

## PBM 2R

Code(d) 620364

Code(e) 624361

|                        |                       |                     |       |                              |           |
|------------------------|-----------------------|---------------------|-------|------------------------------|-----------|
| Refractive Index $n_d$ | 1.620 04<br>1.620 040 | Abbe Number $\nu_d$ | 36.41 | Dispersion $n_F - n_C$       | 0.017 031 |
| Refractive Index $n_e$ | 1.624 076             | Abbe Number $\nu_e$ | 36.15 | Dispersion $n_{F'} - n_{C'}$ | 0.017 265 |

| Refractive Indices |           |          |
|--------------------|-----------|----------|
| $\lambda$ (μm)     |           |          |
| $n_{2325}$         | 2.325 42  | 1.584 75 |
| $n_{1970}$         | 1.970 09  | 1.589 65 |
| $n_{1530}$         | 1.529 58  | 1.595 19 |
| $n_{1129}$         | 1.128 64  | 1.600 74 |
| $n_t$              | 1.013 98  | 1.602 82 |
| $n_s$              | 0.852 11  | 1.606 73 |
| $n_{A'}$           | 0.768 19  | 1.609 58 |
| $n_F$              | 0.706 52  | 1.612 28 |
| $n_C$              | 0.656 27  | 1.615 04 |
| $n_{C'}$           | 0.643 85  | 1.615 82 |
| $n_{He-Ne}$        | 0.632 8   | 1.616 56 |
| $n_D$              | 0.589 29  | 1.619 89 |
| $n_d$              | 0.587 56  | 1.620 04 |
| $n_e$              | 0.546 07  | 1.624 08 |
| $n_F$              | 0.486 13  | 1.632 07 |
| $n_{F'}$           | 0.479 99  | 1.633 09 |
| $n_{He-Cd}$        | 0.441 57  | 1.640 66 |
| $n_g$              | 0.435 835 | 1.642 01 |
| $n_h$              | 0.404 656 | 1.650 64 |
| $n_i$              | 0.365 015 |          |

| Constants of Dispersion Formula |                  |
|---------------------------------|------------------|
| $A_1$                           | 1.341 394 22E+00 |
| $A_2$                           | 2.131 855 10E-01 |
| $A_3$                           | 9.832 880 16E-01 |
| $B_1$                           | 9.803 016 69E-03 |
| $B_2$                           | 4.705 870 88E-02 |
| $B_3$                           | 1.174 582 70E+02 |

| Chemical Properties                       |     |
|-------------------------------------------|-----|
| Water Resistance(Powder) Group RW(P)      | 1   |
| Acid Resistance(Powder) Group RA(P)       | 1   |
| Weathering Resistance(Surface) Group W(S) | 2   |
| Acid Resistance(Surface) Group SR         | 1.0 |
| Phosphate Resistance PR                   | 2.0 |

| Mechanical Properties    |       |
|--------------------------|-------|
| Young's Modulus E (GPa)  | 57.8  |
| Rigidity Modulus G (GPa) | 23.6  |
| Poisson's Ratio $\sigma$ | 0.223 |
| Knoop Hardness Hk[Class] | 410 4 |
| Abrasion Aa              | 169   |

| Partial Dispersions |           |
|---------------------|-----------|
| $n_C - n_t$         | 0.012 219 |
| $n_C - n_{A'}$      | 0.005 460 |
| $n_d - n_C$         | 0.005 000 |
| $n_e - n_C$         | 0.009 036 |
| $n_g - n_d$         | 0.021 967 |
| $n_g - n_F$         | 0.009 936 |
| $n_h - n_g$         | 0.008 630 |
| $n_i - n_g$         |           |
| $n_C - n_t$         | 0.013 003 |
| $n_e - n_{C'}$      | 0.008 252 |
| $n_{F'} - n_e$      | 0.009 013 |
| $n_i - n_{F'}$      |           |

| Relative Partial Dispersions |         |
|------------------------------|---------|
| $\theta_{C,t}$               | 0.717 5 |
| $\theta_{C,A'}$              | 0.320 6 |
| $\theta_{d,C}$               | 0.293 6 |
| $\theta_{e,C}$               | 0.530 6 |
| $\theta_{g,d}$               | 1.289 8 |
| $\theta_{g,F}$               | 0.583 4 |
| $\theta_{h,g}$               | 0.506 7 |
| $\theta_{i,g}$               |         |
| $\theta'_{C,t}$              | 0.753 1 |
| $\theta'_{e,C'}$             | 0.478 0 |
| $\theta'_{F',e}$             | 0.522 0 |
| $\theta'_{i,F'}$             |         |

| Anomalous dispersion  |         |
|-----------------------|---------|
| $\Delta\theta_{C,t}$  | 0.000 0 |
| $\Delta\theta_{C,A'}$ | 0.000 6 |
| $\Delta\theta_{g,d}$  | 0.000 7 |
| $\Delta\theta_{g,F}$  | 0.000 8 |
| $\Delta\theta_{i,g}$  |         |

| Coloring              |       |                  |     |
|-----------------------|-------|------------------|-----|
| $\lambda_{80}$        | 445   | $\lambda_5$      | 380 |
| $\lambda_{70}$        |       |                  |     |
| Internal transmission |       |                  |     |
| $\lambda_{0.80}$      | 431   | $\lambda_{0.05}$ | 381 |
|                       |       |                  |     |
| CCI                   |       |                  |     |
| B                     | G     | R                |     |
| 0.00                  | 11.29 | 11.60            |     |

| Internal Transmittance |                  |
|------------------------|------------------|
| $\lambda$ (nm)         | $\tau_i$ (10 mm) |
| 280                    |                  |
| 290                    |                  |
| 300                    |                  |
| 310                    |                  |
| 320                    |                  |
| 330                    |                  |
| 340                    |                  |
| 350                    |                  |
| 360                    |                  |
| 370                    |                  |
| 380                    | 0.04             |
| 390                    | 0.16             |
| 400                    | 0.35             |
| 420                    | 0.70             |
| 440                    | 0.88             |
| 460                    | 0.943            |
| 480                    | 0.968            |
| 500                    | 0.978            |
| 550                    | 0.989            |
| 600                    | 0.993            |
| 650                    | 0.995            |
| 700                    | 0.998            |
| 800                    | 0.999            |
| 900                    | 0.999            |
| 1 000                  | 0.999            |
| 1 200                  | 0.999            |
| 1 400                  | 0.997            |
| 1 600                  | 0.995            |
| 1 800                  | 0.979            |
| 2 000                  | 0.959            |
| 2 200                  | 0.912            |
| 2 400                  | 0.88             |

| Thermal Properties                                               |       |
|------------------------------------------------------------------|-------|
| Strain Point StP (°C)                                            | 374   |
| Annealing Point AP (°C)                                          | 407   |
| Transformation Temperature Tg (°C)                               | 441   |
| Yield Point At (°C)                                              | 485   |
| Softening Point SP (°C)                                          | 579   |
| Expansion Coefficients (-30 °C ~ 70 °C)                          | 84    |
| $\alpha_i$ (10 <sup>-7</sup> K <sup>-1</sup> ) (100 °C ~ 300 °C) | 98    |
| Thermal Conductivity $\lambda$ (W/(m·K))                         | 0.801 |

| Linear coefficient of thermal expansion |                                                |
|-----------------------------------------|------------------------------------------------|
| Temperature range (°C)                  | $\alpha_i$ (10 <sup>-7</sup> K <sup>-1</sup> ) |
| -100 ~ -90                              | 75                                             |
| -90 ~ -80                               | 76                                             |
| -80 ~ -70                               | 77                                             |
| -70 ~ -60                               | 78                                             |
| -60 ~ -50                               | 78                                             |
| -50 ~ -40                               | 79                                             |
| -40 ~ -30                               | 80                                             |
| -30 ~ -20                               | 81                                             |
| -20 ~ -10                               | 81                                             |
| -10 ~ 0                                 | 82                                             |
| 0 ~ 10                                  | 83                                             |
| 10 ~ 20                                 | 84                                             |
| 20 ~ 30                                 | 84                                             |
| 30 ~ 40                                 | 85                                             |
| 40 ~ 50                                 | 86                                             |
| 50 ~ 60                                 | 87                                             |
| 60 ~ 70                                 | 87                                             |
| 70 ~ 80                                 | 88                                             |
| 80 ~ 90                                 | 89                                             |
| 90 ~ 100                                | 90                                             |
| 100 ~ 110                               | 91                                             |
| 110 ~ 120                               | 91                                             |
| 120 ~ 130                               | 92                                             |
| 130 ~ 140                               | 93                                             |
| 140 ~ 150                               | 94                                             |
| 150 ~ 160                               | 94                                             |
| 160 ~ 170                               | 95                                             |
| 170 ~ 180                               | 96                                             |
| 180 ~ 190                               | 97                                             |
| 190 ~ 200                               | 98                                             |
| 200 ~ 210                               | 98                                             |
| 210 ~ 220                               | 99                                             |
| 220 ~ 230                               | 100                                            |
| 230 ~ 240                               | 101                                            |
| 240 ~ 250                               | 102                                            |
| 250 ~ 260                               | 102                                            |
| 260 ~ 270                               | 103                                            |
| 270 ~ 280                               | 104                                            |
| 280 ~ 290                               | 105                                            |
| 290 ~ 300                               | 106                                            |

| Other Properties                                          |      |
|-----------------------------------------------------------|------|
| Photoelastic Constant $\beta$ nm/(cm <sup>3</sup> ·105Pa) | 2.82 |
| Specific Gravity $d$                                      | 3.59 |
| Remarks                                                   |      |

| Temperature Coefficients of Refractive Index |                                                                 |     |     |     |     |     |     |     |     |     |     |   |
|----------------------------------------------|-----------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| Range of Temperature (°C)                    | $\Delta n_{rel} / \Delta T$ (10 <sup>-6</sup> K <sup>-1</sup> ) |     |     |     |     |     |     |     |     |     |     |   |
|                                              | 1550                                                            | t   | r   | C   | C'  | d   | e   | F   | F'  | g   | h   | i |
| -80 ~ -60                                    | 1.2                                                             | 1.4 | 1.9 | 2.1 | 2.2 | 2.6 | 2.8 | 3.5 | 3.6 | 4.4 | 5.4 | - |
| -60 ~ -40                                    | 1.2                                                             | 1.5 | 2.0 | 2.2 | 2.3 | 2.6 | 2.9 | 3.6 | 3.7 | 4.6 | 5.5 | - |
| -40 ~ -20                                    | 1.3                                                             | 1.6 | 2.2 | 2.4 | 2.4 | 2.7 | 3.0 | 3.7 | 3.8 | 4.8 | 5.7 | - |
| -20 ~ 0                                      | 1.4                                                             | 1.7 | 2.4 | 2.6 | 2.6 | 2.9 | 3.3 | 4.0 | 4.1 | 5.0 | 5.9 | - |
| 0 ~ 20                                       | 1.7                                                             | 2.0 | 2.6 | 2.7 | 2.8 | 3.1 | 3.5 | 4.2 | 4.3 | 5.3 | 6.3 | - |
| 20 ~ 40                                      | 1.9                                                             | 2.2 | 2.8 | 3.0 | 3.0 | 3.4 | 3.7 | 4.4 | 4.5 | 5.6 | 6.6 | - |
| 40 ~ 60                                      | 2.0                                                             | 2.3 | 2.9 | 3.1 | 3.2 | 3.6 | 4.0 | 4.8 | 4.9 | 5.8 | 6.8 | - |
| 60 ~ 80                                      | 2.2                                                             | 2.5 | 3.2 | 3.4 | 3.4 | 3.8 | 4.2 | 4.9 | 5.0 | 6.0 | 7.0 | - |
| 80 ~ 100                                     | 2.4                                                             | 2.7 | 3.4 | 3.6 | 3.6 | 4.0 | 4.4 | 5.2 | 5.3 | 6.3 | 7.3 | - |
| 100 ~ 120                                    | 2.5                                                             | 2.8 | 3.5 | 3.7 | 3.8 | 4.1 | 4.5 | 5.3 | 5.4 | 6.4 | 7.5 | - |
| 120 ~ 140                                    | 2.6                                                             | 2.9 | 3.6 | 3.8 | 3.9 | 4.3 | 4.6 | 5.5 | 5.6 | 6.6 | 7.7 | - |
| 140 ~ 160                                    | 2.6                                                             | 3.0 | 3.6 | 3.9 | 3.9 | 4.3 | 4.7 | 5.6 | 5.7 | 6.7 | 8.0 | - |
| 160 ~ 180                                    | 2.6                                                             | 3.0 | 3.8 | 4.0 | 4.1 | 4.4 | 4.8 | 5.7 | 5.8 | 6.9 | 8.0 | - |

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