The Light Diffuser from Freudenberg is an efficient surface and volume diffuser with low area weight and material thickness. In contrast to conventional light diffuser films and plates, our special process overlays very fine polyester fibers in a crossing pattern creating a highly-uniform, multi-layer diffuser. Due to this innovative construction, collimated or irregular incoming light is refracted by individual fibers which spreads the light over the material’s surface. In cases where there is a short distance to a light source the Light Diffuser from Freudenberg is able to hide unwanted hotspots effectively. The result is a homogeneously lit surface which is needed to achieve a high quality luminaire system.

**FPLD 85**

<table>
<thead>
<tr>
<th>DATA</th>
<th>PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>85 g/m²</td>
</tr>
<tr>
<td>Thickness</td>
<td>0,12 mm</td>
</tr>
<tr>
<td>Achievable system efficiency (direct-lit systems)</td>
<td>&gt;80%*</td>
</tr>
<tr>
<td>Achievable system efficiency (edge-lit systems)</td>
<td>&gt;90%*</td>
</tr>
<tr>
<td>Haze</td>
<td>100%**</td>
</tr>
<tr>
<td>Product width</td>
<td>Up to 2.000 mm</td>
</tr>
</tbody>
</table>

* according to EN 13032-1:2012-06   **according to ASTM D1003
Application of Light Diffuser from Freudenberg in direct-lit systems (on example of a typical LED-Downlight)

**CONSTRUCTION WITHOUT DIFFUSER**

**CONSTRUCTION WITH FPLD 85**

**SYSTEM EFFICIENCY IN A TYPICAL LED-DOWNLIGHT: 81%**

**LIGHT DISTRIBUTION CURVE WITHOUT DIFFUSER**

**LIGHT DISTRIBUTION CURVE WITH FPLD 85**

Measurement of light distribution and luminance according to EN 13032-1:2012-06
Application of **Light Diffuser from Freudenberg** in edge-lit systems (on example of a typical LED-panel)

**CONSTRUCTION WITHOUT DIFFUSER**

- Light guide plate
- Reflector
- LED
- Prism film

**CONSTRUCTION WITH FPLD 85**

- Light guide plate
- Reflector
- LED
- FPLD 85
- Prism film

**System efficiency in a typical LED-panel: 91%**

**LIGHT DISTRIBUTION CURVE WITHOUT DIFFUSER**

- Vertical axis (0°-180°)
- Horizontal axis (90°-270°)

- 2201 lm

**LIGHT DISTRIBUTION CURVE WITH FPLD 85**

- Vertical axis (0°-180°)
- Horizontal axis (90°-270°)

- 1999 lm

Measurement of light distribution and luminance according to EN 13032-1:2012-06
Comparison of light diffusion performance of FPLD 85 and conventional diffusers

In the table below you will find false color images taken with a luminance camera in our laboratory. The images show the light-emitting surface of a direct-lit LED light box in combination with FPLD 85, a conventional light diffuser film and plate. The distance of the LEDs to each other (=LED pitch) in each case is 33 mm while distance from LED to the diffuser (construction depth) is 16.5 mm (ratio 1:0.5) and 33 mm (ratio 1:1).

<table>
<thead>
<tr>
<th>COMPARISON</th>
<th>FPLD 85</th>
<th>PMMA DIFFUSER FILM</th>
<th>PMMA LIGHT DIFFUSER PLATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>0.12 mm</td>
<td>0.5 mm</td>
<td>3 mm</td>
</tr>
</tbody>
</table>
| LED pitch: 33 mm  
Constr. depth: 16.5 mm (ratio 1:0.5) | ![Image](image1) | ![Image](image2) | ![Image](image3) |
| LED pitch: 33 mm  
Constr. depth: 33 mm (ratio 1:1) | ![Image](image4) | ![Image](image5) | ![Image](image6) |

FPLD 85 – Solution in several luminaire systems

Direct-lit luminaire systems (e.g. LED downlights):
– Challenge: Most diffuser films and plates need a relatively large distance to the light source to eliminate hotspots
– Solution: FPLD 85 eliminates the hotspots at minimum distance due to its high diffusion performance
– Result: Slim luminaire design and saving in material of frame and reflector

Edge-lit luminaire systems (e.g. LED panels):
– Challenge: Light is typically decoupled asymmetrically and irregularly from light guide plates
– Solution: FPLD 85 homogenizes the light output effectively and facilitates system efficiencies of > 90% compared to systems without diffuser
– Result: Slim luminaires with high optical quality and even light distribution curve

Luminaire systems with light management films (e.g. prism films):
– Challenge: Microstructured films need an evenly lit surface to create an uniformly collimated light output
– Solution: FPLD 85 spreads irregularly incoming light evenly on the whole light surface and ensures a smooth coupling of light into the structured film
– Result: Effective and homogeneous light management for sophisticated luminaire systems

All information in this brochure are based on experience and present the current status of our knowledge. The technical data provided are mean values. All previous issues will be replaced by this version. All previous issues are invalid.

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