Light Shaping Diffusers®

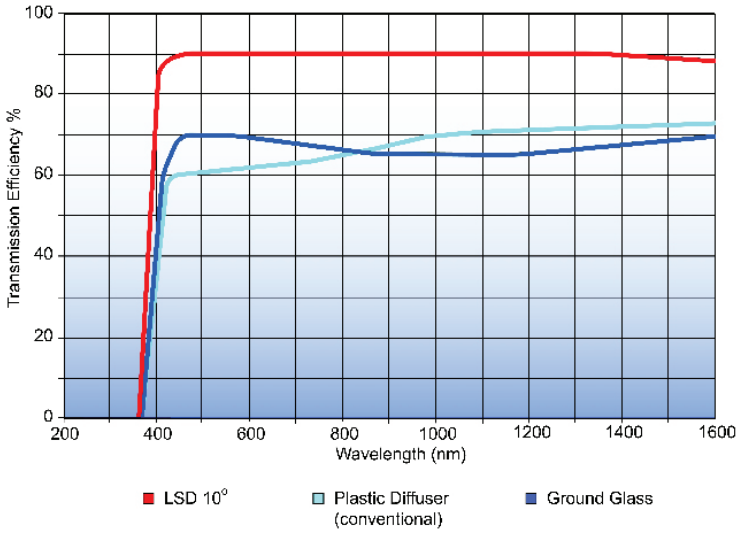
Technical Data Sheet

Holographic **Light Shaping Diffusers®** or **LSD®** are holographically recorded, randomized surface structures which enable:

High Transmission Efficiency - 92%

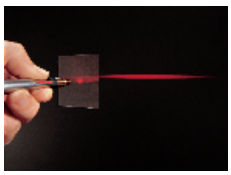
Luminit's holographic Light Shaping Diffusers offer superior optical transmission between 200nm and 1500nm. Depending on the angle of distribution, LSDs will achieve between 85% and 92% transmission efficiency. The low back-scatter of LSD structures are anti-reflective in nature and utilize light that would otherwise be wasted due to Fresnel loss.

A clear piece of polycarbonate substrate is 89% transmissive. With LSD, transmission improves to 92%. Note: Luminit measures transmission utilizing an integrated sphere with the LSD structure incident to the light source. Listed are the transmission efficiencies of a 10° LSD measured at the following wavelengths: 532nm-90%, 632nm-90%, 850nm-89%, 980nm-89%, 1064nm-89%, 1550nm-88%. (UV Transmitting Diffusers are also available.)



Beam Shaping

LSDs precisely shape, control and distribute light. The patented holographic master recording process, allows a variety of circular or elliptical light patterns. Standard circular angles range from 0.5° to 80° FWHM. A wide variety of standard elliptical angles are available from 0.2°x10° to 95°x35°.



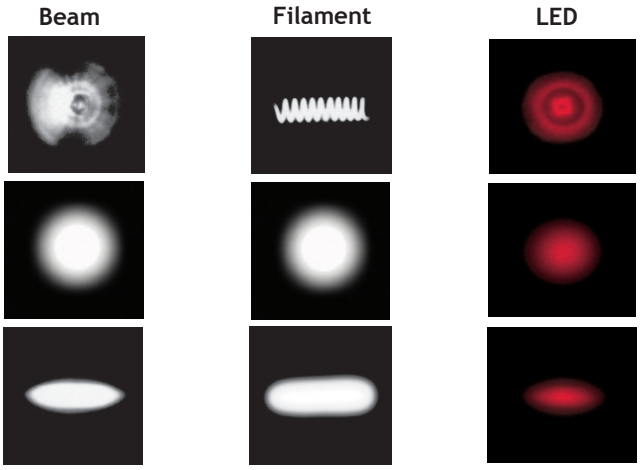
Laser Source
40°x 0.2° FWHM Linear

LED Source
20° FWHM Circular

Filament Source
60°x 10° FWHM Elliptical

Homogenized Light

"Hotspots" and uneven light distribution are common problems with filament, arc, LED, CCFL, fiberoptic and laser light sources. LSDs greatly smooth and homogenize sources while providing uniform light in critical applications such as LCD backlights, LED displays, machine vision, automotive lighting and viewing screens. Large angle LSDs produce the greatest degree of homogenized light.

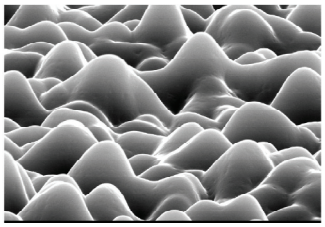


LSD Applications

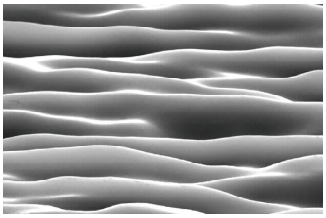
- LCD Backlighting
- LED Display
- Projection Systems
- Signs and Displays
- Machine Vision Inspection
- Front Projection Screens
- Rear Projection Screens
- Mobile Phones & PDA's
- Projection Systems
- Barcode Scanners
- Inspection Systems
- Set/Event Lighting
- Microscopic Illumination
- Fiberoptic Illumination
- Medical Instrumentation
- Architectural Displays

How Holographic LSDs® Work

- LSD surface relief holograms are replicated from a holographically recorded master.
- The completely random, non-periodic structures can be thought of as randomized micro-lenslets.
- LSDs are non-wavelength dependent and will work in white, monochromatic, coherent or incoherent light.
- LSDs diverge light, emulating a negative lens.
- LSDs work best with collimated light, but will also work well with non-collimated light.
- The randomized structures eliminate Moiré and color diffraction.
- Incoming light is precisely controlled within well defined areas. Light does not escape these boundaries, resulting in greater control and utilization of light, thus maximizing photon utilization.
- LSDs provide greater photon density compared to other diffusers, making LSDs very suitable for high ambient or highly efficient light conditions.



60° LSD
SEM Structure 1500x



60°x10° Elliptical LSD
SEM Structure 1000x

What You Need To Know

1. All LSD angles are FWHM.
2. Large angle LSDs, when placed at the image plane, make excellent high resolution viewing screens.
3. LSDs can be combined with polarizers, as the holographic surface structure does not affect polarization.
4. LSDs can be combined with other optical components such as lenses, Fresnels, and prismatic structures.
5. In selecting LSD angles, location and light source must be considered. Call for assistance.
6. $\text{Effective Angular Output} \approx \sqrt{(\text{light source angle})^2 + (\text{LSD angle})^2}$

LSD Notes and Optical Properties

LSD Angle Range FWHM	Circular: 0.5° to 95° Elliptical: minor 1° to 60° major 10° to 95°
Transmission Effiency	Circular: 0.2° to 20° ≥ 90% 20° to 80° ≥ 85% Elliptical: ≥ 85%
Angle Tolerance (Based on 10”x10” area)	≤ 1° ± 0.5° (>1° ≤ 10°) ± 1° > 10° ± 10%
Transmission Spectral Range	400nm to 1600nm

Temperature Range	-30°C to 80°C @ 240 hrs
Humidity	>95% ± 5% RH @ 24 hrs
Refractive Index	PC=1.586; PE=1.51; AC=1.494; Epoxy=1.50
Pencil Hardness	~2H
Yellow Index	0.3% glass exposure (600 hrs) 2.6% direct exposure (600 hrs)
Adhesion	100% - Crosshatched adhesion test ASTM-D3359
Laser Damage	PC=0.22 J/cm²; PE=0.2 J/cm²; AC=0.17 J/cm² @ 1064nm, 10 ns pulse

Note that all specifications contained herein are subject to change without notice

Luminit™
SHAPING LIGHT AS NEEDED

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