Strobe Coverage Examples

Following are two examples of the calculations used in determining the correct strobe coverage mearsurements. For both examples, the following variables are applied:

Ceiling Height = 20 ft.
Square Room Size (length x width) = 25 ft. x 25 ft.
Candela of Model = 75 cd

EXAMPLE #1 – Distance calculation when the distance along the floor is less than 1/2 the room length.

Angle = 30°
Per UL 1971, Effective Candela = 75% x 75cd
Effective Candela = 56.25 cd

Distance to point in profile:

$$\text{Distance} = \frac{\text{Ceiling Height}}{(\text{COS}((\text{Angle} \times \pi)/180°))}$$

$$\text{Distance} = \frac{20 \text{ ft.}}{(\text{COS}((30° \times 3.14159)/180°))}$$

$$\text{Distance} = 23.09 \text{ ft.}$$

Lumens/Square Foot

$$= \frac{56.25 \text{ cd}}{(23.09 \text{ ft.})^2}$$

$$= 0.106 \text{ lumens/square foot}$$

Conclusion: 0.106 is greater than 0.0375 lumens/square foot minimum UL 1971 requirement.

EXAMPLE 2 – Distance calculation when the distance along the floor is greater than 1/2 the room length.

Angle = 60°
Per UL 1971, Effective Candela = 40% x 75cd
Effective Candela = 30 cd

Distance to point in profile:

$$\text{Distance} = \frac{\text{1/2 Room Length}}{(\text{COS}(((90° - \text{Angle}) \times \pi)/180°))}$$

$$\text{Distance} = \frac{12.5 \text{ ft.}}{(\text{COS}(((30°) \times 3.14159)/180°))}$$

$$\text{Distance} = 14.43 \text{ ft.}$$

Lumens/Square Foot

$$= \frac{30 \text{ cd}}{(14.43 \text{ ft.})^2}$$

$$= 0.144 \text{ lumens/square foot}$$

Conclusion: 0.144 is greater than 0.0375 lumens/square foot minimum UL 1971 requirement.

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Calculating Light Intensity

The following is a description of the mathematics involved in calculating light intensity levels throughout a rectangular shaped room, when the light source is located at the center of the ceiling. the calculations are simplified by assuming a square room.

The first step is to construct the smallest square that encompasses the actual room size. Then inscribe a circle inside the square room. The radius of the circle must be chosen such that all four sides of the square room contact the circle, as shown in Figure 1. Distance calculations are then made from 0 degrees (right angle to the ceiling) to 90 degrees (parallel to the ceiling) in 5 degree increments. By assuming the room to be square, the calculations for one quadrant of the room will apply to all four quadrants. Utilizing the UL profile requirements, Lumens/Ft^2 can be calculated by dividing the required candela at each angle by the calculated distance at each angle. According to NFPA 72, the minimum illumination requirement of .0375 lm/ft^2 at any angle must be met. Figure 1 shows these angles in relationship to the device located in the center of the room.