

# FCD615

571-716  $n_d = 1.57144$   $\nu_d = 71.61$  ( 71.609 )  $n_F - n_C = 0.007980$   
 $n_e = 1.57334$   $\nu_e = 71.24$  ( 71.240 )  $n_{F'} - n_{C'} = 0.008048$

| 屈折率 Refractive Index |                |         |
|----------------------|----------------|---------|
|                      | $\lambda$ (nm) |         |
| $n_{1529.6}$         | 1529.60        | 1.55759 |
| $n_{1128.64}$        | 1128.64        | 1.56132 |
| $n_t$                | 1013.98        | 1.56257 |
| $n_s$                | 852.11         | 1.56476 |
| $n_{A'}$             | 768.195        | 1.56626 |
| $n_r$                | 706.519        | 1.56764 |
| $n_C$                | 656.273        | 1.56901 |
| $n_{C'}$             | 643.847        | 1.56940 |
| $n_{633}$            | 632.8          | 1.56976 |
| $n_D$                | 589.294        | 1.57137 |
| $n_d$                | 587.562        | 1.57144 |
| $n_e$                | 546.074        | 1.57334 |
| $n_F$                | 486.133        | 1.57699 |
| $n_{F'}$             | 479.991        | 1.57745 |
| $n_g$                | 435.834        | 1.58132 |
| $n_h$                | 404.656        | 1.58489 |
| $n_i$                | 365.015        | 1.59094 |

| 分散式の定数 Constants of dispersion formula |                             |
|----------------------------------------|-----------------------------|
| $A_0$                                  | 2.4378990                   |
| $A_1$                                  | $-7.0862375 \times 10^{-3}$ |
| $A_2$                                  | $1.1069238 \times 10^{-2}$  |
| $A_3$                                  | $2.6372834 \times 10^{-4}$  |
| $A_4$                                  | $-1.4860741 \times 10^{-5}$ |
| $A_5$                                  | $7.7817112 \times 10^{-7}$  |

| 部分分散 Partial dispersions |          |
|--------------------------|----------|
| $n_C - n_t$              | 0.006447 |
| $n_d - n_C$              | 0.002426 |
| $n_F - n_d$              | 0.005554 |
| $n_g - n_F$              | 0.004324 |
| $n_{C'} - n_t$           | 0.006833 |
| $n_e - n_{C'}$           | 0.003944 |
| $n_{F'} - n_e$           | 0.004104 |
| $n_g - n_{F'}$           | 0.003870 |

| 部分分散比 Partial dispersion rates |        |            |        |
|--------------------------------|--------|------------|--------|
| $P_{C,t}$                      | 0.8079 | $P'_{C,t}$ | 0.8490 |
| $P_{d,C}$                      | 0.3040 | $P'_{d,C}$ | 0.2535 |
| $P_{e,d}$                      | 0.2386 | $P'_{e,d}$ | 0.2366 |
| $P_{F,e}$                      | 0.4574 | $P'_{F,e}$ | 0.5099 |
| $P_{g,F}$                      | 0.5419 | $P'_{g,F}$ | 0.4809 |
| $P_{h,g}$                      | 0.4475 | $P'_{h,g}$ | 0.4437 |
| $P_{i,h}$                      | 0.7578 | $P'_{i,h}$ | 0.7514 |

| 異常分散性 Anomalous dispersions |         |
|-----------------------------|---------|
| $\Delta P_{C,t}$            | -0.0725 |
| $\Delta P_{C,A'}$           | -0.0186 |
| $\Delta P_{g,d}$            | 0.0291  |
| $\Delta P_{g,F}$            | 0.0224  |
| $\Delta P_{i,g}$            | 0.0978  |

| 光弾性定数 Photoelastic Constant |      |
|-----------------------------|------|
| $B$ ( $10^{-12}$ /Pa)       | 0.40 |

| 比重 Specific Gravity |      |
|---------------------|------|
| $d$                 | 4.11 |

| 化学的性質 Chemical Properties |   |
|---------------------------|---|
| $D_W$                     | 1 |
| $D_A$                     | 2 |
| $T_{Blue}$                | 1 |
| $D_{NaOH}$                | 3 |
| $D_{STPP}$                | 2 |
| $D_0$                     | 2 |
| $D_H$                     |   |

| 熱的性質 Thermal Properties             |       |
|-------------------------------------|-------|
| $T_g$ (°C)                          | 520   |
| $T_s$ (°C)                          | 558   |
| $T_{10^{14.5}}$ (°C)                |       |
| $T_{10^{13}}$ (°C)                  |       |
| $T_{10^{7.6}}$ (°C)                 |       |
| $\alpha$ -30/+70°C ( $10^{-7}$ /°C) | 115   |
| $\alpha$ 100/300°C ( $10^{-7}$ /°C) | 138   |
| $\lambda$ [W/(m·K)]                 | 0.612 |
| $C_p$ [kJ/(kg·K)]                   | 0.523 |

| 機械的性質 Mechanical Properties |         |
|-----------------------------|---------|
| $H_K$                       | 370 (4) |
| $F_A$                       | 480     |
| $E$ (GPa)                   | 76      |
| $G$ (GPa)                   | 29.2    |
| $\mu$                       | 0.300   |
| $\sigma_b$ (MPa)            | 51      |

| 内部透過率 Internal Transmittance |            |            |             |
|------------------------------|------------|------------|-------------|
| $\lambda$ (nm)               | $\tau$ 2mm | $\tau$ 5mm | $\tau$ 10mm |
| 2500                         | 0.993      | 0.981      | 0.963       |
| 2400                         | 0.996      | 0.989      | 0.979       |
| 2200                         | 0.997      | 0.993      | 0.986       |
| 2000                         | 0.999      | 0.996      | 0.993       |
| 1800                         | 0.999      | 0.998      | 0.996       |
| 1600                         | 0.999      | 0.999      | 0.998       |
| 1550                         | 0.999      | 0.999      | 0.999       |
| 1500                         | 0.999      | 0.999      | 0.999       |
| 1400                         | 0.999      | 0.999      | 0.999       |
| 1300                         | 0.999      | 0.999      | 0.999       |
| 1200                         | 0.999      | 0.999      | 0.999       |
| 1100                         | 0.999      | 0.999      | 0.998       |
| 1060                         | 0.999      | 0.999      | 0.998       |
| 1050                         | 0.999      | 0.999      | 0.998       |
| 1000                         | 0.999      | 0.999      | 0.997       |
| 950                          | 0.999      | 0.999      | 0.997       |
| 900                          | 0.999      | 0.998      | 0.997       |
| 850                          | 0.999      | 0.998      | 0.996       |
| 830                          | 0.999      | 0.999      | 0.997       |
| 800                          | 0.999      | 0.999      | 0.997       |
| 780                          | 0.999      | 0.999      | 0.998       |
| 750                          | 0.999      | 0.999      | 0.997       |
| 700                          | 0.999      | 0.998      | 0.995       |
| 650                          | 0.999      | 0.999      | 0.997       |
| 600                          | 0.999      | 0.997      | 0.994       |
| 550                          | 0.998      | 0.996      | 0.992       |
| 500                          | 0.999      | 0.998      | 0.996       |
| 480                          | 0.999      | 0.997      | 0.994       |
| 460                          | 0.999      | 0.997      | 0.993       |
| 440                          | 0.998      | 0.996      | 0.992       |
| 420                          | 0.998      | 0.996      | 0.991       |
| 400                          | 0.998      | 0.994      | 0.988       |
| 390                          | 0.996      | 0.990      | 0.980       |
| 380                          | 0.992      | 0.981      | 0.962       |
| 370                          | 0.985      | 0.962      | 0.925       |
| 360                          | 0.966      | 0.917      | 0.841       |
| 350                          | 0.933      | 0.840      | 0.706       |
| 340                          | 0.872      | 0.710      | 0.505       |
| 330                          | 0.774      | 0.526      | 0.277       |
| 320                          | 0.640      | 0.328      | 0.108       |
| 310                          | 0.488      | 0.167      | 0.028       |
| 300                          | 0.332      | 0.063      |             |
| 290                          | 0.212      | 0.021      |             |
| 280                          | 0.116      | 0.005      |             |

| 屈折率の温度係数 $d n / d T$ ( $\times 10^{-6} / ^\circ C$ ) |           |             |        |          |        | アッペ数の温度係数 $d \nu / d T$ ( $\times 10^{-3} / ^\circ C$ ) |        |           |          |        |        |               |         |
|------------------------------------------------------|-----------|-------------|--------|----------|--------|---------------------------------------------------------|--------|-----------|----------|--------|--------|---------------|---------|
| Temperature Coefficient of Refractive Index          |           |             |        |          |        | Temperature Coefficient of Abbe-number                  |        |           |          |        |        |               |         |
|                                                      | (°C)      | $d n / d T$ |        |          |        |                                                         |        |           |          |        |        | $d \nu / d T$ |         |
|                                                      |           | $n_h$       | $n_g$  | $n_{F'}$ | $n_F$  | $n_e$                                                   | $n_d$  | $n_{633}$ | $n_{C'}$ | $n_C$  | $n_r$  | $\nu_e$       | $\nu_d$ |
|                                                      |           | 404.66      | 435.84 | 479.99   | 486.13 | 546.07                                                  | 587.56 | 632.80    | 643.85   | 656.27 | 706.52 | 546.07        | 587.56  |
| $d n / d T$ & $d \nu / d T$ (rel.)                   | -40 / -20 | -4.8        | -5.0   | -5.1     | -5.2   | -5.3                                                    | -5.4   | -5.5      | -5.5     | -5.5   | -5.5   | -3.5          | -3.5    |
|                                                      | -20 / 0   | -5.0        | -5.2   | -5.4     | -5.4   | -5.5                                                    | -5.6   | -5.7      | -5.7     | -5.7   | -5.8   | -3.5          | -3.7    |
|                                                      | 0 / 20    | -5.2        | -5.4   | -5.5     | -5.6   | -5.7                                                    | -5.8   | -5.9      | -5.9     | -5.9   | -5.9   | -3.7          | -3.7    |
|                                                      | 20 / 40   | -5.3        | -5.4   | -5.6     | -5.7   | -5.8                                                    | -5.9   | -6.0      | -6.0     | -6.0   | -6.1   | -3.8          | -3.8    |
|                                                      | 40 / 60   | -5.3        | -5.5   | -5.7     | -5.8   | -5.9                                                    | -6.0   | -6.1      | -6.1     | -6.1   | -6.2   | -3.8          | -3.8    |
|                                                      | 60 / 80   | -5.4        | -5.6   | -5.8     | -5.8   | -6.0                                                    | -6.1   | -6.1      | -6.1     | -6.2   | -6.2   | -4.1          | -4.1    |
|                                                      | 80 / 100  | -5.4        | -5.6   | -5.8     | -5.8   | -6.0                                                    | -6.1   | -6.2      | -6.2     | -6.2   | -6.3   | -4.1          | -4.1    |
|                                                      | 100 / 120 | -5.4        | -5.6   | -5.8     | -5.8   | -6.0                                                    | -6.1   | -6.2      | -6.2     | -6.2   | -6.3   | -4.3          | -4.3    |
|                                                      | 120 / 140 | -5.4        | -5.6   | -5.8     | -5.8   | -6.0                                                    | -6.1   | -6.2      | -6.2     | -6.3   | -6.3   | -4.5          | -4.5    |
|                                                      | 140 / 150 | -5.3        | -5.6   | -5.8     | -5.8   | -6.0                                                    | -6.1   | -6.2      | -6.2     | -6.2   | -6.3   | -4.4          | -4.4    |
| $d n / d T$ & $d \nu / d T$ (abs.)                   | -40 / -20 | -7.0        | -7.2   | -7.3     | -7.3   | -7.5                                                    | -7.5   | -7.6      | -7.6     | -7.6   | -7.6   | -3.4          | -3.4    |
|                                                      | -20 / 0   | -6.9        | -7.1   | -7.2     | -7.2   | -7.4                                                    | -7.4   | -7.5      | -7.5     | -7.5   | -7.6   | -3.5          | -3.5    |
|                                                      | 0 / 20    | -6.8        | -7.0   | -7.1     | -7.1   | -7.3                                                    | -7.4   | -7.4      | -7.4     | -7.4   | -7.5   | -3.6          | -3.6    |
|                                                      | 20 / 40   | -6.7        | -6.9   | -7.0     | -7.1   | -7.2                                                    | -7.3   | -7.3      | -7.4     | -7.4   | -7.4   | -3.8          | -3.8    |
|                                                      | 40 / 60   | -6.6        | -6.8   | -6.9     | -7.0   | -7.1                                                    | -7.2   | -7.3      | -7.3     | -7.3   | -7.4   | -3.9          | -3.9    |
|                                                      | 60 / 80   | -6.5        | -6.7   | -6.9     | -6.9   | -7.0                                                    | -7.1   | -7.2      | -7.2     | -7.2   | -7.3   | -4.0          | -4.0    |
|                                                      | 80 / 100  | -6.4        | -6.6   | -6.8     | -6.8   | -7.0                                                    | -7.1   | -7.1      | -7.1     | -7.2   | -7.2   | -4.2          | -4.2    |
|                                                      | 100 / 120 | -6.3        | -6.5   | -6.7     | -6.7   | -6.9                                                    | -7.0   | -7.1      | -7.1     | -7.1   | -7.1   | -4.3          | -4.3    |
|                                                      | 120 / 140 | -6.2        | -6.4   | -6.6     | -6.6   | -6.8                                                    | -6.9   | -7.0      | -7.0     | -7.0   | -7.1   | -4.4          | -4.4    |
|                                                      | 140 / 150 | -6.1        | -6.3   | -6.5     | -6.6   | -6.8                                                    | -6.9   | -6.9      | -7.0     | -7.0   | -7.0   | -4.5          | -4.5    |

| 線膨張係数 $\alpha$ ( $\times 10^{-7}/^\circ\text{C}$ ) |          |
|----------------------------------------------------|----------|
| Coefficient of Thermal Expansion                   |          |
| (°C)                                               | $\alpha$ |
| -40 / -30                                          | 109      |
| -30 / -20                                          | 111      |
| -20 / -10                                          | 112      |
| -10 / 0                                            | 113      |
| 0 / 10                                             | 114      |
| 10 / 20                                            | 115      |
| 20 / 30                                            | 116      |
| 30 / 40                                            | 116      |
| 40 / 50                                            | 117      |
| 50 / 60                                            | 117      |
| 60 / 70                                            | 118      |
| 70 / 80                                            | 118      |
| 80 / 90                                            | 118      |
| 90 / 100                                           | 119      |
| 100 / 110                                          | 119      |
| 110 / 120                                          | 119      |
| 120 / 130                                          | 119      |
| 130 / 140                                          | 120      |
| 140 / 150                                          | 120      |

| 着色度 Coloration Code                              |         |
|--------------------------------------------------|---------|
| $\lambda_{80}(\lambda_{70})/\lambda_5$           | 365/315 |
| 着色度 (内部透過率) Coloration of Internal Transmittance |         |
| $\lambda_{\tau 80}/\lambda_{\tau 5}$             | 357/314 |
| CCI Color Contribution Index                     |         |
| CCI (G)                                          | 0.26    |
| CCI (R)                                          | 0.20    |

| 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                           | FCD615  |        |       |        |        |      |
| Code                                 | 571-716 |        |       |        |        |      |
| Excel File Name : HOYA20250701M.xlsm |         |        |       |        |        |      |