD1L

717-295  $n_d = 1.71736$   $\nu_d = 29.50$  ( 29.502 )  $n_F - n_C = 0.024316$   
 $n_e = 1.72310$   $\nu_e = 29.27$  ( 29.269 )  $n_{F'} - n_{C'} = 0.024705$

| 屈折率 Refractive Index |                |         |
|----------------------|----------------|---------|
|                      | $\lambda$ (nm) |         |
| $n_{1529.6}$         | 1529.60        | 1.68325 |
| $n_{1128.64}$        | 1128.64        | 1.69073 |
| $n_t$                | 1013.98        | 1.69354 |
| $n_s$                | 852.11         | 1.69884 |
| $n_{A'}$             | 768.195        | 1.70274 |
| $n_r$                | 706.519        | 1.70647 |
| $n_C$                | 656.273        | 1.71032 |
| $n_{C'}$             | 643.847        | 1.71142 |
| $n_{633}$            | 632.8          | 1.71245 |
| $n_D$                | 589.294        | 1.71715 |
| $n_d$                | 587.562        | 1.71736 |
| $n_e$                | 546.074        | 1.72310 |
| $n_F$                | 486.133        | 1.73464 |
| $n_{F'}$             | 479.991        | 1.73613 |
| $n_g$                | 435.834        | 1.74933 |
| $n_h$                | 404.656        | 1.76249 |
| $n_i$                | 365.015        | 1.78755 |

| 分散式の定数 Constants of dispersion formula |                             |
|----------------------------------------|-----------------------------|
| $A_0$                                  | 2.8496451                   |
| $A_1$                                  | $-1.2662471 \times 10^{-2}$ |
| $A_2$                                  | $3.0196873 \times 10^{-2}$  |
| $A_3$                                  | $2.3492982 \times 10^{-3}$  |
| $A_4$                                  | $-1.9216545 \times 10^{-4}$ |
| $A_5$                                  | $2.1946899 \times 10^{-5}$  |

| 部分分散 Partial dispersions |          |
|--------------------------|----------|
| $n_C - n_t$              | 0.016787 |
| $n_d - n_C$              | 0.007039 |
| $n_F - n_d$              | 0.017277 |
| $n_g - n_F$              | 0.014688 |
| $n_{C'} - n_t$           | 0.017885 |
| $n_e - n_{C'}$           | 0.011683 |
| $n_{F'} - n_e$           | 0.013022 |
| $n_g - n_{F'}$           | 0.013201 |

| 部分分散比 Partial dispersion rates |        |
|--------------------------------|--------|
| $P_{C,t}$                      | 0.6904 |
| $P_{d,C}$                      | 0.2895 |
| $P_{e,d}$                      | 0.2361 |
| $P_{F,e}$                      | 0.4744 |
| $P_{g,F}$                      | 0.6040 |
| $P_{h,g}$                      | 0.5412 |
| $P_{i,h}$                      | 1.0308 |
| $P'_{C,t}$                     | 0.7239 |
| $P'_{d,C'}$                    | 0.2405 |
| $P'_{e,d'}$                    | 0.2324 |
| $P'_{F',e'}$                   | 0.5271 |
| $P'_{g,F'}$                    | 0.5343 |
| $P'_{h,g'}$                    | 0.5327 |
| $P'_{i,h'}$                    | 1.0145 |

| 異常分散性 Anomalous dispersions |         |
|-----------------------------|---------|
| $\Delta P_{C,t}$            | 0.0067  |
| $\Delta P_{C,A'}$           | -0.0010 |
| $\Delta P_{g,d}$            | 0.0100  |
| $\Delta P_{g,F}$            | 0.0088  |
| $\Delta P_{i,g}$            | 0.0921  |

| 光弾性定数 Photoelastic Constant  |      |
|------------------------------|------|
| $B$ ( $10^{-12}/\text{Pa}$ ) | 2.71 |

| 比重 Specific Gravity |      |
|---------------------|------|
| $d$                 | 3.05 |

| 化学的性質 Chemical Properties |   |
|---------------------------|---|
| $D_W$                     | 1 |
| $D_A$                     | 1 |
| $T_{Blue}$                | 1 |
| $D_{NaOH}$                | 1 |
| $D_{STPP}$                | 1 |
| $D_0$                     | 1 |
| $D_H$                     |   |

| 熱的性質 Thermal Properties                         |       |
|-------------------------------------------------|-------|
| $T_g$ (°C)                                      | 608   |
| $T_s$ (°C)                                      | 647   |
| $T_{10^{14.5}}$ (°C)                            | 581   |
| $T_{10^{13}}$ (°C)                              | 601   |
| $T_{10^{7.6}}$ (°C)                             | 687   |
| $\alpha$ -30/+70°C ( $10^{-7}/^\circ\text{C}$ ) | 91    |
| $\alpha$ 100/300°C ( $10^{-7}/^\circ\text{C}$ ) | 104   |
| $\lambda$ [W/(m·K)]                             | 0.977 |
| $C_p$ [kJ/(kg·K)]                               | 0.680 |

| 機械的性質 Mechanical Properties |         |
|-----------------------------|---------|
| $H_K$                       | 510 (5) |
| $F_A$                       | 160     |
| $E$ (GPa)                   | 89      |
| $G$ (GPa)                   | 35.6    |
| $\mu$                       | 0.253   |
| $\sigma_b$ (MPa)            | 91      |

| 内部透過率 Internal Transmittance |            |            |             |
|------------------------------|------------|------------|-------------|
| $\lambda$ (nm)               | $\tau$ 2mm | $\tau$ 5mm | $\tau$ 10mm |
| 2500                         | 0.961      | 0.905      | 0.819       |
| 2400                         | 0.969      | 0.924      | 0.854       |
| 2200                         | 0.979      | 0.949      | 0.901       |
| 2000                         | 0.990      | 0.975      | 0.950       |
| 1800                         | 0.994      | 0.984      | 0.969       |
| 1600                         | 0.997      | 0.992      | 0.985       |
| 1550                         | 0.998      | 0.994      | 0.988       |
| 1500                         | 0.998      | 0.994      | 0.989       |
| 1400                         | 0.998      | 0.994      | 0.989       |
| 1300                         | 0.999      | 0.997      | 0.994       |
| 1200                         | 0.999      | 0.997      | 0.995       |
| 1100                         | 0.999      | 0.997      | 0.995       |
| 1060                         | 0.999      | 0.997      | 0.995       |
| 1050                         | 0.999      | 0.997      | 0.995       |
| 1000                         | 0.999      | 0.997      | 0.995       |
| 950                          | 0.999      | 0.998      | 0.996       |
| 900                          | 0.999      | 0.998      | 0.997       |
| 850                          | 0.999      | 0.998      | 0.997       |
| 830                          | 1.000      | 0.999      | 0.998       |
| 800                          | 0.999      | 0.997      | 0.994       |
| 780                          | 0.999      | 0.997      | 0.995       |
| 750                          | 0.999      | 0.997      | 0.995       |
| 700                          | 0.999      | 0.997      | 0.994       |
| 650                          | 0.999      | 0.996      | 0.993       |
| 600                          | 0.997      | 0.993      | 0.986       |
| 550                          | 0.995      | 0.987      | 0.975       |
| 500                          | 0.998      | 0.994      | 0.989       |
| 480                          | 0.997      | 0.993      | 0.986       |
| 460                          | 0.997      | 0.991      | 0.983       |
| 440                          | 0.995      | 0.987      | 0.975       |
| 420                          | 0.990      | 0.976      | 0.953       |
| 400                          | 0.974      | 0.936      | 0.876       |
| 390                          | 0.948      | 0.875      | 0.766       |
| 380                          | 0.885      | 0.736      | 0.542       |
| 370                          | 0.728      | 0.453      | 0.205       |
| 360                          | 0.287      | 0.057      |             |
| 350                          | 0.028      |            |             |
| 340                          |            |            |             |
| 330                          |            |            |             |
| 320                          |            |            |             |
| 310                          |            |            |             |
| 300                          |            |            |             |
| 290                          |            |            |             |
| 280                          |            |            |             |

| 屈折率の温度係数 $dn/dT$ ( $\times 10^{-6}/^\circ\text{C}$ ) |           | アッペ数の温度係数 $d\nu/dT$ ( $\times 10^{-3}/^\circ\text{C}$ ) |       |          |       |       |       |           |          |       |       |           |         |  |  |
|------------------------------------------------------|-----------|---------------------------------------------------------|-------|----------|-------|-------|-------|-----------|----------|-------|-------|-----------|---------|--|--|
| Temperature Coefficient of Refractive Index          |           | Temperature Coefficient of Abbe-number                  |       |          |       |       |       |           |          |       |       |           |         |  |  |
|                                                      | (°C)      | $dn/dT$                                                 |       |          |       |       |       |           |          |       |       | $d\nu/dT$ |         |  |  |
|                                                      |           | $n_h$                                                   | $n_g$ | $n_{F'}$ | $n_F$ | $n_e$ | $n_d$ | $n_{633}$ | $n_{C'}$ | $n_C$ | $n_r$ | $\nu_e$   | $\nu_d$ |  |  |
| $dn/dT$ & $d\nu/dT$ (rel.)                           | -40 / -20 | 5.8                                                     | 4.5   | 3.3      | 3.2   | 2.4   | 2.0   | 1.7       | 1.6      | 1.5   | 1.3   | -2.0      | -2.0    |  |  |
|                                                      | -20 / 0   | 6.2                                                     | 4.8   | 3.6      | 3.4   | 2.5   | 2.1   | 1.8       | 1.8      | 1.7   | 1.4   | -2.1      | -2.1    |  |  |
|                                                      | 0 / 20    | 6.6                                                     | 5.1   | 3.8      | 3.7   | 2.7   | 2.3   | 2.0       | 1.9      | 1.8   | 1.6   | -2.2      | -2.2    |  |  |
|                                                      | 20 / 40   | 6.9                                                     | 5.4   | 4.1      | 3.9   | 2.9   | 2.5   | 2.1       | 2.0      | 2.0   | 1.7   | -2.3      | -2.3    |  |  |
|                                                      | 40 / 60   | 7.3                                                     | 5.7   | 4.3      | 4.1   | 3.1   | 2.6   | 2.2       | 2.2      | 2.1   | 1.8   | -2.3      | -2.3    |  |  |
|                                                      | 60 / 80   | 7.6                                                     | 5.9   | 4.5      | 4.3   | 3.2   | 2.7   | 2.3       | 2.3      | 2.2   | 1.9   | -2.5      | -2.4    |  |  |
|                                                      | 80 / 100  | 7.9                                                     | 6.2   | 4.6      | 4.5   | 3.3   | 2.8   | 2.4       | 2.3      | 2.3   | 2.0   | -2.5      | -2.5    |  |  |
|                                                      | 100 / 120 | 8.2                                                     | 6.3   | 4.7      | 4.6   | 3.4   | 2.9   | 2.4       | 2.4      | 2.3   | 2.0   | -2.6      | -2.6    |  |  |
|                                                      | 120 / 140 | 8.4                                                     | 6.5   | 4.8      | 4.7   | 3.4   | 2.9   | 2.4       | 2.4      | 2.3   | 2.0   | -2.7      | -2.7    |  |  |
|                                                      | 140 / 150 | 8.5                                                     | 6.5   | 4.8      | 4.7   | 3.4   | 2.9   | 2.4       | 2.3      | 2.2   | 1.9   | -2.8      | -2.8    |  |  |
| $dn/dT$ & $d\nu/dT$ (abs.)                           | -40 / -20 | 3.4                                                     | 2.1   | 1.0      | 0.8   | 0.0   | -0.4  | -0.7      | -0.7     | -0.8  | -1.0  | -2.0      | -2.0    |  |  |
|                                                      | -20 / 0   | 4.1                                                     | 2.7   | 1.5      | 1.4   | 0.5   | 0.1   | -0.2      | -0.2     | -0.3  | -0.5  | -2.1      | -2.1    |  |  |
|                                                      | 0 / 20    | 4.8                                                     | 3.3   | 2.1      | 1.9   | 1.0   | 0.6   | 0.3       | 0.2      | 0.1   | -0.1  | -2.2      | -2.2    |  |  |
|                                                      | 20 / 40   | 5.4                                                     | 3.9   | 2.5      | 2.4   | 1.4   | 1.0   | 0.6       | 0.5      | 0.5   | 0.2   | -2.3      | -2.3    |  |  |
|                                                      | 40 / 60   | 5.9                                                     | 4.3   | 2.9      | 2.8   | 1.8   | 1.3   | 0.9       | 0.9      | 0.8   | 0.5   | -2.4      | -2.4    |  |  |
|                                                      | 60 / 80   | 6.4                                                     | 4.7   | 3.3      | 3.1   | 2.0   | 1.6   | 1.2       | 1.1      | 1.0   | 0.8   | -2.5      | -2.5    |  |  |
|                                                      | 80 / 100  | 6.8                                                     | 5.1   | 3.6      | 3.4   | 2.3   | 1.8   | 1.4       | 1.3      | 1.2   | 0.9   | -2.6      | -2.5    |  |  |
|                                                      | 100 / 120 | 7.2                                                     | 5.4   | 3.8      | 3.6   | 2.5   | 1.9   | 1.5       | 1.4      | 1.4   | 1.1   | -2.6      | -2.6    |  |  |
|                                                      | 120 / 140 | 7.5                                                     | 5.6   | 4.0      | 3.8   | 2.6   | 2.0   | 1.6       | 1.5      | 1.4   | 1.1   | -2.7      | -2.7    |  |  |
|                                                      | 140 / 150 | 7.7                                                     | 5.7   | 4.0      | 3.9   | 2.6   | 2.1   | 1.6       | 1.5      | 1.4   | 1.1   | -2.8      | -2.8    |  |  |

| 線膨張係数 $\alpha$ ( $\times 10^{-7}/^\circ\text{C}$ ) |          |
|----------------------------------------------------|----------|
| Coefficient of Thermal Expansion                   |          |
| (°C)                                               | $\alpha$ |
| -40 / -30                                          | 79       |
| -30 / -20                                          | 80       |
| -20 / -10                                          | 82       |
| -10 / 0                                            | 83       |
| 0 / 10                                             | 83       |
| 10 / 20                                            | 84       |
| 20 / 30                                            | 85       |
| 30 / 40                                            | 85       |
| 40 / 50                                            | 85       |
| 50 / 60                                            | 86       |
| 60 / 70                                            | 86       |
| 70 / 80                                            | 86       |
| 80 / 90                                            | 87       |
| 90 / 100                                           | 87       |
| 100 / 110                                          | 87       |
| 110 / 120                                          | 88       |
| 120 / 130                                          | 88       |
| 130 / 140                                          | 89       |
| 140 / 150                                          | 90       |

| 着色度 Coloration Code                              |         |
|--------------------------------------------------|---------|
| $\lambda_{80}(\lambda_{70})/\lambda_5$           | 410/365 |
| 着色度 (内部透過率) Coloration of Internal Transmittance |         |
| $\lambda_{\tau 80}/\lambda_{\tau 5}$             | 392/364 |

| CCI Color Contribution Index |      |
|------------------------------|------|
| CCI (G)                      | 2.14 |
| CCI (R)                      | 2.21 |

| 冷却速度による屈折率の変化 Difference of refractive indices by cooling rate |  |
|----------------------------------------------------------------|--|
| $\beta_C$                                                      |  |
| $\beta_d$                                                      |  |
| $\beta_F$                                                      |  |
| $\beta_g$                                                      |  |

| 備考 Remarks                        |         |         |         |         |         |         |
|-----------------------------------|---------|---------|---------|---------|---------|---------|
| 硝種対照表 Glass Cross Reference Index |         |         |         |         |         |         |
|                                   | HOYA    | SCHOTT  | OHARA   | HIKARI  | SUMITA  | CDGM    |
| Glass_Type                        | E-FD1L  | N-SF1   | S-TIH1  | J-SF1   | K-SFLD1 | H-ZF3   |
| Code                              | 717-295 | 717-296 | 717-295 | 717-296 | 717-295 | 717-295 |

Excel File Name : HOYA20250701M.xlsm