# Lighting Maintenance Factor and Initial Illuminance

Maintenance factor from lumen depreciation, survival, luminaire and room surface factors, and the initial illuminance needed to keep a maintained value.

**Method:** Maintenance factor components; Lighting Handbook practice (lumen method, maintenance factor components)

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Rated life to 70 % lumens | 50,000 | h |
| Operating hours to maintenance | 25,000 | h |
| Lamp survival factor | 100.00 | % |
| Luminaire maintenance factor | 90.000 | % |
| Room surface maintenance factor | 95.000 | % |
| Maintained illuminance required | 500.00 | lx |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Lamp lumen maintenance factor | 83.666 | % |
| Maintenance factor | 71.534 | % |
| Initial illuminance to design for | 698.96 | lx |
| Over-lighting when new | 39.793 | % |

**Notes for this case**

- MF = LLMF × LSF × LMF × RSMF, with LLMF assumed to fall exponentially to 0.7 at $L_{70}$. Use the maker's LLMF table where given; constant-light-output drivers can recover much of the over-lighting energy.

## Formula and method

$$MF = LLMF \cdot LSF \cdot LMF \cdot RSMF, \quad LLMF = 0.7^{t/L_{70}}, \quad E_i = \frac{E_m}{MF}$$

### Variables

| | | |
|---|---|---|
| $L_{70}$ | Rated life to 70 % lumens | s |
| $t$ | Operating hours to maintenance | s |
| $LSF$ | Lamp survival factor | - |
| $LMF$ | Luminaire maintenance factor | - |
| $RSMF$ | Room surface maintenance factor | - |
| $E_m$ | Maintained illuminance required | lx |
| $LLMF$ | Lamp lumen maintenance factor | - |
| $MF$ | Maintenance factor | - |
| $E_i$ | Initial illuminance to design for | lx |
| $1/MF - 1$ | Over-lighting when new | - |

### Method and standards

Maintenance factor.

### Assumptions and limits

- Exponential lumen depreciation.

### References

Maintenance factor components, Lighting Handbook practice (lumen method, maintenance factor components)

## Report details

| | |
|---|---|
| Report reference | FCC-BVS3-68EA (the same inputs always give the same reference) |
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| Calculator | Lighting Maintenance Factor and Initial Illuminance |
| Method last reviewed | 17 November 2026 |
| Software release | FireCAD Calc, release of 22 November 2026 |
| 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/lighting-maintenance-factor

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.