

Cours E314

Principe d'éclairagisme

Document Autorisé à l'examen

Professeur:
Peer Eric Moldvar
Consultant en éclairage
peer-eric.moldvar@polymtl.ca



Document autorisé à l'examen

\bar{E} = éclairage ou illuminance en fc ou lux

CU = coefficient d'utilisation

$N_{\text{luminaire}}$ = nombre de luminaire

$\frac{\text{lamps}}{\text{luminaire}}$ = nombre de lampes par luminaire

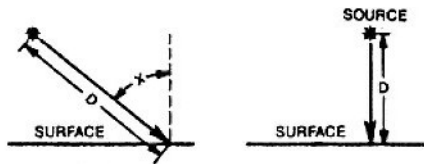
Φ_{lamp} = Lumen par lampes

LLF = Light loss factor (facteur de perte de puissance)

$A_{\text{workplane}}$ = surface en pied² ou m² selon des fc ou lux

$$\bar{E} = \frac{CU \cdot N_{\text{luminaire}} \cdot \frac{\text{lamps}}{\text{luminaire}} \cdot \Phi_{\text{lamp}} \cdot \text{LLF}}{A_{\text{workplane}}}$$

$$N_{\text{luminaire}} = \frac{\bar{E} \cdot A_{\text{workplane}}}{CU \cdot \frac{\text{lamps}}{\text{luminaire}} \cdot \Phi_{\text{lamp}} \cdot \text{LLF}}$$



$$E = \frac{I \times \text{Cosine } X}{D^2}$$

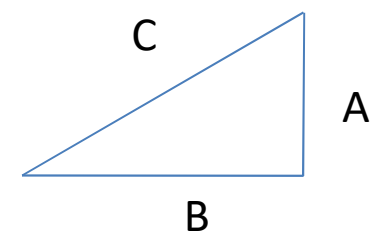
E = Footcandles
I = Candlepower
D = Distance in feet
X = Angle of incidence

$$E = \frac{I}{D^2}$$

Angle of incidence is 0°, cosine is 1.0.

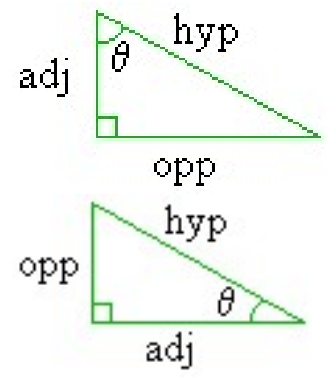
$$RCR = \frac{(L+W) \cdot 5 \cdot H}{L \cdot W}$$

$$E = \frac{I \cos \theta}{D^2}$$



$$C = \sqrt{A^2 + B^2}$$

Sine θ = opp/hyp
Cosine θ = adj/hyp
tangent θ = opp/adj



Document autorisé à l'examen

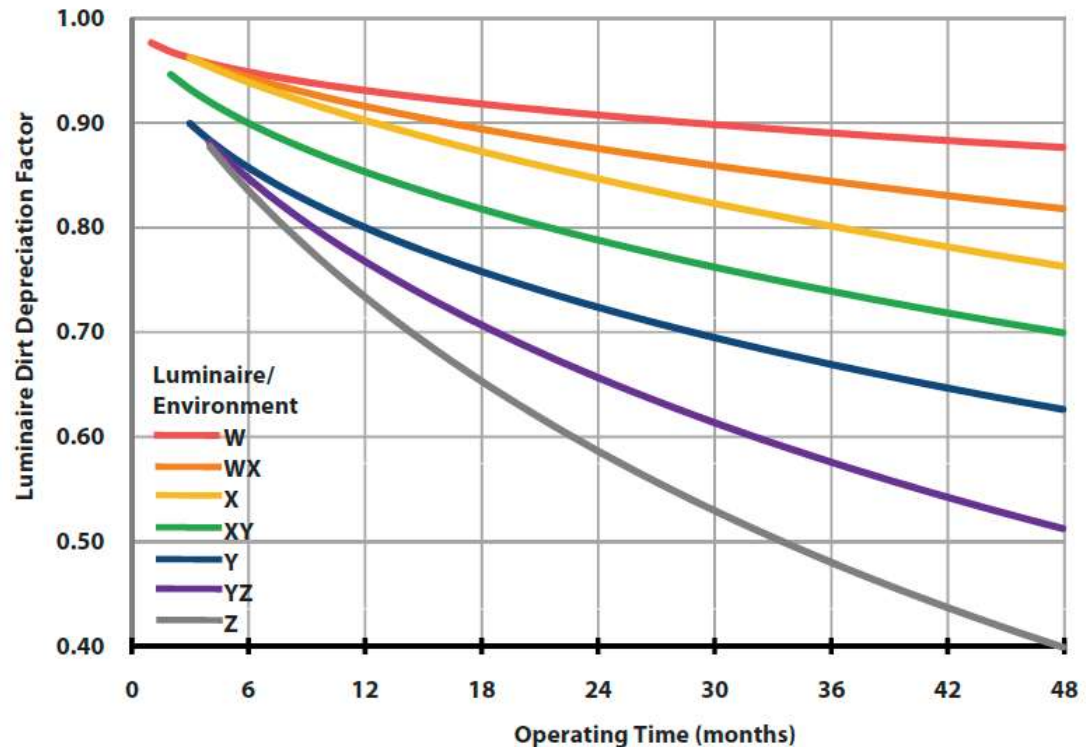
Angle	Cos	Sin	Tan
0	1.0000	0.0000	0.000
1	0.9998	0.0175	0.017
2	0.9994	0.0349	0.035
3	0.9986	0.0523	0.052
4	0.9976	0.0698	0.070
5	0.9962	0.0872	0.087
6	0.9945	0.1045	0.105
7	0.9925	0.1219	0.123
8	0.9903	0.1392	0.141
9	0.9877	0.1564	0.158
10	0.9848	0.1736	0.176
11	0.9816	0.1908	0.194
12	0.9781	0.2079	0.213
13	0.9744	0.2250	0.231
14	0.9703	0.2419	0.249
15	0.9659	0.2588	0.268
16	0.9613	0.2756	0.287
17	0.9563	0.2924	0.306
18	0.9511	0.3090	0.325
19	0.9455	0.3256	0.344
20	0.9397	0.3420	0.364
21	0.9336	0.3584	0.384
22	0.9272	0.3746	0.404
23	0.9205	0.3907	0.424
24	0.9135	0.4067	0.445
25	0.9063	0.4226	0.466
26	0.8988	0.4384	0.488
27	0.8910	0.4540	0.510
28	0.8829	0.4695	0.532
29	0.8746	0.4848	0.554
30	0.8660	0.5000	0.577

Angle	Cos	Sin	Tan
31	0.8572	0.5150	0.601
32	0.8480	0.5299	0.625
33	0.8387	0.5446	0.649
34	0.8290	0.5592	0.675
35	0.8192	0.5736	0.700
36	0.8090	0.5878	0.727
37	0.7986	0.6018	0.754
38	0.7880	0.6157	0.781
39	0.7771	0.6293	0.810
40	0.7660	0.6428	0.839
41	0.7547	0.6561	0.869
42	0.7431	0.6691	0.900
43	0.7314	0.6820	0.933
44	0.7193	0.6947	0.966
45	0.7071	0.7071	1.000
46	0.6947	0.7193	1.036
47	0.6820	0.7314	1.072
48	0.6691	0.7431	1.111
49	0.6561	0.7547	1.150
50	0.6428	0.7660	1.192
51	0.6293	0.7771	1.235
52	0.6157	0.7880	1.280
53	0.6018	0.7986	1.327
54	0.5878	0.8090	1.376
55	0.5736	0.8192	1.428
56	0.5592	0.8290	1.483
57	0.5446	0.8387	1.540
58	0.5299	0.8480	1.600
59	0.5150	0.8572	1.664
60	0.5000	0.8660	1.732

Angle	Cos	Sin	Tan
61	0.4848	0.8746	1.804
62	0.4695	0.8829	1.881
63	0.4540	0.8910	1.963
64	0.4384	0.8988	2.050
65	0.4226	0.9063	2.145
66	0.4067	0.9135	2.246
67	0.3907	0.9205	2.356
68	0.3746	0.9272	2.475
69	0.3584	0.9336	2.605
70	0.3420	0.9397	2.747
71	0.3256	0.9455	2.904
72	0.3090	0.9511	3.078
73	0.2924	0.9563	3.271
74	0.2756	0.9613	3.487
75	0.2588	0.9659	3.732
76	0.2419	0.9703	4.011
77	0.2250	0.9744	4.331
78	0.2079	0.9781	4.705
79	0.1908	0.9816	5.145
80	0.1736	0.9848	5.671
81	0.1564	0.9877	6.314
82	0.1392	0.9903	7.115
83	0.1219	0.9925	8.144
84	0.1045	0.9945	9.514
85	0.0872	0.9962	11.430
86	0.0698	0.9976	14.301
87	0.0523	0.9986	19.081
88	0.0349	0.9994	28.636
89	0.0175	0.9998	57.290
90	0.0000	1.0000	

$$LLF = LLD \times LDD \times BF \times LATF \times RSDD \times LSD \times LBO \times VTLF \times BLPF \times HETF \times EOF \times UDF$$

Classification	% Uplight	% Downlight	Typical Candlepower Distribution Curve
Direct	0-10%	90-100%	
Semi-Direct	10-40%	60-90%	
General Diffuse	40-60%	40-60%	
Semi-Indirect	60-90%	10-40%	
Indirect	90-100%	0-10%	



LDD

		Direct	Semi-Direct	General Diffuse	Semi-Indirect	Indirect
Percent Uplight →		0-10	10-40	40-60	60-90	90-100
Percent Downlight →		90-100	60-90	40-60	10-40	0-10
CLEAN environment	Open/Unventilated	W	W	W	X	X
	All Other	W	W	W	X	X
MODERATE environment	Open/Unventilated	XY	XY	XY	Y	Y
	All Other	X	X	X	Y	Y
DIRTY environment	Open/Unventilated	Z	Z	Z	Z	Z
	All Other	Y	Y	Y	Z	Z