

## TUFFAK Lumen XT polycarbonate sheet

### LIGHT DIFFUSING

TUFFAK Lumen XT sheet is a translucent polycarbonate product with a textured surface on one side specifically designed for lighting lenses. It features a unique combination of high light diffusion and high light transmission through a combination of optimized surface texture and advanced diffuser technologies.

When compared to other light diffusing products such as glass and acrylic, TUFFAK Lumen XT sheet has superior impact strength and toughness. Its higher flammability resistance and wider service temperature range provide an additional performance advantage over acrylic diffusers.

The wide range of standard diffusion levels offers designers the flexibility to maximize light fixtures' aesthetics and performance. Other surface textures are available for additional design options.

### APPLICATIONS

Interior LED and conventional lighting fixtures

### Regulatory code compliance and certifications

UL 94: Flammability File #E87887

### Typical Properties\*

| Property  | Test Method | Units                         | Values                  |
|---|-------------|-------------------------------|-------------------------|
| <b>PHYSICAL</b>                                 |             |                               |                         |
| Specific Gravity                                | ASTM D 792  | -                             | 1.2                     |
| Water Absorption, 24 hrs                        | ASTM D 570  | %                             | 0.15                    |
| Poisson's Ratio                                 | ASTM E 132  | -                             | 0.38                    |
| Light Transmission                              |             |                               |                         |
| LC0 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 91 / 90                 |
| LC3 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 90 / 85                 |
| LC5 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 88 / 77                 |
| LC7 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 79 / 62                 |
| LW3 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 93 / 90                 |
| LW5 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 90 / 81                 |
| LW7 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 82 / 67                 |
| LW9 @ 0.060" / 0.118"                           | ASTM D 1003 | %                             | 73 / 55                 |
| <b>MECHANICAL</b>                               |             |                               |                         |
| Tensile Strength, Ultimate                      | ASTM D 638  | psi                           | 9,540                   |
| Tensile Strength, Yield                         | ASTM D 638  | psi                           | 8,840                   |
| Tensile Modulus                                 | ASTM D 638  | psi                           | 335,000                 |
| Elongation                                      | ASTM D 638  | %                             | 94                      |
| Flexural Strength                               | ASTM D 790  | psi                           | 14,200                  |
| Flexural Modulus                                | ASTM D 790  | psi                           | 362,000                 |
| Instrumented Impact @ 0.118"                    | ASTM D 3763 | ft-lbs                        | 49                      |
| <b>THERMAL</b>                                  |             |                               |                         |
| Coefficient of Thermal Expansion                | ASTM D 696  | in/in/°F                      | 3.75 x 10 <sup>-5</sup> |
| Coefficient of Thermal Conductivity             | ASTM C 177  | BTU-in/hr-ft <sup>2</sup> -°F | 1.35                    |
| Heat Deflection Temperature @ 264 psi           | ASTM D 648  | °F                            | 274                     |
| Heat Deflection Temperature @ 66 psi            | ASTM D 648  | °F                            | 287                     |
| <b>ELECTRICAL</b>                               |             |                               |                         |
| Dielectric Constant @10 Hz                      | ASTM D 150  | -                             | 2.98                    |
| Dielectric Constant @ 60 Hz                     | ASTM D 150  | -                             | 2.88                    |
| Volume Resistivity                              | ASTM D 257  | Ohm-cm                        | >8 x 10 <sup>15</sup>   |
| Dissipation Factor @ 60 Hz                      | ASTM D 150  | -                             | 0.002                   |
| Arc Resistance, Tungsten Electrodes             | ASTM D 495  | Seconds                       | 125                     |
| Dielectric Strength, in air @ 0.118"            | ASTM D 149  | V/mil                         | 460                     |
| <b>FLAMMABILITY</b>                             |             |                               |                         |
| Flame Class @ 0.060" - 0.118"                   | UL 94       | -                             | V2                      |
| Horizontal Burn                                 | ASTM D 635  | in.                           | <1 (CC1)                |
| Surface Flammability @ 0.060" - 0.118"          | ASTM E 162  | Is                            | <100                    |
| Smoke Density @1.5 min                          | ASTM E 662  | Ds                            | <100                    |
| @ 4 min   |             |                               | <200                    |
| @ 20 min  |             |                               | <200                    |
| Vertical Burn @ 12 sec @ 0.060" - 0.118"        | FAR 25.853  | -                             | Pass                    |
| Horizontal Burn @ 2.5" & 4.0" @ 0.060" - 0.118" | FAR 25.853  | -                             | Pass                    |
| Toxic Gas Generation @ 0.060" - 0.118"          | BSS 7239    | -                             | Pass                    |
|   | SMP 800-C   | -                             | Pass                    |

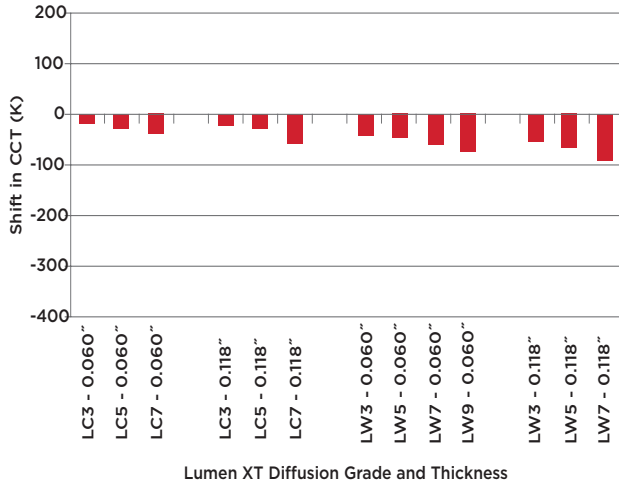
\*Typical properties are not intended for specification purposes

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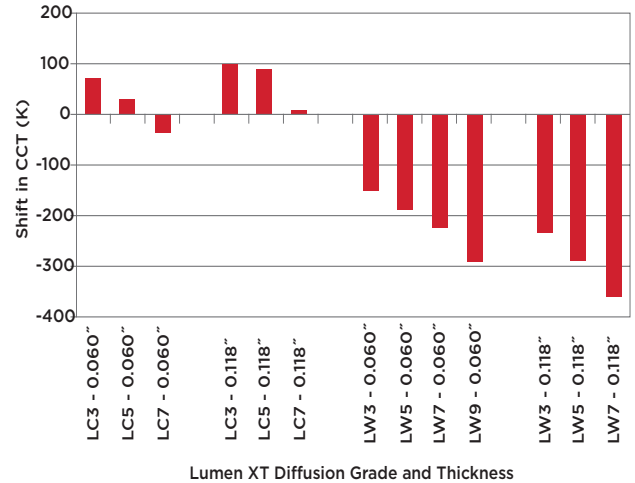
## Diffusion and Transmission

| Lumen XT Grade | DIFFUSION (FWHM, degrees) |                  | % TRANSMISSION (ASTM D 1003) |                  |
|----------------|---------------------------|------------------|------------------------------|------------------|
|                | 0.060" thickness          | 0.118" thickness | 0.060" thickness             | 0.118" thickness |
| LC0            | 14                        | 13               | 91                           | 90               |
| LC3            | 38                        | 53               | 90                           | 85               |
| LC5            | 53                        | 77               | 88                           | 77               |
| LC7            | 86                        | 135              | 79                           | 62               |
| LW3            | 38                        | 53               | 93                           | 90               |
| LW5            | 53                        | 77               | 90                           | 81               |
| LW7            | 86                        | 135              | 82                           | 67               |
| LW9            | 146                       | 166              | 73                           | 55               |

**Correlated Color Temperature Shift for a 3000 K LED**



**Correlated Color Temperature Shift for a 6000 K LED**



These graphs show measured shifts in Correlated Color Temperature (CCT) of light from an LED light fixture with a diffuser sheet vs. the same LED fixture without a diffuser. The LED fixtures' CCT without a diffuser is 3000 K and 6000 K.

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**PLASKOLITE**

400 Nationwide Blvd, Suite 400  
Columbus, OH 43215  
800.848.9124 • Fax: 877.538.0754  
plaskolite@plaskolite.com  
www.plaskolite.com