

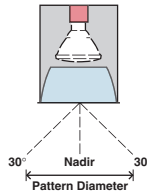
Understanding Kurt Versen Photometric Information

Performance Datachart

Single Unit Initial Footcandles, 30" Work Plane					Ceiling to Floor		Multiple Units Initial Footcandles, 30" Work Plane				
Fixture Number and Lamp							Ceiling 80%	Walls 50%	Floor 20%		
Nadir	10°		20°		30°		Spacing is Maximum Over Work Plane				
FC	FC	Diam	FC	Diam	FC	Diam	Spacing	RCR 1	RCR 3	RCR 8	
39	31	3'	18	6'	5	11'	12'	6'	54	45	30
28	22	3'	13	8'	4	13'	15'	7'	38	32	22

Single Unit

To describe the pattern, points are selected on one side of nadir. They may be 10°, 20°, 30°, etc... depending on the pattern width. Footcandles are measured at each of these points. The pattern diameter includes both sides from nadir for a full circle pattern description.



Multiple Units

Spacing shows the maximum mounting distance between fixtures for a visually uniform pattern. Spacing values are rounded off to the nearest foot. Room Cavity Ratios (RCR) 1, 3 or 8 were chosen arbitrarily to illustrate illumination values in various room sizes.

Directionals: Footcandle Values at Nadir

Distance	5'			10'			15'			20'										
	Nadir	5°	10°	Nadir	5°	10°	Nadir	5°	10°	Nadir	5°	10°								
Lamps	FC	FC	Diam	FC	FC	Diam	FC	FC	Diam	FC	FC	Diam	FC	FC	Diam					
Fixture Number and Lamp	178	134	1'	63	2'	45	33	2'	16	4'	20	15	3'	7	5'	11	8	3'	4	7'
Fixture Number and Lamp	194	141	1'	77	2'	48	35	2'	19	4'	22	16	3'	9	5'	12	9	3'	5	7'
Fixture Number and Lamp	286	206	1'	111	2'	72	51	2'	28	4'	32	23	3'	12	5'	18	13	3'	7	7'

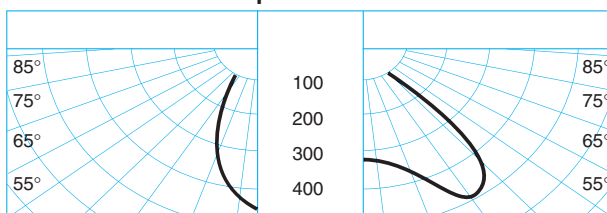
Directionals

Footcandle Values at Nadir show data at various distances with 0° lamp tilt. Values are at nadir and several degrees from nadir, depending upon beam spread. Angulated lamps change all data and space does not permit a description of performance at all variations of beam tilt. Contact the factory for specific information.

Cone Colors

Data are collected with clear specular cones. Colored cones diminish output because reflectivity is reduced by the dye color. Output depreciates in the 3% to 25% loss range depending upon the depth of color. Differing beam patterns also affect performance. There is less loss from spots, more from floods. Precise data are available from the factory.

Wall Washers: Candlepower Distribution Curves



Wall Washers

The Candlepower Distribution Curves describe single unit performance. Downlight shows output at nadir directly opposite the wall. Wall washer illustrates projected performance on the wall. Multiple Units Footcandles are computer calculations derived from actual measurements. They describe performance at various distances from the wall, at different fixture spacing. CL readings are at centerline, under the fixture. Mid readings are between fixtures.

Candlepower Distribution Curves, Candelas, Spacing Criteria

A candlepower distribution curve offers a visual image of how a particular lamp performs in a specific luminaire. It graphically shows light spread and intensity. Because it is hard to read candelas off the curve, particularly at high angles, refer to the candela chart for greater accuracy. Spacing criteria numbers follow the letters S/M for spacing to mounting height ratios. Multiply this value by the height above the work plane for maximum spacing for visually uniform illumination at the work plane.

Multiple Units Footcandles

From Ceiling	2' from wall		3' from wall				4' from wall					
	2' Centers		3' Centers		3' Centers		4' Centers		4' Centers		6' Centers	
	CL	Mid	CL	Mid	CL	Mid	CL	Mid	CL	Mid	CL	Mid
1'	29	27	24	22	10	10	8	7	5	4	3	3
2'	60	48	41	38	15	15	12	11	7	7	5	4
3'	56	55	45	44	22	22	18	16	9	9	7	6
4'	44	44	36	35	26	25	20	19	13	12	9	8

Brightness

Control of light is essential for proper downlight performance. Light misdirected at higher angles wastes energy and fails to put light where required. Brightness in the form of glare creates visual discomfort and impairs productivity. We publish laboratory tested brightness data under the Maximum Brightness Method, the only valid system for point source downlights. See Z section brochure Z1 for further information.

Efficiency

Tests are performed with seasoned calibrated lamps and controlled voltage. Efficiency is that portion of total lamp lumens delivered to the workspace. Losses occur from light adsorbed in the fixture, reduction from reflector reflectivity and from the IES formula which uses zonal constant multipliers to modify empirical measurements. Multipliers are much greater at high angles than at nadir. What seems an efficient unit may not be right for the application if it doesn't deliver light where required. A proper luminaire design is balanced, providing performance and visual comfort.