

## Safety Manual > Illumination for Occupational Tasks

### E. Illumination for Occupational Tasks

#### 1. Background

Glare, diffusion, direction, uniformity, brightness, color, and brightness ratios affect visibility and the ability to see easily, accurately, and quickly. Poor lighting is uncomfortable and possibly hazardous. The desirable quantity of light for any particular installation depends primarily upon the work that is being done. As the illumination of the task is increased, the ease, speed, and accuracy of accomplishing it are also increased. Following are two tables of levels of illumination for industrial areas as recommended by the American National Standard A11.1 “Practice for Industrial Lighting.” The Office of Environmental Health and Safety will perform lighting measurements upon request.

#### 2. Definitions

Footcandle – A unit of illuminance on a surface that is everywhere 1 foot from a point source of light of one candle and equal to one lumen per square foot.

Illumination Level – The quantity or amount of light falling on a surface usually expressed in foot candles.

Intensity (Luminous Intensity) – The quantity of light a source gives off in a given direction expressed in candela (formerly “candle”).

Lamp – any man-made light source.

Lumen – The flux falling on a surface of one square foot in area, every part of which is one foot from a point source having a luminous intensity of one candela (candlepower) in all directions.

Luminaire – A complete lighting device consisting of lamps and parts to distribute the light.

Luminance (Photometric Brightness) – The amount of light emitted and reflected from an area of a surface measured in footlamberts. A surface emitting one lumen per square foot has a luminance of one footlambert.

Reflectance – A measure of how much light is reflected from a surface. It is the ratio of luminance to illumination.

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<b>Recommended Maximum Luminance Ratios</b>				
		<b>Environmental Classification</b>		
		<b>A</b>	<b>B</b>	<b>C</b>
1	Between task and adjacent darker surroundings	3 to 1	3 to 1	5 to 1
2	Between tasks and adjacent lighter surroundings	1 to 3	1 to 3	1 to 5
3	Between tasks and more remote darker surfaces	10 to 1	20 to 1	*
4	Between tasks and more remote lighter surfaces	1 to 10	1 to 20	*
5	Between luminaires (or windows, skylights, etc.) and surfaces adjacent to them	20 to 1	*	*
6	Anywhere within normal field of view	40 to 1	*	*

\*Brightness Ratio control not practical.

A — Interior Areas where reflectances of entire space can be controlled in line with recommendations for optimum seeing conditions.

B — Areas where reflectances of immediate work area can be controlled, but control of remote surroundings is limited.

C — Areas (indoor and outdoor) where it is completely impractical to control reflectances and difficult to alter environmental conditions.

Note: From the normal view point, brightness ratios of areas of appreciable size in industrial areas shall not exceed those in the above table.

<b>Recommended Reflectance Values Applying to Environmental Classifications A and B</b>	
	<b>Reflectance (%)**</b>
Ceiling	80 to 90
Walls	40 to 60
Desk and bench tops, machines and equipment	25 to 50
Floors	not less than 20

\*\* Reflectance should be maintained as near as practical to recommended values.

Levels of Illumination Recommended for Sample Occupational Tasks

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Area Foot-Candles

Assembly-rough, easy seeing 30

Assembly-medium 100

Building construction-general 10

Corridors 20

Drafting Rooms-detailed 200

Electrical equipment, testing 100

Elevators 20

Garages-repair areas 100

Garages-traffic areas 20

Inspection, ordinary 50

Inspection, highly difficult 200

Loading platforms 20

Machine shops-medium work 100

Materials-loading, trucking 20

Offices-general areas 100

Paint dipping, spraying 50

Service spaces-wash rooms, etc. 30

Sheet metal-presses, shears 50

Storage rooms-inactive 5

Storage rooms-active, medium 20

Welding-general 50

Woodworking-rough sawing 30

1 foot-candle=10.76 lux.

From: A132.1-1973, Office Lighting.