Floodlight Illuminance on Horizontal, Vertical and Inclined Planes

Illuminance at a point from a floodlight of known intensity, on horizontal, vertical (facing the mast) and inclined planes, by the inverse-square and cosine laws.

Method: Inverse-square and cosine laws

Input parameters

Unit system: SI

Parameter	Value	Unit
Luminous intensity toward the point (cd)	50,000	
Mounting height above the point	12.000	m
Horizontal distance from the mast	20.000	m
Plane tilt from horizontal, facing the mast	30.000	°

Calculated results

Parameter	Value	Unit
Distance to the luminaire	23.324	m
Horizontal illuminance	47.288	lx
Vertical illuminance facing the mast	78.814	lx
Illuminance on the inclined plane	80.360	lx

Notes for this case

• E = I·cosθ/d², θ between the light ray and the surface normal: horizontal cosθ = h/d, vertical facing the mast x/d, inclined (h·cosβ + x·sinβ)/d. Read I from the floodlight's polar data at the aiming angle; add contributions of all floodlights and apply a maintenance factor.

Formula and method

$$E_h = \frac{Ih}{d^3}, \quad E_v = \frac{Ix}{d^3}, \quad E_\beta = \frac{I(h\cos\beta + x\sin\beta)}{d^3}$$

Variables

I	Luminous intensity toward the point (cd)	-
h	Mounting height above the point	m
x	Horizontal distance from the mast	m
β	Plane tilt from horizontal, facing the mast	rad
d	Distance to the luminaire	m
E_h	Horizontal illuminance	lx
E_v	Vertical illuminance facing the mast	lx
E_β	Illuminance on the inclined plane	lx

Method and standards

Point illuminance.

Assumptions and limits

- Point source; no obstruction or reflections.

References

Inverse-square and cosine laws

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/lighting/floodlight-inclined-plane-illuminance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.