

Release Film Grades and Physical Properties

| Item | | | Single-layer film | | | | Multi-layer film | | |
|--|-------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Grade | | X-44B | | X-88B | X-88BMT4 | CR1012 | CR1012MT4 | CR2031MT4 |
| | Thickness | | 25μm | 50μm | 50μm*1 | 50μm*1 | 150μm | 150μm | 120μm |
| | Unit | Test method | Untreatment surface | Untreatment surface | Untreatment surface | Both sides embossed | Untreatment surface | Both sides embossed | Both sides embossed |
| | Surface treatment | (gloss) | (gloss) | (gloss) | (both sides matte) | (gloss) | (both sides matte) | (both sides matte) | |
| Tensile modulus (MD) | MPa | ASTM D882 | 1650 | 1650 | 2100 | 2000 | 1200 | 1200 | 1400 |
| Yield point strength (MD) | MPa | ASTM D882 | 26 | 25 | 30 | 29 | 20 | 19 | 22 |
| Tensile strength (MD) | MPa | ASTM D882 | 40 | 30 | 33 | 32 | 22 | 23 | 26 |
| Elongation at break point (MD) | % | ASTM D882 | 100 | 100 | 60 | 50 | 160 | 160 | 120 |
| Softening temperature | °C | Mitsui Chemicals Tohcello method*2 | 47 | 47 | 52 | 52 | 42 | 42 | 46 |
| Dimensional change rate after heating (MD) | % | Mitsui Chemicals Tohcello method*3 | 2.1 | 1.4 | 1.6 | -0.6 | 0.7 | 0 | -1.6 |
| Dimensional change rate after heating (TD) | % | Mitsui Chemicals Tohcello method*3 | -1.8 | -0.9 | -1.1 | 0.3 | -1 | -0.4 | 0.5 |
| Water absorption rate | % | ASTM D570 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dielectric constant (12GHz) | - | ASTM D150 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| Dielectric tangent (12GHz) | - | ASTM D150 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

*1 100μm thick film is also available.

*2 Softening temperature is the temperate at which the tensile modulus reaches 300 MPa.

*3 Involves heating a film specimen in an oven, cooling it to room temperature, and then measuring its dimensions.

Specimen; 300mm X 300mm; Heating conditions; 170°C for 30 min.

Dimensional change ratio after heating = (dimensions after heating - original dimensions) /original dimensions X 100