"Visual Comfort"

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.

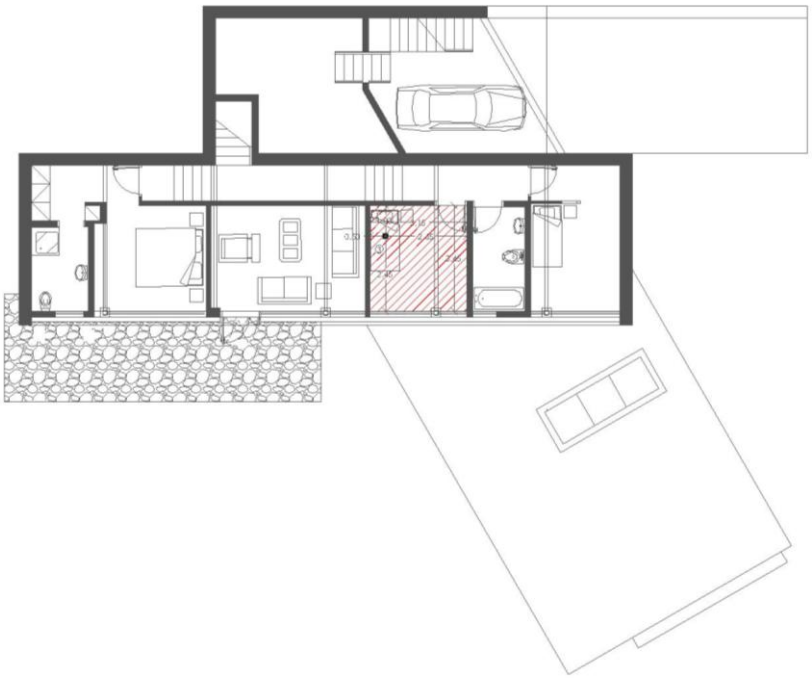
The Daylight Factor can be calculated applying the next formula:

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

Where the corrector factors are:

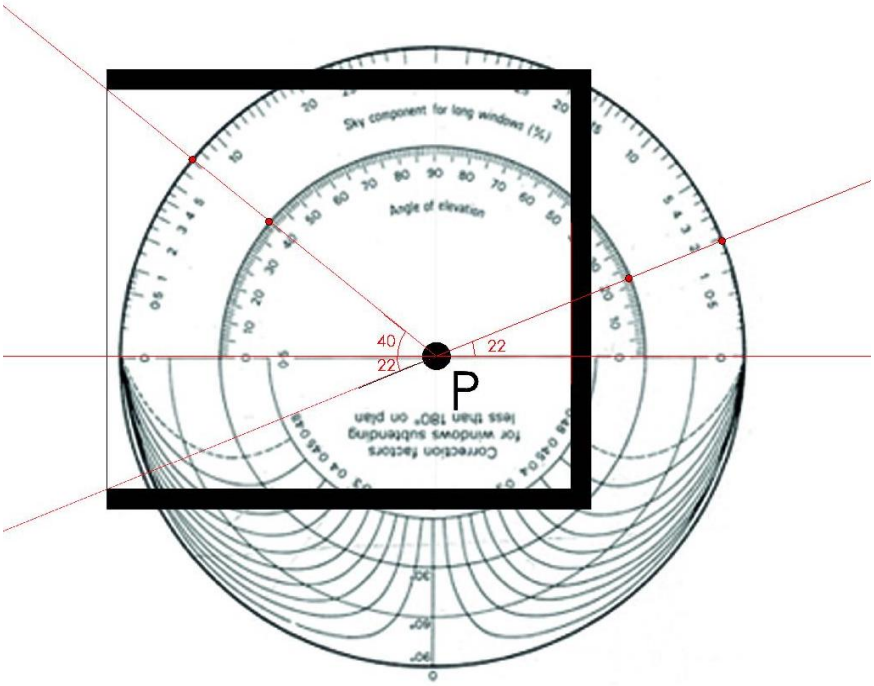
- **M: maintenance factor.**
- **G: glass factor.**
- **B: bars or framing factor.**

Location of the Room:



SKY COMPONENT (SC):

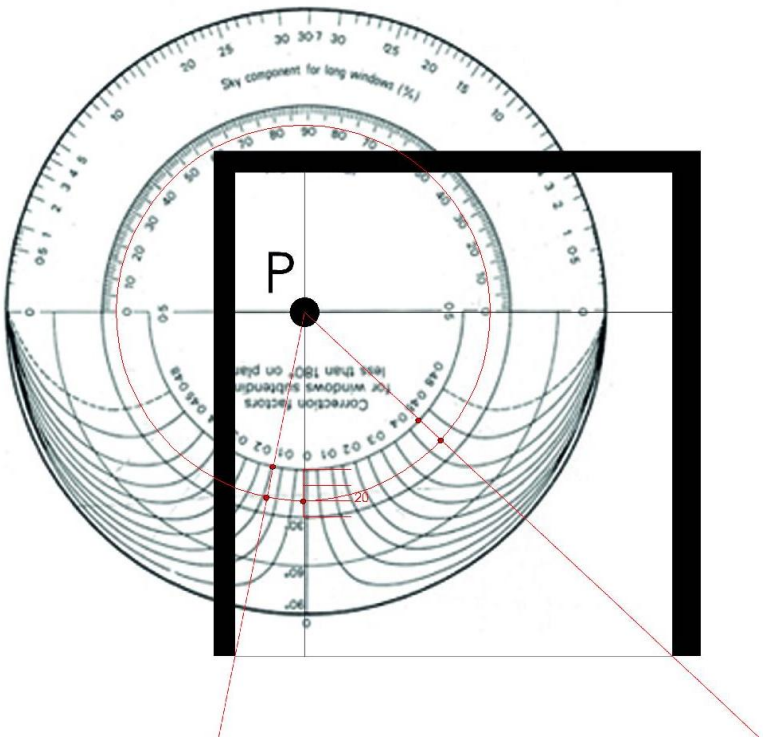
1° Vertical Section:



1. **40° ---- 7%**
2. **22° ---- + 2%**

62° ----- 9%

2º Horizontal Section:



1. 0.15
2. 0.43
0.58

SC = 9 x 0.58 = 5.22%

EXTERNALLY REFLECTED COMPONENT (ERC):

In this room there aren't some obstructions opposite the window, then the ERC value is "0".

ERC = 0

INTERNALLY REFLECTED COMPONENT (IRC):

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

3.45 x 3 x 2 = 20.7 m²
3.15 x 3 x 2 = 18.9 m²
3.15 x 3.45 x 2 = 21.74 m²

Total Surface (100%) = 61.34 m²
Window area = 3.15 x 3 = 9.45 m²

Ratio of window area = 9.45 m² / 61.34 m² ≈ 15 %

This value must be located on the A Scale.

2º 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.**
   Total Surface = 61.34 m²
   Wall area = (3.45 x 3 x 2) + (3.15 x 3) = 39.60 m²
   Ratio of wall area = (39.60 x 100) m² / 61.34 m² ≈ 64%

2. **Find the wall reflectance.**

   Generally for an office you it should this amount of wall reflectance should be considered:

- **70% reflectance from the ceiling**
- **50% reflectance from the walls**
- **20% reflectance from the floor**

Regarding the similarity between the function of this room and an office the value of wall Reflectance is = 50%

According to the table of Average Reflectance the value of Average Reflectance is ≈ 45

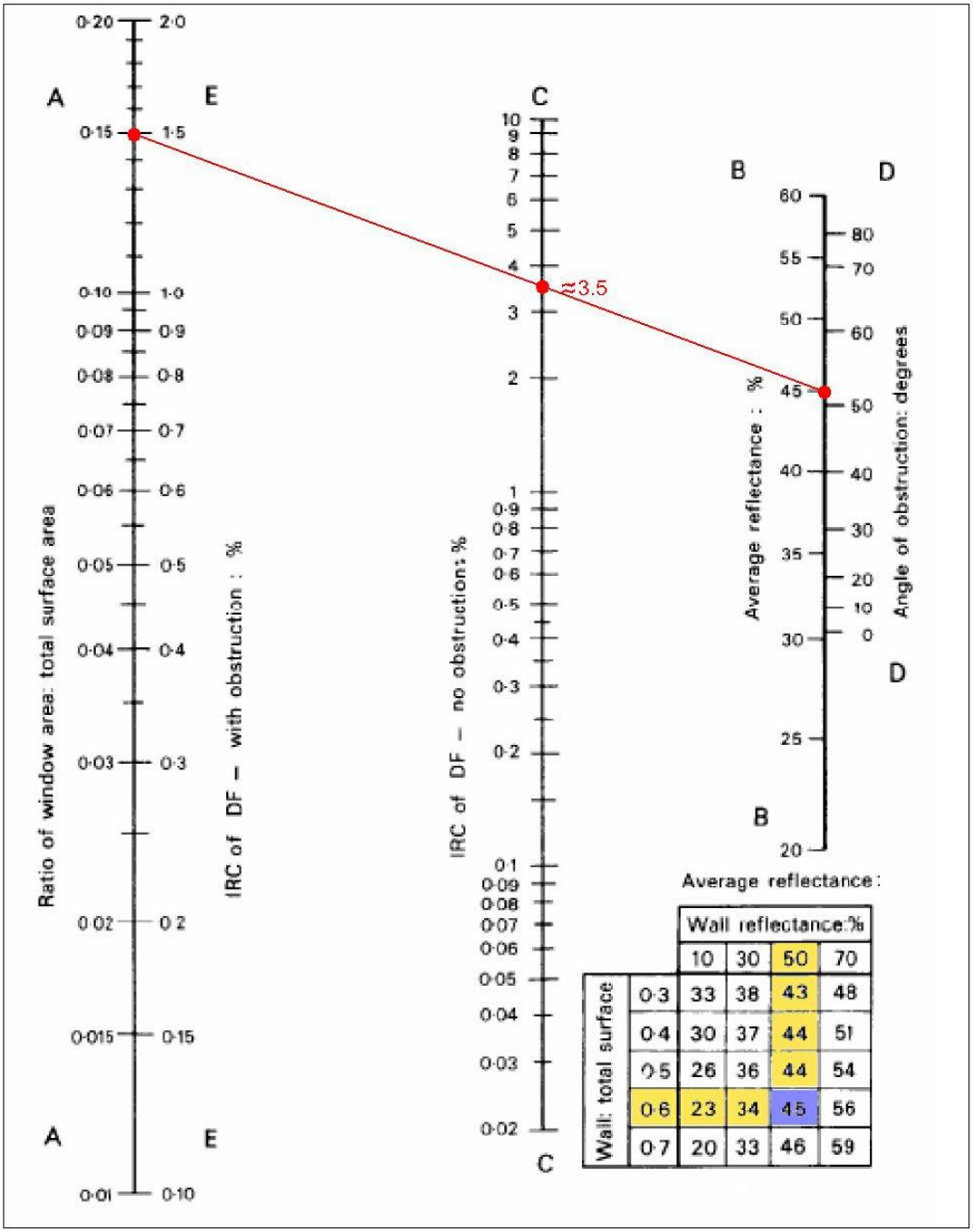
3. **Locate the value on the B Scale**

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

4º If there is an obstruction outside, the altitude angle of its top edge is to be located on scale D.

5º Lay a straight edge from this point of scale D through the point on scale C previously determined and the corrected IRC is found where this straight edge intersects scale E.

According to the table the value of IRC is = 3.5%



CORRECTOR FACTORS:

M (maintenance factor):

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

According to the table,
M = 0.7

G (glass factor):
G = 0.36

B (bars or framing factor):

B = Nett glass area / overall window area

B= 0.93

Now, the Daylight Factor can be calculated applying the next formula:

DF = (SC + ERC + IRC) x M x G x B

DF = (5.22 + 0 + 3.5) x 0.7 x 0.36 x 0.93 = 2.04 %