

"Visual Comfort"

BedRoom-Lower Floor.

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VISUAL COMFORT:

DAYLIGHT FACTOR:

Daylight is the light originating from the whole of the overcast sky hemisphere, which acts as a diffuser of the light reaching it from the sun.

For examination of the flow of light into buildings and the development of prediction techniques, we going to use the Split flux method, it consists in consider the room as a closed box into which light is admitted through an aperture. We can distinguish the various paths along which light can reach a point inside the room:

(SC): light from the patch of sky visible at the point considered, expressed as the sky component.

(ERC): light reflected from opposing surfaces, expressed as the externally reflected component.

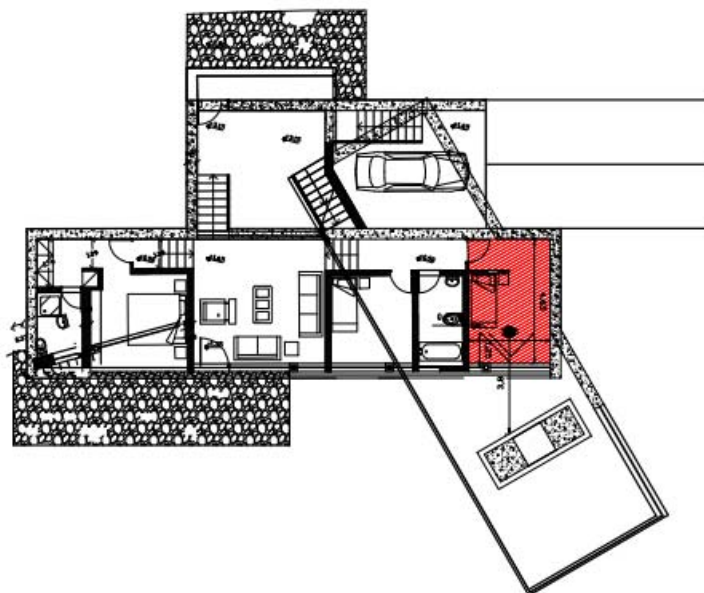
(IRC): light arriving at the point through an infinite number of possible paths, entering through the window, but reaching the point only after reflection from internal surfaces, expressed as the internally reflected component.

The Daylight Factor can be calculated applying the next formula:

$$DF = (SC + ERC + IRC) \times M \times G \times B$$

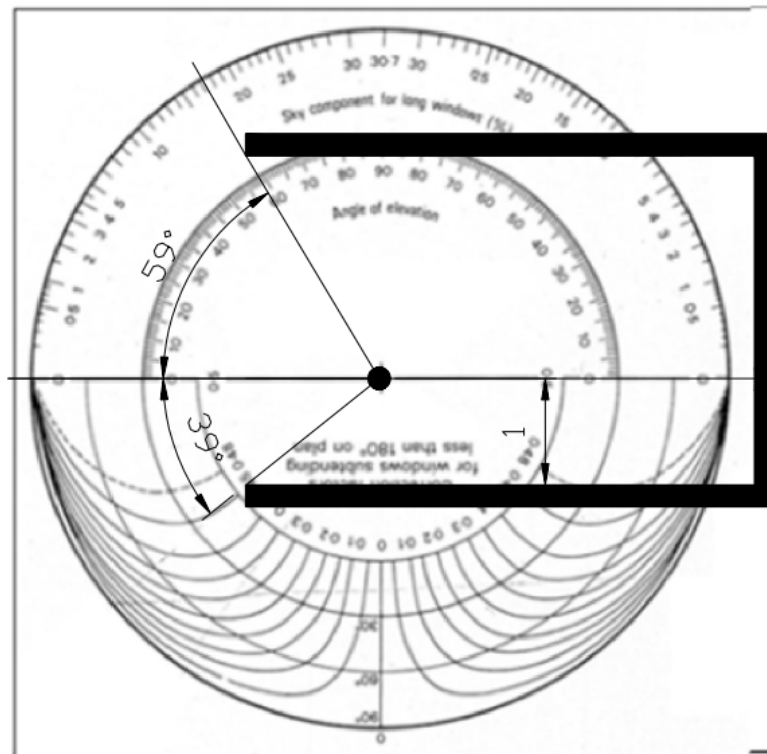
Where the corrector factors are:

- M: maintenance factor.
- G: glass factor.
- B: bars or framing factor.



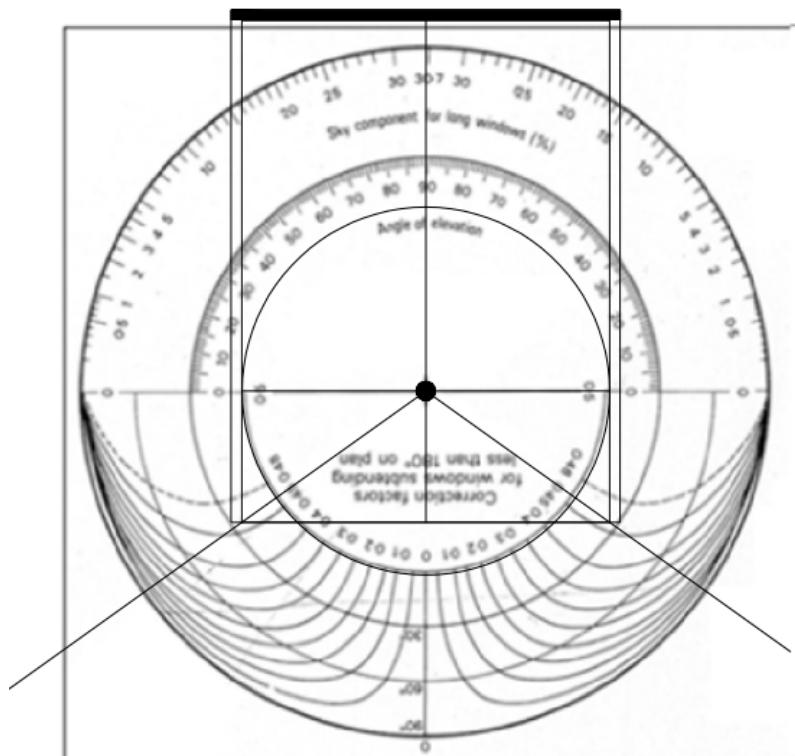
SKY COMPONENT (SC):

1° Vertical Section:



1. 59° ----- 17%
2. 39° ----- + 7%
- 98° ----- 24%

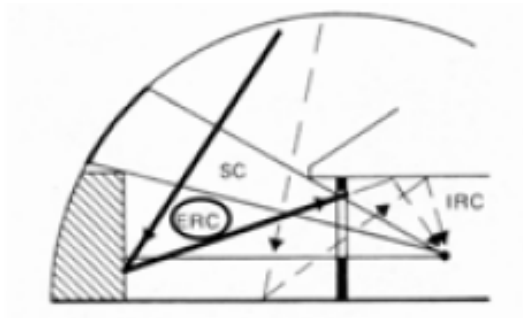
2° Horizontal Section:



$$\begin{array}{r}
 1. \quad 0,46 \\
 2. \quad + 0,46 \\
 \hline
 0,92
 \end{array}$$

$$SC = 24 \times 0,92 = 22,08\%$$

EXTERNALLY REFLECTED COMPONENT (ERC):



Coefficienti di assorbimento o di rimbalzo (riflettanza) in luce bianca di materiali edili di uso comune

Materiale e natura della superficie	Coefficiente di assorbimento	Coefficiente di rimbalzo
Intonaco comune bianco (latte di calce o simili) recente o carta	0,2	0,8
Intonaco comune o carta di colore molto chiaro (avorio, giallo, grigio)	0,3	0,7
Intonaco comune o carta di colore chiaro (grigio perla, avorio, giallo limone, rosa chiaro)	0,4 - 0,5	0,6 - 0,5
Intonaco comune o carta di colore medio (verde prato, azzurro chiaro, marrone chiaro)	0,5 - 0,7	0,5 - 0,3
Intonaco comune o carta di colore scuro (verde oliva, rosso)	0,7 - 0,9	0,3 - 0,1
Pavimenti di tinta chiara	0,4 - 0,6	0,6 - 0,4
Pavimenti di tinta scura	0,8 - 0,9	0,2 - 0,1
Alluminio	0,2 - 0,1	0,8 - 0,9
Vernice bianca	0,5	0,5
Smalto bianco	0,4	0,6
Plastica chiara	0,45	0,55

$$ERC = 0,2$$

INTERNALLY REFLECTED COMPONENT (IRC):

1° Find the ratio of window area to total surface area:

CEILING:

$$3,50 \times 4,65 = 14,18 \text{ m}^2$$

FLOOR:

$$3,05 \times 4,65 = 14,18 \text{ m}^2$$

WALLS:

$$4,65 \times 3,35 \times 2 = 31,155 \text{ m}^2$$

$$3,05 \times 3,35 \times 2 = 20,43 \text{ m}^2$$

$$\text{Total Surface (100\%)} = 79,95 \text{ m}^2$$

$$\text{Window area} = 3,05 \times 3,35 = 10,22 \text{ m}^2$$

$$\text{Ratio of window area} = 10,22 / 79,95 = 0,128 \text{ ----- } 12,8\%$$

This value must be located on the A Scale.

2° Find the average reflectance:

1. Find the ratio of wall area (including the window) to the total surface area and locate this value in the first column.

CEILING:

$$3,50 \times 4,65 = 14,18 \text{ m}^2$$

FLOOR:

$$3,05 \times 4,65 = 14,18 \text{ m}^2$$

WALLS:

$$4,65 \times 3,35 \times 2 = 31,155 \text{ m}^2$$

$$3,05 \times 3,35 \times 2 = 20,43 \text{ m}^2$$

$$\text{Total Surface (100\%)} = 79,95 \text{ m}^2$$

$$\text{Wall area} = (4,65 \times 3,35 \times 2) + (3,05 \times 3,35 \times 2) = 51,58 \text{ m}^2$$

$$\text{Ratio of wall area} = 51,58 / 79,95 = 0,64 \approx 0,64 \text{ ----- } 64\%$$

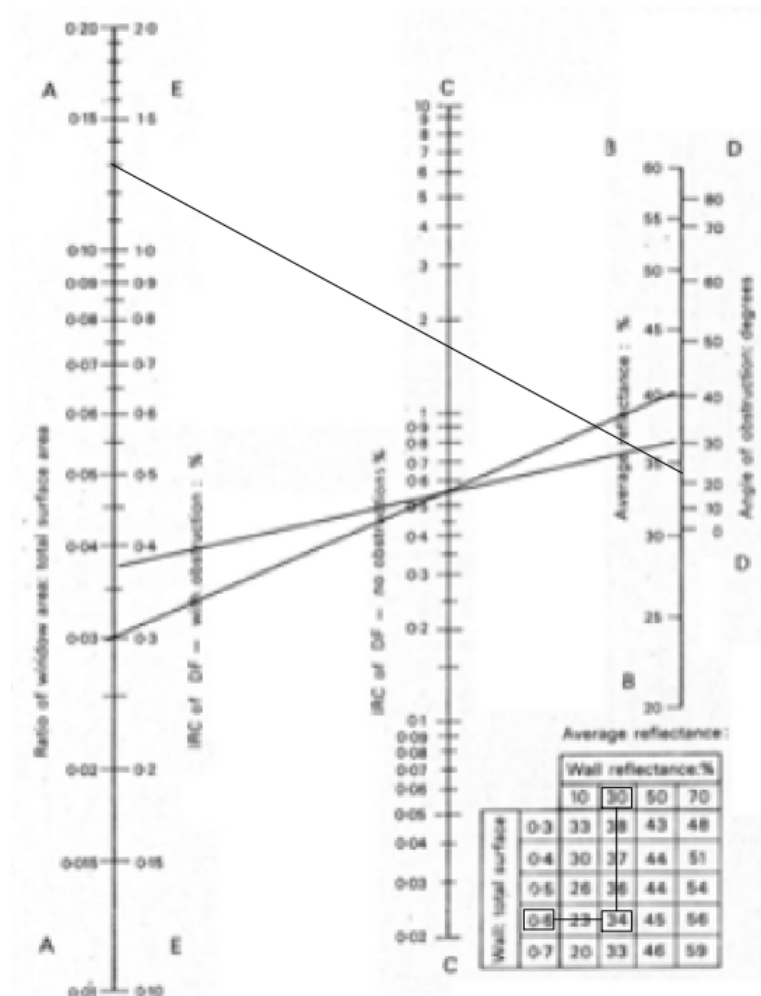
2. Find the wall reflectance.

The wall reflectance is 30% because two wall are stone and therefore dark and wall are light-colored finished.

3. Locate the value on the B Scale

$$\text{Value} = 34 \%$$

3° Lay a straight edge across these two points. Its intersection with scale C gives the IRC.



IRC = 1,8%

CORRECTOR FACTORS:

M:

Location	Slope	Room use	
		Non-industrial or clean industrial	Dirty industrial
Non-industrial area	Vertical	0.9	0.8
	Sloping	0.8	0.7
	Horizontal	0.7	0.6
Dirty industrial area	Vertical	0.8	0.7
	Sloping	0.7	0.6
	Horizontal	0.6	0.5

M = 0,7

G = 0,36

B = Nett glass area / Overall window area :

Overall window area = 10,22 m²

Frames surface = (0,05 x 3,05 x 3,35) = 0,511 m²

Nett glass area = 10,22 – 0,511 = 9,709 m²

B= Nett glass area / overall window area = 9,709 / 10,22 = 0,95.

DAYLIGHT FACTOR:

DF = (SC + ERC + IRC) x M x G x B = (22,08 + 0,2+ 1,8) x 0,7 x 0,36 x 0,95 = 5,76