

3M Optical Systems



Thin Brightness Enhancement Film (TBEF) 90/24



A Thinner Solution for Handheld Displays



Vikuiti™ Thin Brightness Enhancement Film (TBEF) 90/24 provides maximum display brightness toward the on-axis viewer, which can be converted into power savings and longer battery life. The film achieves this by using a microreplicated prismatic structure to control the exit angle of light.

Vikuiti TBEF 90/24 can be used as a single sheet or two sheets crossed at 90 degrees to each other. It is designed for use with various backlight systems and may also be combined with a Vikuiti™ Reflective Polarizer such as Dual Brightness Enhancement Film—Matte (DBEF-M) for further increased luminance. To maximize the increase in brightness Vikuiti TBEF 90/24 may also be combined with Vikuiti™ Enhanced Specular Reflector (ESR).

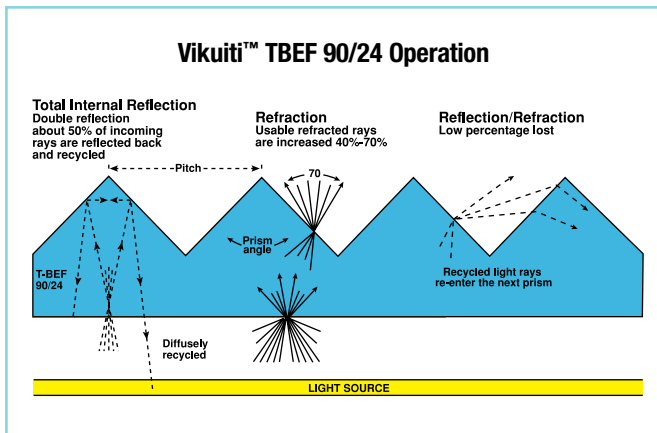




Vikuiti™ Thin Brightness Enhancement Film (TBEF) 90/24

How it works

Vikuiti TBEF employs two principles—refraction and reflection—to increase the efficiency of your backlight. Vikuiti TBEF refracts light within the viewing cone (up to 35° off the perpendicular) toward the viewer. Light outside this angle is reflected back and recycled until it exits at the proper angle.

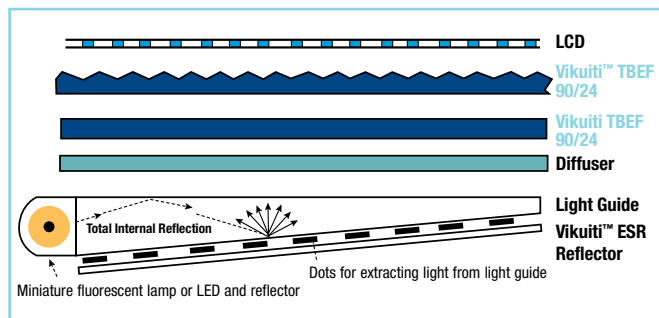


Nominal film properties

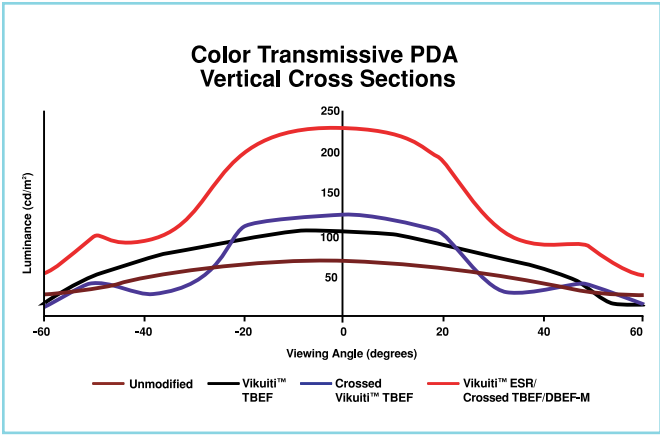
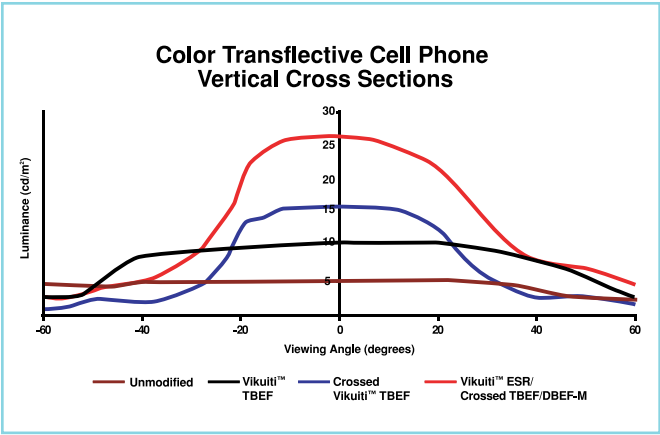
| Film properties | Vikuiti™ TBEF 90/24 |
|----------------------------------|---------------------|
| Physical Characteristics: | |
| • Thickness (ASTM D2103) | 62µm (2.44 mils) |
| • Prism Angle | 90° |
| • Prism Pitch | 24µm (0.9 mils) |

The technical data for the products are typical, based on information accumulated during their life, and are not to be used in the generation of purchase specifications, which define property limits rather than typical performance.

Vikuiti™ TBEF 90/24 in a LCD display



Brighter
brighter



| | On-Axis Luminance (cd/m ²) | Peak Luminance (cd/m ²) | Integrated Intensity (lm/m ²) |
|----------------------------------|--|-------------------------------------|---|
| Film Stack PDA | | | |
| Unmodified | 68 | 86 | 126 |
| Vikuiti™ TBEF | 104 | 116 | 127 |
| Crossed Vikuiti™ TBEF | 124 | 129 | 112 |
| Vikuiti™ ESR/Crossed TBEF/DBEF-M | 230 | 240 | 412 |
| Film Stack Cell Phone | | | |
| Unmodified | 5.3 | 5.7 | 9.1 |
| Vikuiti™ TBEF | 10.6 | 11.4 | 13.1 |
| Crossed Vikuiti™ TBEF | 15.8 | 16.8 | 11.6 |
| Vikuiti™ ESR/Crossed TBEF/DBEF-M | 26.2 | 27.2 | 23.0 |

Environmental test results

| Environments | Delta, Δx | Delta, Δy | Delta Gain |
|--|-----------|-----------|------------|
| Cold Temperature, (-40°C) for 1,000 hours | 0.002 | 0.002 | 0.006 |
| High Temperature/High Humidity, (65°C at 95% RH) for 1,000 hours | 0.004 | 0.003 | 0.01 |
| High Temperature, (85°C) for 1,000 hours | 0.003 | 0.002 | 0.009 |



Important Notice to Purchaser

The following is made in lieu of all warranties, express or implied, including any implied warranties of merchantability or fitness for a particular purpose. 3M warrants that, at the time of shipment, product will meet 3M's published specification or that specification agreed in writing between 3M and purchaser. Should product not meet specifications at time of shipment, 3M will replace or refund the purchase price of such quantity of the product found not to meet specifications. Purchaser shall determine the suitability of the 3M product for purchaser's application. 3M shall not be liable under any legal theory, including in contract or in tort, for any injury, loss, or damage, whether direct, indirect, incidental, special or consequential, arising out of the use of or the inability to use the product. **The warranties and remedies set forth herein are purchaser's sole and exclusive warranties and remedies.**

3M

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