

## USING LUMINAIRE PHOTOMETRY CHARTS

All photometric performance listed is based on measured data. Light levels are measured in footcandles using 10-foot lengths of fiber. The beam angles shown are the zoom limits for each luminaire.

A luminaire can be zoom focused to any size between the two extremes. At all beam angles in the zoom range, the beams are perfect, uniform circles of light with no dark holes or aberrations. The zoom range shown may be exceeded slightly, but the beam patterns will be imperfect.

Light levels in footcandles are listed in black and gray. The **BLACK FOOTCANDLE LEVELS** show luminaire performance on a 10-foot length of fiber with a CLDN-HP COLD-NOSE® projector and the power supply on "HI." The **GRAY FOOTCANDLE LEVELS** show luminaire output on "LO."

FC IN BLACK  
FC IN GRAY

Output on "HI" power supply setting with HIGH PERFORMANCE COLD-NOSE PROJECTOR  
Output on "LO" power supply setting with HIGH PERFORMANCE COLD-NOSE PROJECTOR

- 1) Look at the charts for the desired distance from the luminaire to the artifact.
- 2) Find the desired footcandle level and beam size you need on the chart.
- 3) Interpolate the footcandle level you will have for the luminaire beam size.

**Photometric charts are used in three easy steps:**

**Start with the SPOT chart on 9-4. If you want a brighter, smaller beam, turn to the PINSPOT chart on page 9-5. If you want a larger, less intense beam, turn to the FLOOD chart on page 9-3.**

**Once you pick a flood, spot, pinspot, close-up, or multiple power luminaire by beam performance, you can select a mounting type from the list of that family of luminaires above the photometry data. For more specification detail go to the body of the catalog.**

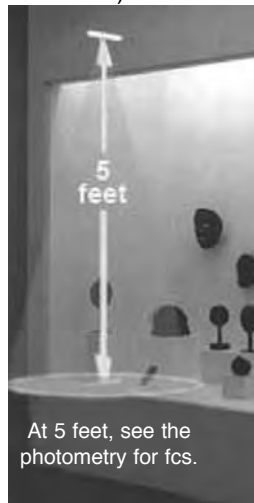
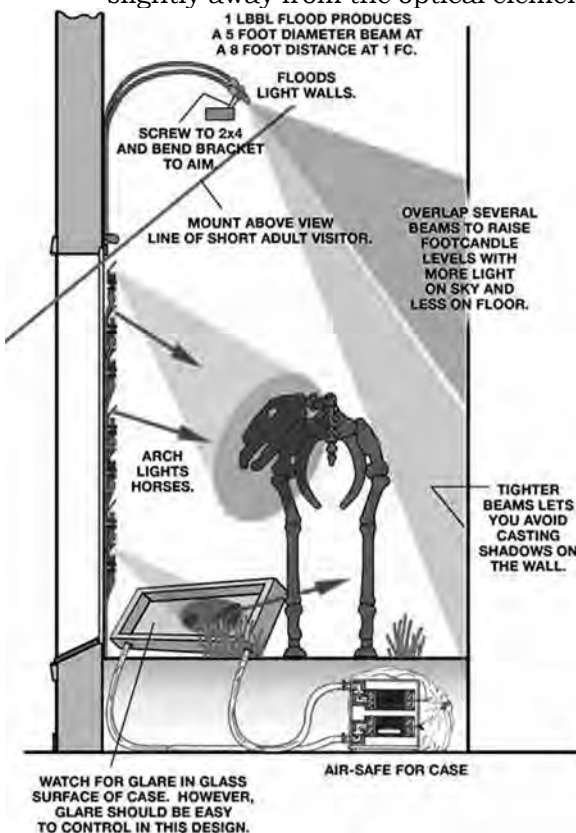
**Footcandle levels can be increased** by using two or more adjacent fixtures with overlapping or superimposed beams, by changing to a luminaire with more power (larger fiber, greater number of fibers or tighter focus), by zooming to a tighter beam, or by shortening extremely long fiber runs.

**Footcandle levels can be decreased** by zooming the fixture to a wider diameter beam within the zoom range, changing to a luminaire with less power (miniature fiber or wider focus), by inserting REM Filters to match reflected color, by using a DIMMER-SPLICE™ Connector to dim the beam, or by backing the fiber slightly away from the optical element in the projector bushing. Long lengths of fiber will also dim the beam by approximately 0.7% per foot for 3mm (1/8") fiber and 1.0% per foot for 1mm (.040") diameter fiber. (Extremely, overly long lengths may result in a color shift.) See the chart on the opposite page.

This is a very user-friendly system. **Simply point, see, adjust and then install permanently.** For either a lighting expert or a layman, NoUVIR fiber optic luminaires are unique tools. These lights will do things impossible with other types of lighting.

Though the following charts are at 10 feet of fiber, fibers of 20 and 30 feet are common. Fiber can run 50-feet with a minor shift in color. (A NoUVIR projector will illuminate through an entire 500' roll of fiber.) But be sure to calculate the cost difference between long fibers and a second projector system. Adding a projector often saves money over stretching an installation with long fiber runs. When using a partially filled bushing, use short stubs of fiber to hold space in the bushing for more fiber should the exhibit design change and to keep all of the fiber aligned.

Note that on each photometry page there is a list of fiber optic luminaires, all with identical optical properties. The different is only with respect to the mounting, aiming and application. The photometry is the same. Every optical beam type from flood to pinspot comes in a huge variety of configurations to meet your needs from downlights to eyeballs, bracket-mounts to tracklights.



At 5 feet, see the photometry for fcs.

## PROCEDURAL GUIDE FOR FIBER OPTICS ESTIMATION

DESIRED FOOTCANDLES	10fc	5fc	2.5fc	1.25fc
<b>APPLICATION</b>	<b>OIL</b>	<b>WATER</b>	<b>TEXTILES,</b>	<b>FLOORS,</b>
<b>FIBER</b>	<b>PAINTINGS</b>	<b>COLORS</b>	<b>DOCUMENTS</b>	<b>CARPETS</b>
<b>COVERAGE</b>	<b>1.5 ft<sup>2</sup>/fiber</b>	<b>3 ft<sup>2</sup>/fiber</b>	<b>6 ft<sup>2</sup>/fiber</b>	<b>24 ft<sup>2</sup>/fiber</b>
	(16" DIA. BEAM)	(24" DIA. BEAM)	(32" DIA. BEAM)	(64" DIA. BEAM)
<b>LUMINAIRE</b>	<b>ZDSL</b>	<b>ZDSL</b>	<b>ZDSL</b>	<b>LBRL</b>
<b>TYPES</b>	<b>ZDSA</b>	<b>ZDSA</b>	<b>ZDSA</b>	<b>LBRA</b>
<b>FOL's</b>	<b>ZDPL</b>	<b>ZDPL</b>		

**PROCEDURE:**

- 1) Estimate total area for each application. Look at OBJECTS, not the size of the space.
- 2) Calculate total fibers required for each application.
- 3) Add up total fibers for all applications.
- 4) Assumes standard reflectances: Ceiling: 80%, Walls: 50%, Floor: 20%, Combined: 150% (Different totals will require adjustments.)
- 5) Assumes 10 foot fiber lengths. See chart below for longer lengths.
- 6) Divide total fibers by 32 to determine number of fiber optic systems.  
Specify one CLDN-SYS projector with its power supply system for every 32 fibers.

### FOOTCANDLE LOSS PER FOOT OF FIBER

A standard fiber can light 50 feet or more from the projector. Transmission losses of NoUVIR Acrylic fiber are only 0.7%/foot. **At 10 feet**, a luminaire will produce **100%** of what is in the photometry section.

<b>At 20 feet</b>	<b>93%</b>
<b>At 30 feet</b>	<b>86%</b>
<b>At 40 feet</b>	<b>79%</b>
<b>At 50 feet</b>	<b>72%</b>

Even at just \$1.00 a foot, fiber costs do add up when multiplied by a number of fibers. Balance fiber cost against projector costs. Running 16 of the 32 fibers in a projector more than 35 feet to a second case or exhibit is usually more expensive than using two projectors with 16 shorter fibers in each unit. ñ

### REMEMBER THE ABCs

- A. Light Artifacts, Not Areas.** How many items will you light? What lighting levels do they require? From how far away will you be lighting the objects? Use the photometry charts to calculate how many luminaires and which kinds of luminaires to use. Use DIMMER-SPLICE connectors to lower light levels. Cross light or "tile" several luminaires for brighter light levels. Use CLOSE-UP or ULTRA-FOL PINSPOT luminaires to highlight objects.
- B Keep Backgrounds Subdued.** Light graphics at 1/2 the light level of the brightest artifacts. Light floors and walls 1/2 of that. Give eyes time to acclimate by putting the most sensitive artifacts several galleries into the museum. Lower light levels gradually as you move further from doors and windows.
- C. Control Glare and Case Reflections.** Watch lighting angles. Keep lights inside cases. Conceal lighting wherever possible to avoid reflections in case windows.

### NEED AN AIR-SAFE SYSTEM?

For a case or cases, an AIR-SAFE MICRO-CLIMATE Control System is better than a desiccant chamber and often cheaper to either build or maintain. It cleans the air inside a case, maintains a set humidity level without using electricity and keeps cases from exchanging air with a gallery.

# PARA-FOL™ PARABOLIC FLOOD LUMINAIRES

## NEARLY INVISIBLE, LOW-BRIGHTNESS, BLACK PARABOLIC REFLECTOR LUMINAIRES

- LBRL** • PARA-FOL™ - Low BRIGHTNESS PARABOLIC REFLECTOR LUMINAIRE
- LBBL** • PARA-FOL™ - Low BRIGHTNESS PARABOLIC REFLECTOR WITH BRACKET LUMINAIRE
- LB RP** • FIBER-STEM™ PARA-FOL™ - Low BRIGHTNESS PARABOLIC REFLECTOR PENDANT
- LB RA** • AZ-EL PARA-FOL™ - Low BRIGHTNESS PARABOLIC REFLECTOR LUMINAIRE WITH AZ-EL MIRROR
- LB BA** • AZ-EL PARA-FOL™ - Low BRIGHTNESS PARABOLIC REFLECTOR WITH BRACKET AND AZ-EL MIRROR
- LB RA P** • FIBER-STEM™ PARA-FOL™ - Low BRIGHTNESS PARABOLIC REFLECTOR AZ-EL MIRROR PENDANT
- LB RT** • FIBER-TRACK™ PARA-FOL™ - Low BRIGHTNESS REFLECTOR FOR FIBER/CORNER-TRACK
- LB FT** • FLAT-TRACK™ PARA-FOL™ - Low BRIGHTNESS REFLECTOR FOR FLAT-TRACK AND BANNISTER

All PARA-FOL flood luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating a PARA-FOL Flood Luminaire on a single 3mm (1/8") fiber 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns or zoom diameters.

### PARA-FOL™ FLOODLIGHT LUMINAIRES

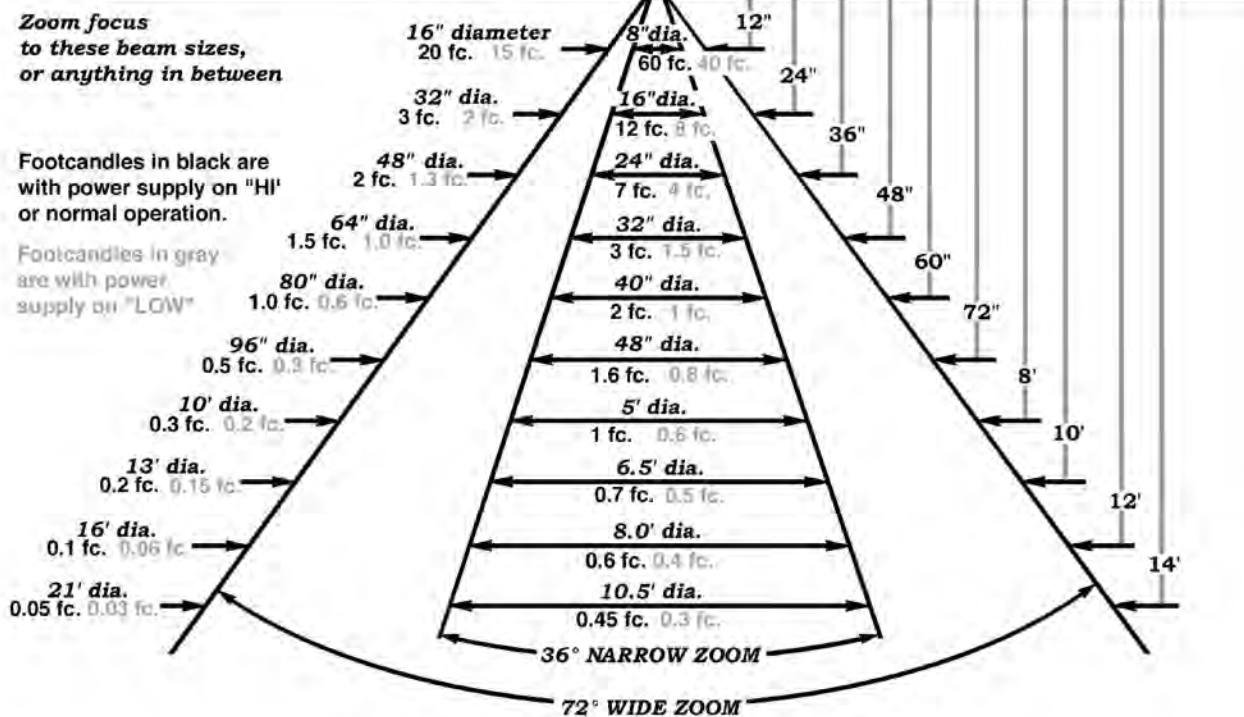
Actual measured data with luminaire on a single 3mm fiber 10' in length

Down to distance, then Across for data.

*Zoom focus to these beam sizes, or anything in between*

Footcandles in black are with power supply on "HI" or normal operation.

Footcandles in gray are with power supply on "LOW"



A polished bare fiber produces the same beam and intensity as a flood adjusted to its widest 72° beam. The difference is that without the luminaire body, aim is more difficult and there is no zoom control. In small enclosures or at close lighting distances, bare fiber can provide spectacular lighting at minimum cost. Several fibers with overlapping 72° beams give a wide, gentle wash.

Bare fiber can be polished and mounted through an 1/8" hole like the fibers in the top of this case. Adding luminaires lets you highlight important artifacts. Fiber cut at a 45° angle can be also run flat against a surface or behind a lip. Light will project about 60° off axis. These cubby hole boxes are lit with bare fiber.

Using floods only where bare fiber will not work, spots only where floods won't give enough control and pinspots only when spots won't give sufficient throw or focus will save hardware costs. But it can limit future changes and possibilities!



# MICRO-FOL™ MICRO-MINIATURE SPOT LUMINAIRES

## ZOOM-AND-DIM MICRO-MINIATURE SPOTLIGHTS WITH PURE-WHITE, STONE-COLD LIGHT

- ZDSL** • MICRO-FOL™ - ZOOM-AND-DIM SPOTLIGHT LUMINAIRE
- ZSBL** • MICRO-FOL™ - ZOOM-AND-DIM SPOTLIGHT WITH BRACKET LUMINAIRE (was #ZDBL)
- ZDSP** • FIBER-STEM™ - MICRO-FOL™ ZOOM-AND-DIM SPOTLIGHT PENDANT
- ZDSA** • AZ-EL MICRO-FOL™ - ZOOM-AND-DIM SPOTLIGHT WITH AZ-EL MIRROR
- ZSBA** • AZ-EL MICRO-FOL™ - ZOOM-AND-DIM SPOTLIGHT WITH BRACKET & AZ-EL MIRROR
- ZSAP** • AZ-EL FIBER-STEM™ - ZOOM-AND-DIM SPOTLIGHT WITH AZ-EL MIRROR PENDANT
- ZDST** • FIBER-TRACK™ MICRO-FOL™ - ZOOM-AND-DIM SPOT FOR FIBER/CORNER-TRACK
- ZSFT** • FLAT-TRACK™ MICRO-FOL™ ZOOM-AND-DIM SPOT FOR FLAT-TRACK AND BANNISTER
- ZDEL** • SPHERI-FOL™ - ZOOM-AND-DIM EYEBALL LUMINAIRE
- ZDER** • REFLEX SPHERI-FOL™ - ZOOM-AND-DIM EYEBALL REFLEX LUMINAIRE
- LNSA** • SPHERI-FOL™ - LONG NECK SPOTLIGHT WITH AZ-EL MIRROR

All MICRO-FOL spot luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating a MICRO-FOL Spot Luminaire on a single 3mm (1/8") fiber 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns or zoom diameters.

### MICRO-FOL™ SPOTLIGHT LUMINAIRES

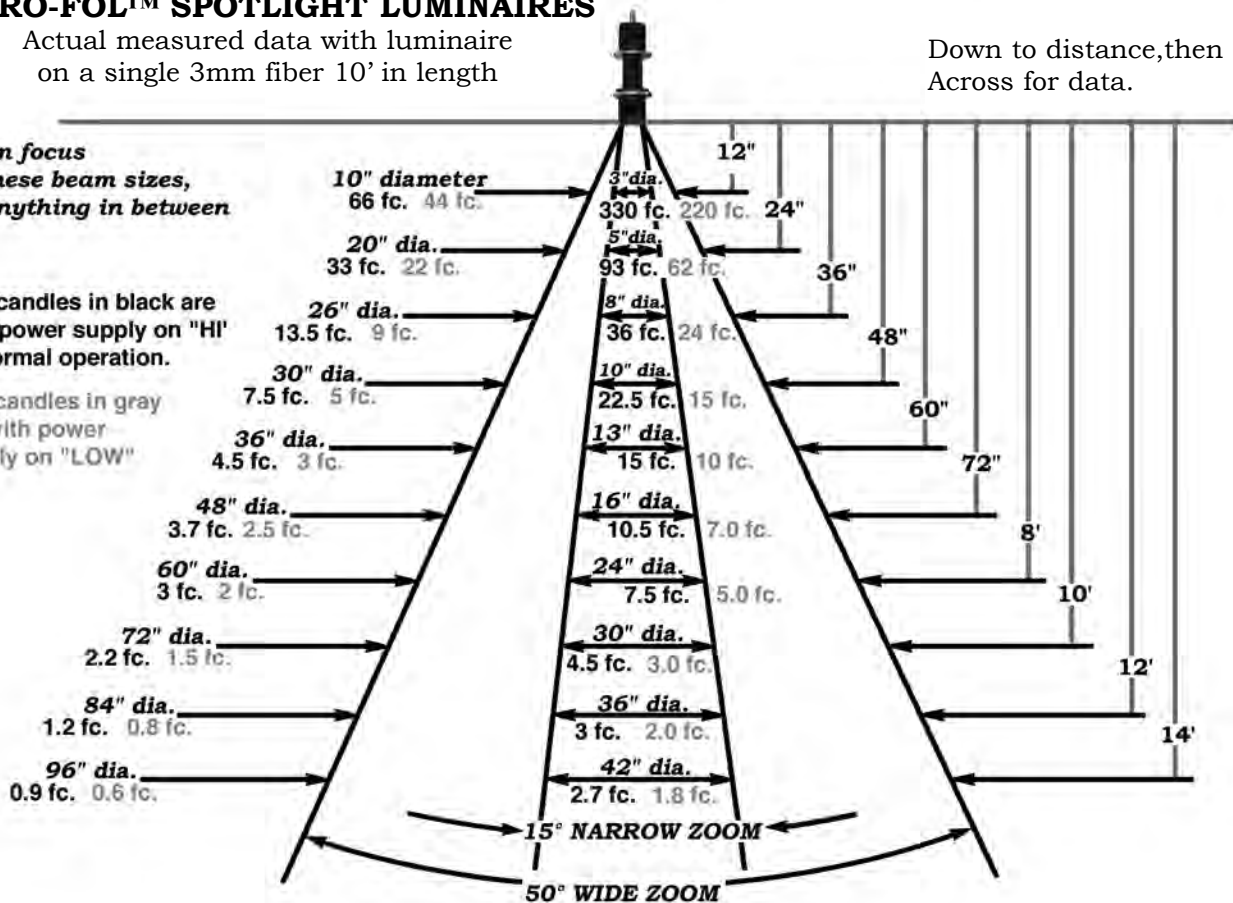
Actual measured data with luminaire on a single 3mm fiber 10' in length

Down to distance, then Across for data.

**Zoom focus to these beam sizes, or anything in between**

Footcandles in black are with power supply on "HI" or normal operation.

Footcandles in gray are with power supply on "LOW"



Need a tighter beam? Turn one page to the pinspot on page 9-5. Beam isn't wide enough? Use a flood on page 9-3. Need more footcandles? Overlap beams or mix floods in with spots for more fill.

# ULTRA-FOL™ ULTRA-WIDE-ZOOM PINSPOT LUMINAIRES

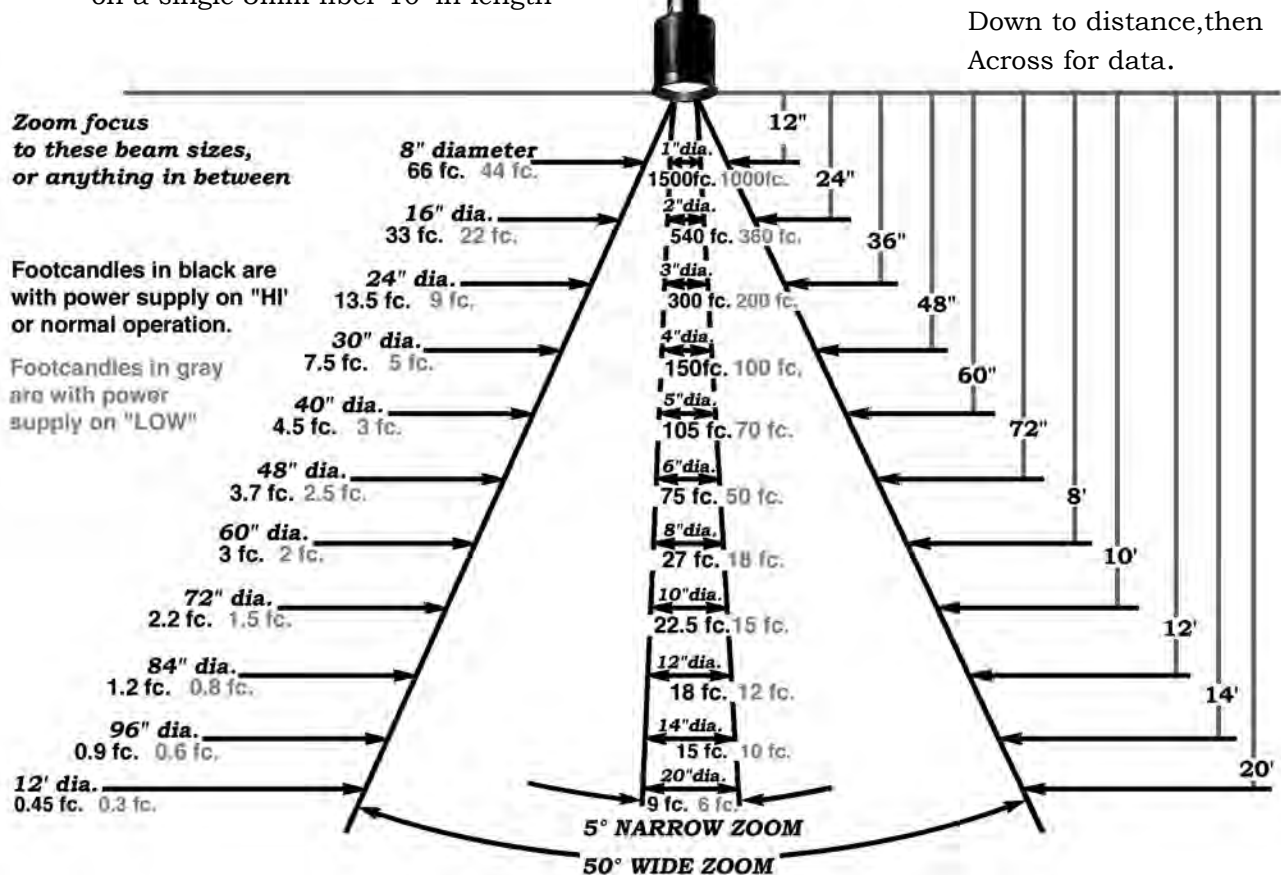
## A TRUE PINSPOT WITH PIN-POINT ACCURACY AND AN AMAZING 10:1 ZOOM RANGE

- ZDPL** • ULTRA-FOL™ - ULTRA-WIDE ZOOM-AND-DIM PINSPOT LUMINAIRE
- ZPBL** • ULTRA-FOL™ - ZOOM-AND-DIM PINSPOT WITH BRACKET LUMINAIRE
- ZDPP** • FIBER-STEM™ ULTRA-FOL™ - ZOOM-AND-DIM PINSPOT PENDANT
- ZDPA** • AZ-EL ULTRA-FOL™ - ZOOM-AND-DIM PINSPOT LUMINAIRE WITH AZ-EL MIRROR
- ZPBA** • AZ-EL ULTRA-FOL™ - ZOOM-AND-DIM PINSPOT WITH BRACKET AND AZ-EL MIRROR
- ZPAP** • FIBER-STEM™ - ZOOM-AND-DIM PINSPOT WITH AZ-EL MIRROR PENDANT
- ZPFT** • FLAT-TRACK™ ULTRA-FOL™ - ZOOM-AND-DIM PIN FOR FLAT-TRACK & 4" BANNISTER
- LNPL** • SPHERI-FOL™ - LONG-NECK EYEBALL PINSPOT LUMINAIRE
- LNPA** • SPHERI-FOL™ - LONG-NECK EYEBALL PINSPOT LUMINAIRE WITH AZ-EL MIRROR
- ZDPO** • ULTRA-FOL™ - ZOOM-AND-DIM PINSPOT WITH 0-15° OFF-AXIS AIM=

All ULTRA-FOL Pinspot luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating an ULTRA-FOL Pinspot Luminaire on a single 3mm (1/8") fibers 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns or zoom diameters.

### ULTRA-FOL™ PINSPOT LUMINAIRES

Actual measured data with luminaire on a single 3mm fiber 10' in length



The pinspot duplicates a spot from 50° to 15°, but also zooms down to 5° for a tight, bright beam or the ability to reach across a space. Don't need that much control? Pick a spot on page 9-4. Too much light? Add a DMSP DIMMER-SPLICE Connector on page 6-7.

# PENTA-FOL™ MULTIPLE FIBER POWER LUMINAIRES

## 5 MICRO-FOL™ ZOOM-AND-DIM SPOTLIGHTS IN ONE PRECISION MACHINED LUMINAIRE

- PFOL** • PENTA-FOL™ - PENTA FIBER OPTIC LUMINAIRE
- PFBL** • PENTA-FOL™ - PENTA FIBER OPTIC WITH BRACKET LUMINAIRE
- PFLA** • AZ-EL PENTA-FOL™ - PENTA FIBER OPTIC LUMINAIRE WITH AZ-EL MIRROR
- PFBA** • AZ-EL PENTA-FOL™ - PENTA FIBER OPTIC LUMINAIRE WITH BRACKET AND AZ-EL MIRROR<sup>7</sup>

All PENTA-FOL Multiple Fiber Power Luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating a PENTA-FOL Multiple Fiber Power Luminaire on five 3 mm (1/8") fibers, each 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns or zoom diameters.0

**REMEMBER - THESE LUMINAIRES CAN PRODUCE A SINGLE BEAM OR TWO BEAMS INSIDE ONE ANOTHER. YOU CAN HAVE BOTH ZOOM DIA. AT THE SAME TIME AS A TIGHT 1ST BEAM IS WITHIN A 2ND LARGER BEAM.**

### PENTA-FOL™ 5-FIBER LUMINAIRES

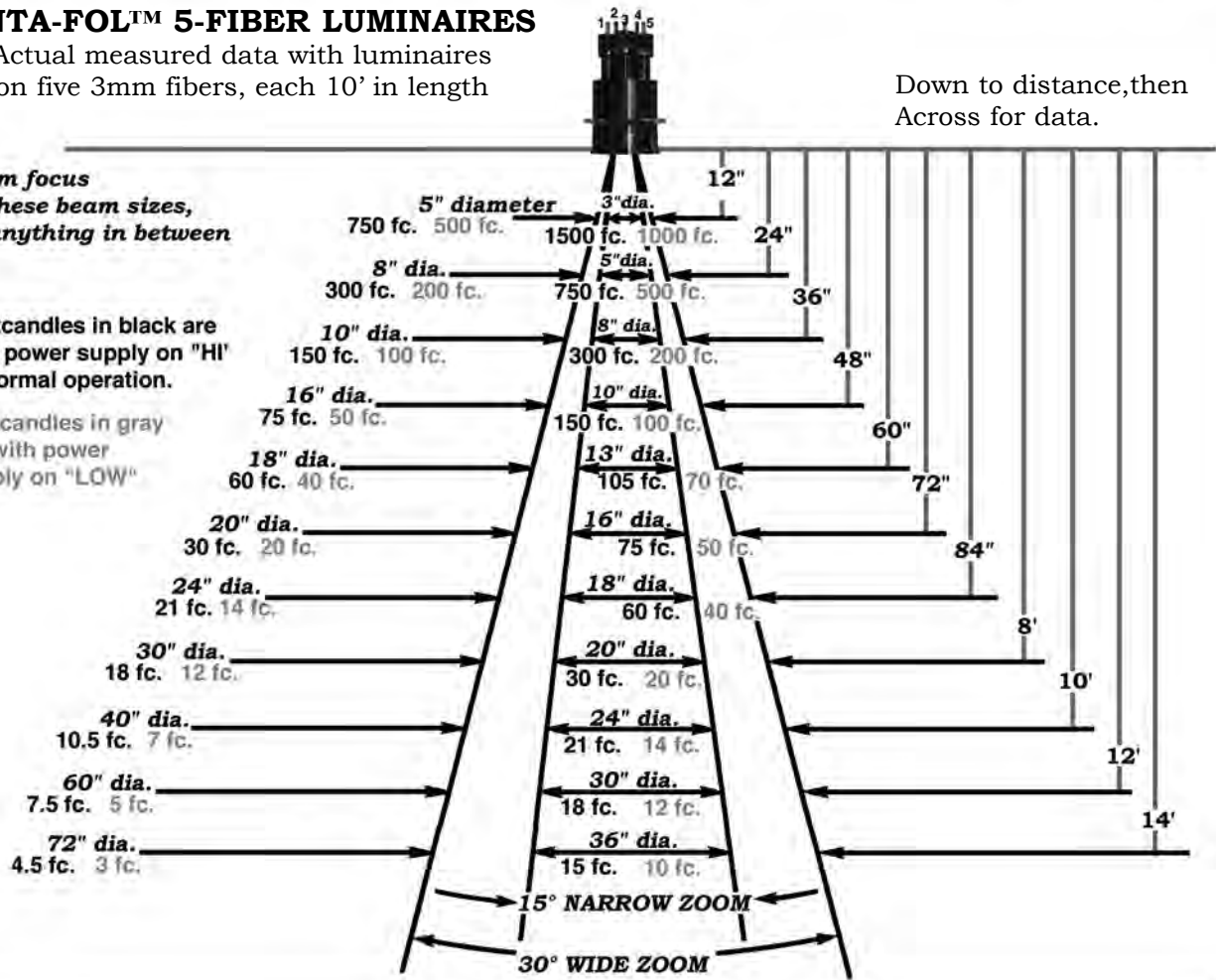
Actual measured data with luminaires on five 3mm fibers, each 10' in length

Down to distance, then Across for data.

*Zoom focus to these beam sizes, or anything in between*

Footcandles in black are with power supply on "HI" or normal operation.

Footcandles in gray are with power supply on "LOW"



The PENTA-FOL uses 5 fibers and is a lot of optics in a small package. This unique luminaire fits 5 spots into the housing size of a pinspot.

Each PENTA-FOL replaces 5 spot luminaires, but 5 individual spots can be aimed in different directions whereas all 5 beams in a PENTA-FOL aim as one. A system with 6 PENTA-FOL luminaires (and two spots or pinspots for the total of 32 fibers) may be easier to install than 32 luminaires saving money. Remember that the real cost of lighting is not hardware, the installation or even the operating costs in electricity and maintenance. **The real cost of lighting is the loss of value, art and irreplaceable history caused by poor lighting.** Both the doll and the historic painting here have suffered serious surface damage from the IR in conventional lighting.



# POWER-FOL™ TEN FIBER PHOTOMETRIC PERFORMANCE

## THE OPTICAL POWER OF TEN 3MM FIBERS IN ONE 10° FIXED FOCUS SPOTLIGHT

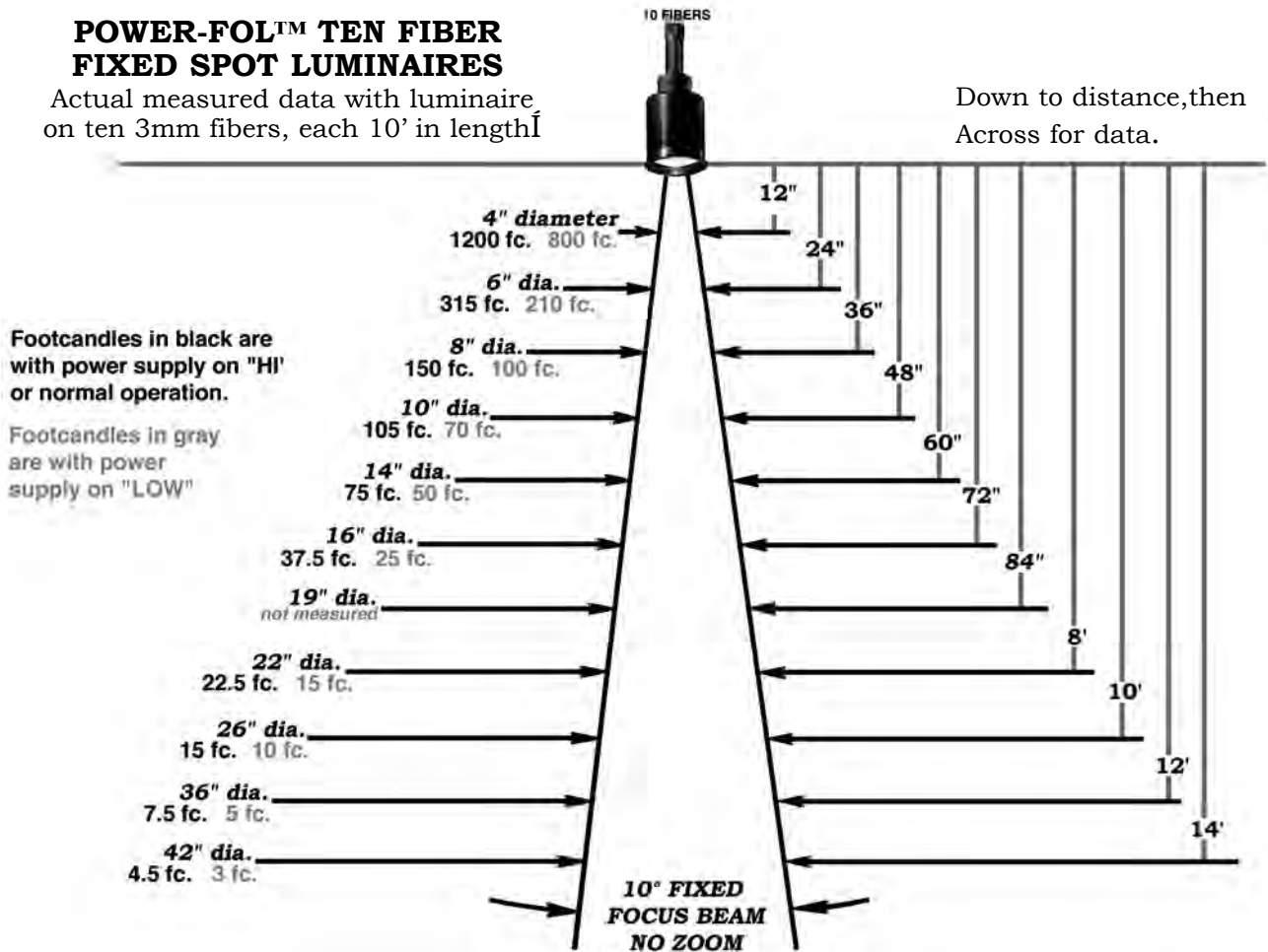
- PRFL** • POWER-FOL™ - POWER FIBER OPTIC LUMINAIRE
- PRBL** • POWER-FOL™ - POWER FIBER OPTIC WITH BRACKET LUMINAIRE
- PRFA** • AZ-EL POWER-FOL™ - POWER FIBER OPTIC LUMINAIRE WITH AZ-EL MIRROR
- PRBA** • AZ-EL POWER-FOL™ - POWER FIBER OPTIC LUMINAIRE WITH BRACKET AND AZ-EL MIRROR

All POWER-FOL Spotlight luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating POWER-FOL Spotlight Luminaires on ten 3mm (1/8") fibers, each 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns. POWER-FOL luminaires do not zoom.

### POWER-FOL™ TEN FIBER FIXED SPOT LUMINAIRES

Actual measured data with luminaire on ten 3mm fibers, each 10' in length

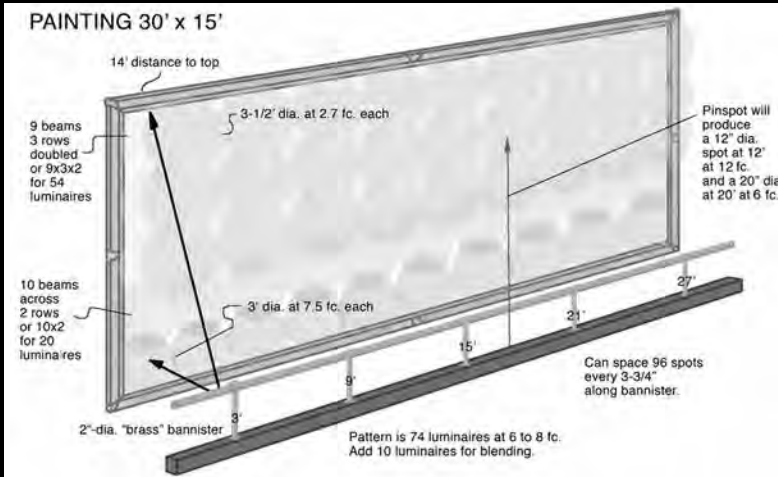
Down to distance, then Across for data.



Footcandles in black are with power supply on "HI" or normal operation.

Footcandles in gray are with power supply on "LOW"

### PAINTING 30' x 15'



Just because a POWER-FOL fiber optic luminaire can act like a typical hot, fixed-focus spotlight doesn't mean it should be used like one. The inverse-square law of physics says that doubling the distance from a light source quarters the light level. Lighting from above with a single source always means bright at the top and dim at the bottom. Overlapping multiple adjustable beams defeats the  $1/r^2$  law and gives uniform lighting even over large areas.

This painting is evenly lit. The bottom is as bright as the top. The sides are the same intensity as the center. Unlike painting lights or fixed-focus downlights, the sky is not overlit and washed out. The foreground is not dark, but bright and shows all its detail. No glare is reflected off of the canvas and the walls are not washed with scattered light.

If multiple sources are better, why offer a fixed-focus 10-fiber luminaire? Aquariums. Living museum displays. A single light without electricity that does not corrode is perfect!

# CLOSE-UP PARA-FOL™ MICRO-FLOOD LUMINAIRES

NEARLY INVISIBLE, LOW BRIGHTNESS FLOOD FOR CLOSE DISTANCES

(FOR APPLICATIONS WITH 24" OR LESS THROW DISTANCE)

- CBRL** • CLOSE-UP PARA-FOL™ - CLOSE-UP LOW-BRIGHTNESS PARABOLIC REFLECTOR FLOOD LUMINAIRE
- CBBL** • CLOSE-UP PARA-FOL™ - CLOSE-UP LOW-BRIGHTNESS FLOOD WITH BRACKET LUMINAIRE
- CBRA** • AZ-EL CLOSE-UP PARA-FOL™ - CLOSE-UP LOW-BRIGHTNESS REFLECTOR FLOOD WITH AZ-EL MIRROR
- CBBA** • AZ-EL CLOSE-UP - CLOSE-UP LOW-BRIGHTNESS FLOOD WITH BRACKET AND AZ-EL MIRROR
- CBRT** • FIBER-TRACK™ CLOSE-UP - CLOSE-UP LOW-BRIGHTNESS REFLECTOR FLOOD FOR FIBER/CORNER TRACK
- CBFT** • FLAT-TRACK™ CLOSE-UP - CLOSE-UP LOW-BRIGHTNESS REFLECTOR FLOOD FOR FLAT-TRACK

All CLOSE-UP PARA-FOL flood luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating a CLOSE-UP PARA-FOL Spotlight Luminaire on one 1 mm (.040") fiber 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns.

## CLOSEUP PARA-FOL™ FLOOD LUMINAIRES

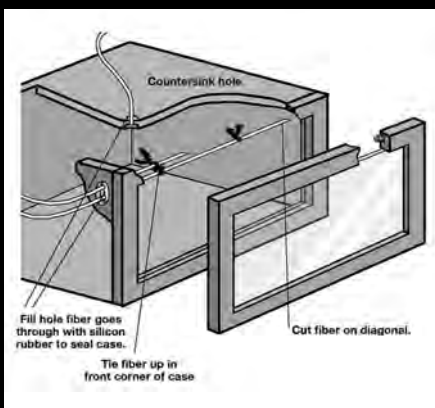
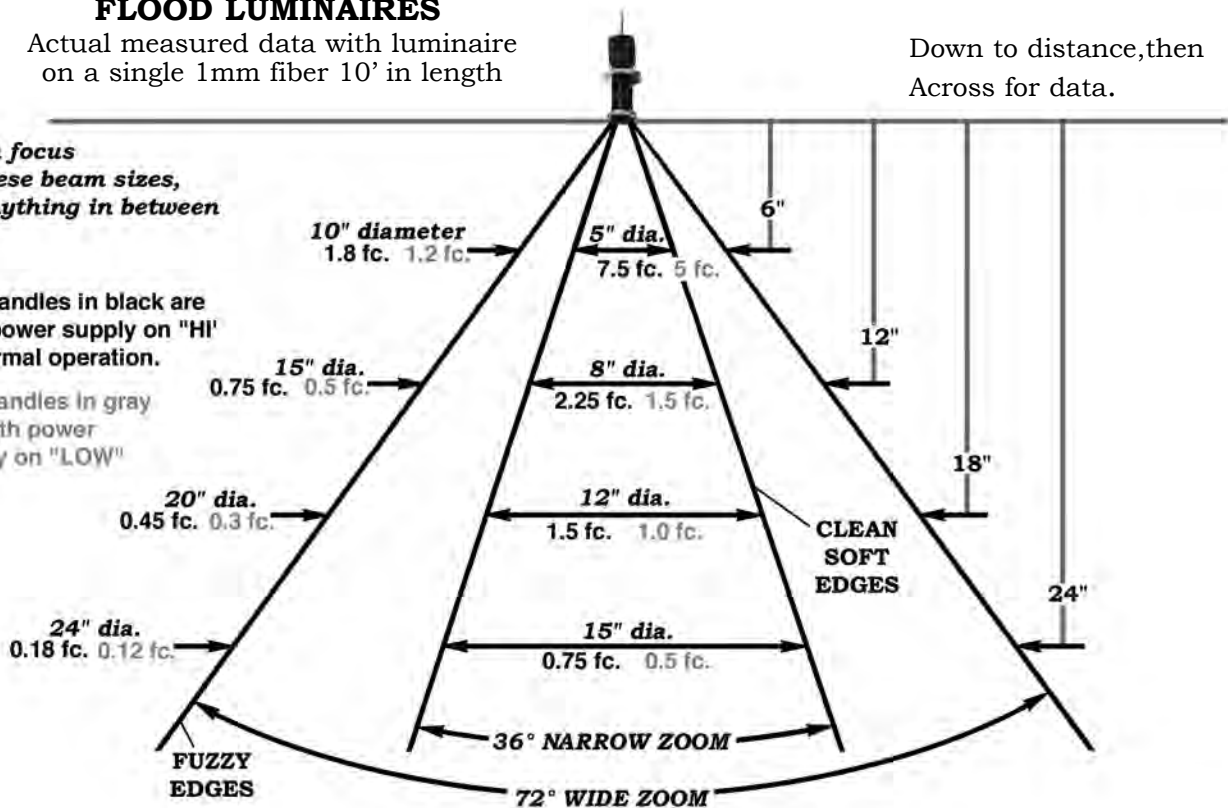
Actual measured data with luminaire on a single 1mm fiber 10' in length

Down to distance, then Across for data.

**Zoom focus to these beam sizes, or anything in between**

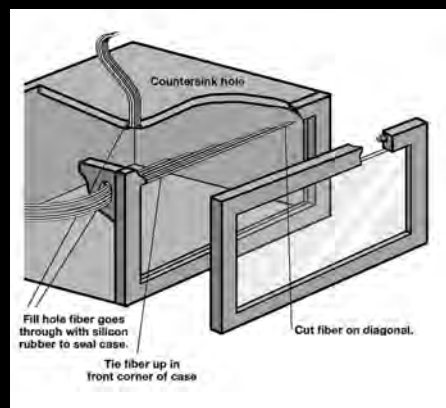
Footcandles in black are with power supply on "HI" or normal operation.

Footcandles in gray are with power supply on "LOW"



Just like a 3 mm fiber, a bare 1 mm fiber has beam and intensity of a wide zoom flood. A single 3 mm fiber would light this tiny inset wall case to 20 fc. Using several 3 mm fibers for better lighting angles requires the use of DMSP DIMMER-SPLICE Connectors to prevent overlighting.

**But the same design** using 1 mm fiber gives you 10 fc with 14 fibers or 5 fc with 7 or 8. The 1 mm fiber is "close-up" to the artifacts. Two 3 mm fibers will power 14 1 mm fibers. A single projector will power 224 1 mm fibers using DIMMER-SPLICES (300 directly). That's 32 to 42 cases at 5 fc...from one projector!





# CLOSE-UP MICRO-FOL™ MICRO-SPOT LUMINAIRES

## ZOOM-AND-DIM MICRO-SPOTLIGHTS FOR CLOSE DISTANCES

(FOR APPLICATIONS WITH 36" OR LESS THROW DISTANCE)

- CDSL** • CLOSE-UP MICRO-FOL™ - CLOSE-UP ZOOM-AND-DIM MICRO-MINIATURE SPOTLIGHT LUMINAIRE
- CSBL** • CLOSE-UP MICRO-FOL™ - CLOSE-UP SPOTLIGHT WITH BRACKET LUMINAIRE (WAS #CDBL)
- CSSA** • AZ-EL CLOSE-UP MICRO-FOL™ - CLOSE-UP SPOTLIGHT WITH AZ-EL MIRROR
- CSBA** • AZ-EL CLOSE-UP MICRO-FOL™ - CLOSE-UP SPOT WITH BRACKET AND AZ-EL MIRROR (WAS #CDBA)
- CSST** • FIBER-TRACK™ CLOSE-UP MICRO-FOL™ - CLOSE-UP SPOT FOR FIBER-TRACK & CORNER-TRACK
- CSFT** • FLAT-TRACK™ CLOSE-UP MICRO-FOL™ - CLOSE-UP SPOT FOR FLAT-TRACK
- CDEL** • SPHERI-FOL™ CLOSE-UP - CLOSE-UP ZOOM-AND-DIM SPOTLIGHT EYEBALL LUMINAIRE

All CLOSE-UP MICRO-FOL Spot luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating a CLOSE-UP MICRO-FOL Spotlight Luminaire on one 1 mm (.040") fiber 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns.

### CLOSE-UP MICRO-FOL™ SPOTLIGHT LUMINAIRES

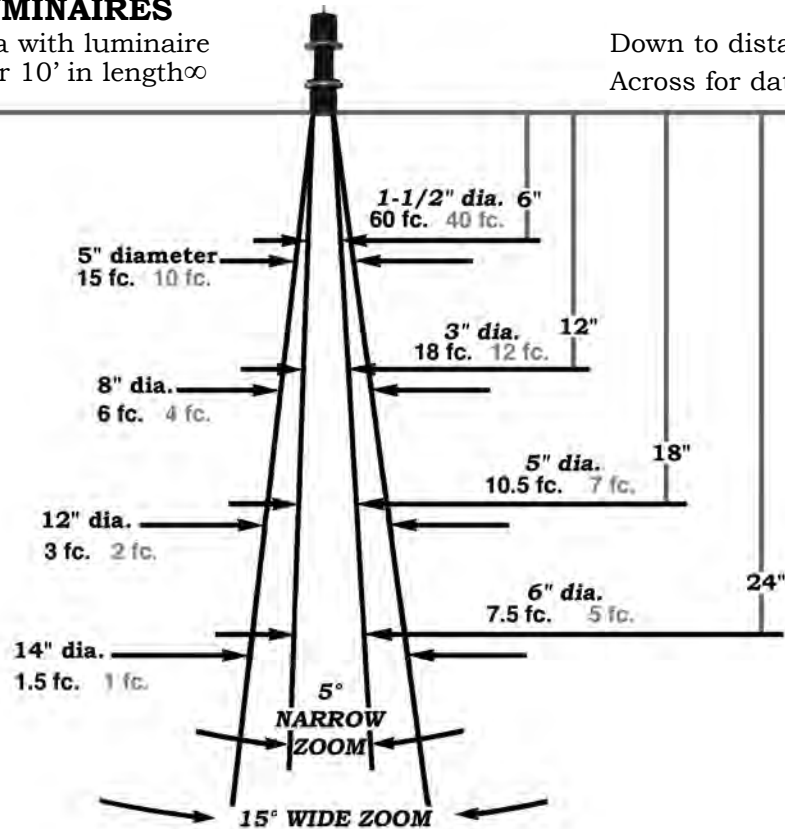
Actual measured data with luminaire on a single 1mm fiber 10' in length∞

Down to distance, then Across for data.

*Zoom focus to these beam sizes, or anything in between*

Footcandles in black are with power supply on "HI" or normal operation.

Footcandles in gray are with power supply on "LOW"



Small artifacts can be beautifully lit at low footcandle levels by 1 mm CLOSE-UP Luminaires. But the throw distance has to be less than 24" and preferably 12". The light must work "close up".

Spots with 3 mm fiber worked better for these historic Hollywood items. See page 9-4 and page 5-7. Spots hidden at the edges of the case, 12" to 42" from each item, gave 3" to 8" diameter beams.

Cases using 3 mm fiber are more flexible and usually are better for a variety of objects. CLOSE-UP Luminaires are used to solve special problems like pinpointing individual jewels or medals, illuminating tiny artwork or lighting very fugitive artifacts like Dauguerreotypes.



# CLOSE-UP ULTRA-FOL™ MICRO-PINSPOT LUMINAIRES

## INCREDIBLY TIGHT FOCUS 2° BEAM FOR CLOSE DISTANCES

(FOR APPLICATIONS WITH 48" OR LESS THROW DISTANCE)

- CPPL** • CLOSE-UP ULTRA-FOL™ - CLOSE-UP PINSPOT LUMINAIRE
- CPBL** • CLOSE-UP ULTRA-FOL™ - CLOSE-UP PINSPOT WITH BRACKET LUMINAIRE
- CPPA** • AZ-EL CLOSE-UP ULTRA-FOL™ - CLOSE-UP PINSPOT WITH AZ-EL MIRROR
- CPBA** • AZ-EL CLOSE-UP ULTRA-FOL™ - CLOSE-UP PINSPOT WITH BRACKET AND AZ-EL MIRROR
- CPFT** • FLAT-TRACK™ ULTRA-FOL™ - CLOSE-UP PINSPOT FOR FLAT-TRACK
- CLPL** • SPHERE-FOL™ LONGNECK ULTRA-FOL - CLOSE-UP LONGNECK EYEBALL PINSPOT LUMINAIRE
- CLPA** • AZ-EL SPHERE-FOL™ LONGNECK - CLOSE-UP LONGNECK EYEBALL PINSPOT WITH AZ-EL MIRROR
- CPPO** • CLOSE-UP OFF-AXIS ULTRA-FOL™ - CLOSE-UP PINSPOT WITH 0-15° OFF-AXIS AIM™

All CLOSE-UP ULTRA-FOL Pinspot luminaires share the same optical elements and provide the photometric performance characteristics shown below. The photometry below is actual measured data from a NoUVIR system operating a CLOSE-UP ULTRA-FOL Pinspot Luminaires on one 1 mm (.040") fiber 10' in length. Shorter fibers will produce more intensity. Fiber length does not affect beam patterns. E

### CLOSE-UP ULTRA-FOL™ PINSPOT LUMINAIRES

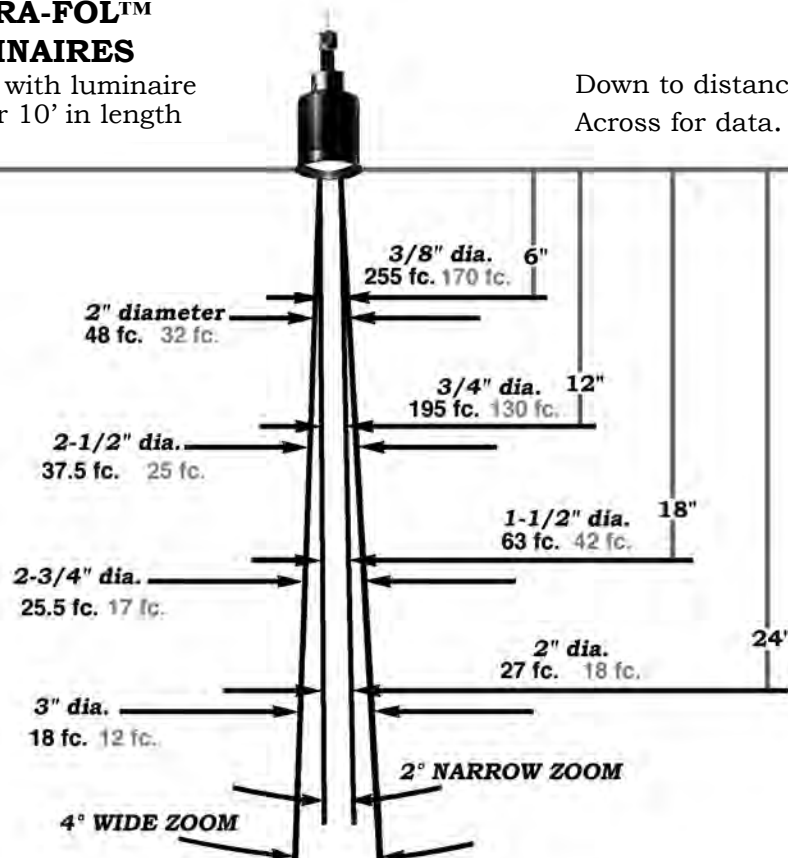
Actual measured data with luminaire on a single 1mm fiber 10' in length

Down to distance, then  
Across for data.

**Zoom focus to these beam sizes, or anything in between**

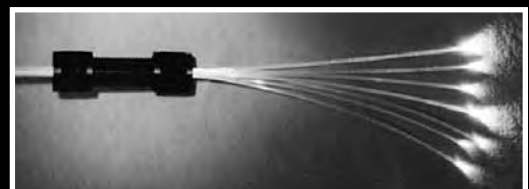
Footcandles in black are with power supply on "HI" or normal operation.

Footcandles in gray are with power supply on "LOW"



The smaller cross-section of a 1 mm fiber means more internal reflections as the light travels through the fiber. That increases the transmission loss by roughly 50%. When the length of a 1 mm fiber gets over 20 feet, use a 3 mm fiber to carry the light to the luminaire and take the smaller 20% loss of a DMSP DIMMER-SPLICE Connector.

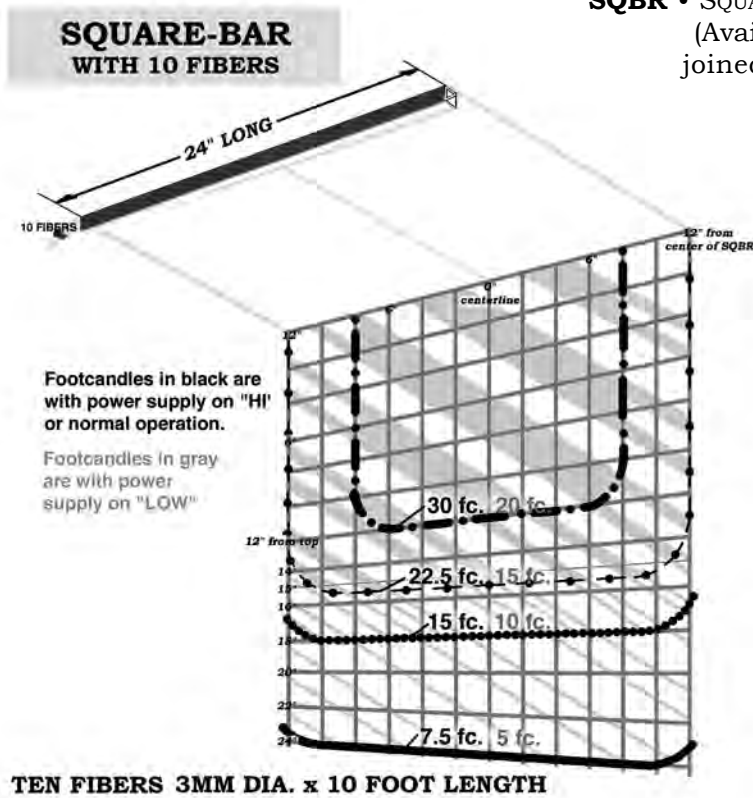
A DMSP DIMMER-SPLICE Connector joins a single 3 mm fiber to 7 individual 1 mm fibers. Working with a smaller number of larger fibers will simplify installation.



# SQUARE-BAR™ FIBER-OPTIC WALL WASHER

ONE-INCH SQUARE WALL WASHER. ¥

**SQBR** • SQUARE-BAR™ - WALL WASHER Luminaire  
(Available in 4-foot lengths. Easily cut, it can be joined together to create an 8-foot solid length.)



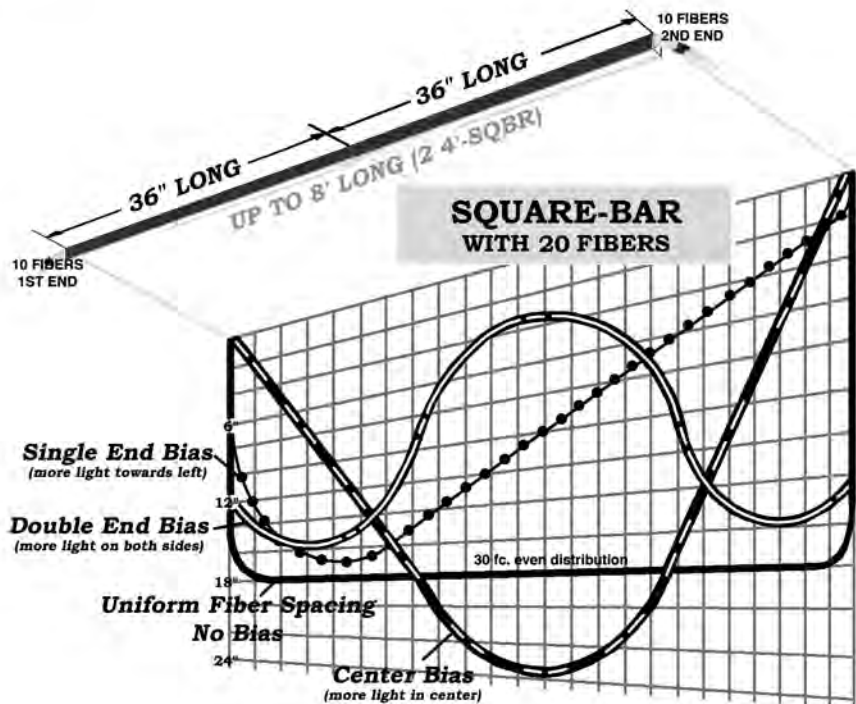
## UNIFORM DISTRIBUTION OF FIBER

The chart on the left shows the actual measured data for one piece of SQUARE-BAR, 24" in length illuminated by a NoUVIR system using 10 individual 3 mm fibers, each fiber 10 feet in length, with the fibers cut and polished at a 45° angle and evenly spaced across the bar.

For lower light levels, use less fiber. For more light, fibers can be fed from each end of a SQUARE-BAR. Additional fiber can also be fed through a hole drilled through the SQUARE-BAR's reflector. (The internal cross section limits bundles through the fixture to ten 3 mm fibers from each end.)

## WEIGHTED FIBER DISTRIBUTION

Evenly spaced fiber ends result in uniform lighting along the length of the SQUARE-BAR. Weighting the distribution of fiber ends toward one end of the bar, both ends or the center results in a smooth even graduation of light with a strong emphasis in the areas you select. As with all NoUVIR products, adjustment is simple, readjusting or rearranging is easy, and a SQUARE-BAR and its fiber can be used over again and again.



The lens on a SQBR SQUARE-BAR Wall Washer projects a smooth distribution that will make library cases glow. There are no scallops, no bright spots and no stripes in the beam. None. Nada. Zero. SQUARE-BAR can be shorter than the case itself making it easier to install. With its smooth cosign distribution (bell curve) of light, the corners and ends of a case will be illuminated even if the bar is short by 6 to 12".

## STANDARD RECOMMENDED LIGHTING INTENSITIES

*These are the lighting levels recommended by conservators for the protection of art and artifacts.*

<b>LIGHT LEVEL</b> (in footcandles)	<b>OBJECTS:</b> Detailed Description, Examples
<b>1 to 5</b>	<b>INSECTS, FLORA, FAUNA:</b> Butterflies, grass clothes, hemp products, flax tex tiles, berry dyes, dried flowers, native baskets
<b>2 to 5</b>	<b>FRAGILE PAPERS, RARE PHOTOGRAPHS:</b> Documents, letters, hand-written items, newspapers, drafts, checks, rare books, Daguerreotypes
<b>2 to 7</b>	<b>STAMPS, TAX TAGS, RIBBONED MILITARY OBJECTS, BRAID:</b> Rare stamps, event tickets, tax stamps, military ribbons, sword handles, paper money
<b>2 to 12</b>	<b>ANCIENT CERAMICS, GLASS, POTTERY:</b> Biblical glass, Faiences, bilbils, seals, painted pottery, unearthed ceramics, iridescent glass
<b>2 to 20</b>	<b>ORGANICS, ANIMALS, BIRDS:</b> Mounted animals, dioramas, furs, feathered objects, untanned hides, hair objects, shells
<b>3</b>	<b>FLUORESCENT DYES AND PAINTS:</b> Asian art, safety clothing, stick-on post notes, modern posters, bright markers, children's paints
<b>3 to 10</b>	<b>TEXTILES, COSTUMES, ABORIGINAL OBJECTS:</b> Shrouds, quilts, samplers, movie costumes, shoes, African art, Native American artifacts
<b>3 to 10</b>	<b>PROMOTIONAL PRINTED OBJECTS:</b> Trading cards, movie posters, game boards, ads, printed packaging, fliers, rare handbills, can labels
<b>3 to 12</b>	<b>ILLUMINATED BOOKS, ILLUSTRATIONS, ART PRINTS:</b> Fragile books with color, flower illustrations, hand-tinted prints, Sumi-e ink paintings
<b>3 to 25</b>	<b>BOOKS, PRINTED MATERIALS:</b> More durable books, collector fine art prints (modern), printed plates, greeting cards
<b>5</b>	<b>BONE, IVORY, HORN, PHOTOGRAPHS:</b> Inlaid instruments, horn chairs, scrimshaw, more durable photographs, paintings on ivory
<b>5 to 10</b>	<b>UNSTABLE PLASTICS, STYRENES:</b> Plastic toys, dolls, promotional items, telephones, kitchen table-top appliances
<b>5 to 12</b>	<b>WATERCOLORS, PASTELS:</b> Paintings on paper, art studies, fugitive pastels, bright chalks, cloisonné. 5 fc for permanent exhibits, 12 fc for exhibits under 1 year.
<b>5 to 15</b>	<b>PEARLS, FRAGILE GEMS, FRAGILE MINERALS:</b> Soft stones, uncut gems, carved jade, cameos, intricate-structured minerals
<b>10 to 20</b>	<b>LEATHERS, CURED HIDES, SADDLES:</b> Unpainted leathers, boots, harnesses (no clothes, no ancient artifacts)
<b>10 to 30</b>	<b>WOODS, FURNITURE, VENEERS:</b> Tables, Chinese boxes, classic car interiors, (use lowest fc level for cherry woods)
<b>10 to 30</b>	<b>NATURAL RUBBERS, LATEX, AGED RUBBER:</b> Balls, hats, rubber shoes, belted machinery, construction equip., sales models
<b>10 to 50</b>	<b>ANTIQUÉ CERAMICS, POTTERY, CHINA:</b> Fine china, ceramic sculptures, clay pots, porcelain, Victorian tiles, bisques
<b>10 to 30</b>	<b>PAINTINGS IN OIL/ACRYLIC:</b> Well-constructed paintings only (no objects on paper or older works) folk art, painted furniture, whirligigs. 10 - 12 fc is the limit for masterpieces or really fine work. 30 fc is for commercial retail galleries showing a work for a short time, usually 1 year or less.
<b>20 and up</b>	<b>STABLE PLASTICS, CLEAR RESINS:</b> Plastic sculptures, tables, cases, water dioramas, computer housings, castings
<b>20 and up</b>	<b>GLASS, CRYSTAL, COLORED GLASS:</b> Stained-glass windows, carnival glass, stemware, cut crystal, light fixtures
<b>30 and up</b>	<b>METALS, SILVER:</b> Damascus steel, swords, copper pots, brass instruments, engraved silver, bracelets
<b>30 and up</b>	<b>ACRYLIC, SYNTHETICS, CARBON-FILLED RUBBER:</b> Stress test models, nylon webbing, military hardware, tires, no textiles or fabrics
<b>50 and up</b>	<b>GEMS, MINERALS, ROCKS, FOSSILS:</b> Diamonds, set jewels, necklaces, carved coal sculpture, sculptures, dinosaurs