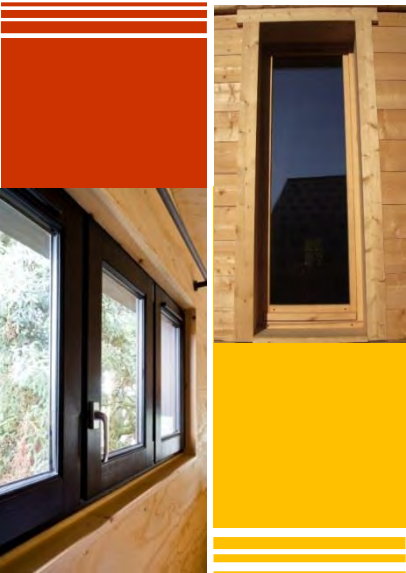




Policy development in France as example of national requirements of daylight factor

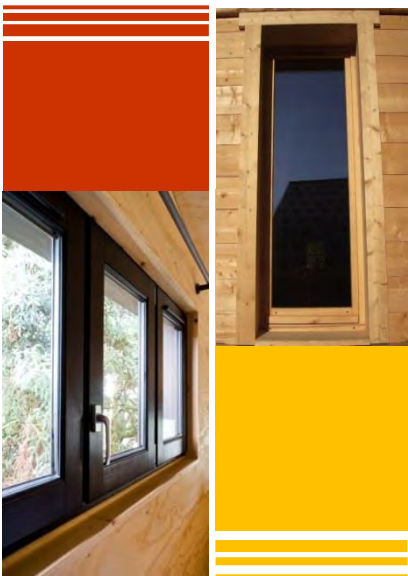


« Daylight by EuroWindoor »

21/09/2022



GENESIS OF EN 17037



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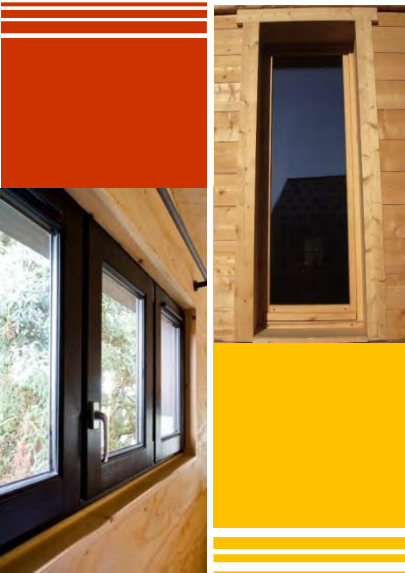
GENESIS OF EN 17037

■ Biophysiological needs

- Balance of circadian rhythms : minimum exposure to daylight
- Visual contact with external environment
- Openings to refresh indoor air and help maintain good air quality and reduction of summer discomfort without air conditioning

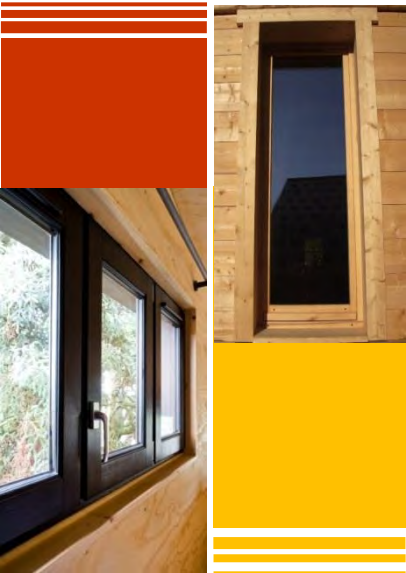
■ Standardized method and levels

- Complementary items :
 - Quantity of daylight
 - Quality of daylight
 - Quality of view
 - Control of glare
- Targets : Minimum, medium and high level in Europe





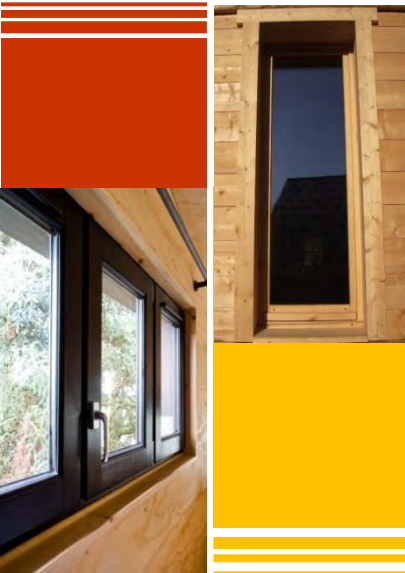
CONTEXT IN FRANCE



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NEW BUILDINGS AND DAYLIGHT

- From 1974 to 2021, 6 thermal regulations;
The last one is RT 2012
- Previous Thermal Regulation (RT2012),
Introduction of a minimum glazed surface:
 - Residential buildings : minimum glazed surface $\geq 1/6^{\text{th}}$ of habitable area (« 1/6th rule »)
 - Anticipated benefits : free solar gains (thermal et light)
 - Adaptations/exceptions :
 - Small habitable areas lodgings
 - Low availability of façade surface

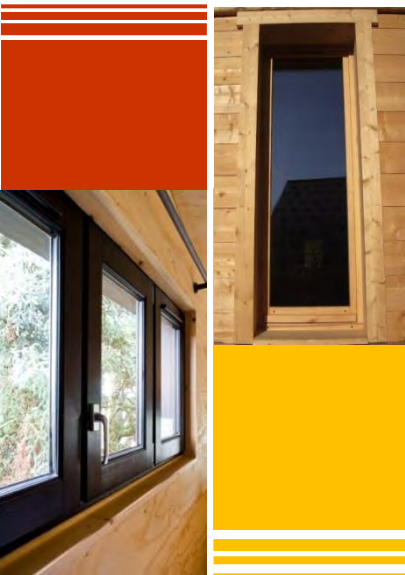


NEW BUILDINGS AND DAYLIGHT

■ From January 2022, residential buildings: New Environmental regulation (RE2020)

- For 2 years, legal obligation in France for construction regulations : **result requirement** as alternative to requirement of means
- **Summer comfort :**
 - **Introduction of Degree-Hour (DH) of discomfort** : 2 thresholds Dh_{low} and DH_{high}
 - If $Dh_{low} < DH < DH_{high}$: cooling needs integrated in Energy consumption (Cep) and Bioclimatic needs (Bbio)
 - Feedback : **$DH > Dh_{low}$ in most cases**
- **Carbon indicator (Ic) : $Ic < Ic_{max}$**

Threat : reduction of glazed surface in new buildings
Safeguard necessary to guarantee minimum surface of glazed area



RE2020 - FOCUS ON DAYLIGHT

• Global simple requirement (as in RT2012) :

- Total area of openings $\geq 1/6^{\text{th}}$ of habitable surface (« 1/6th rule »)

▪ Exceptions :

- Available area of facade $< \frac{1}{2}$ habitable area
- Mean habitable area per lodging $< 25 \text{ m}^2$



Total area of openings $\geq 1/3^{\text{rd}}$ of available area of facade.

OR

• 2 types of requirements (from EN 17037) :

▪ Daylight provision

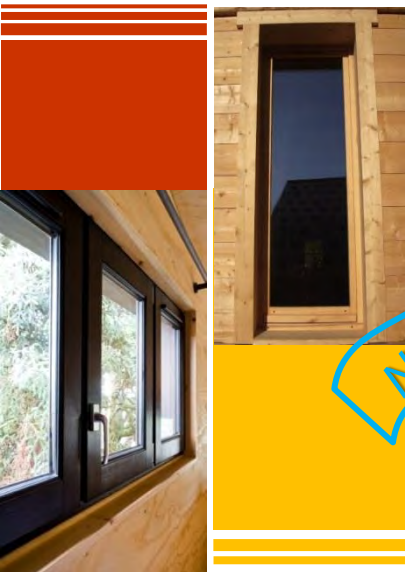
- Target daylight illuminance $\geq 300 \text{ lx}$ for 50% area of the space* for more than 50% daylit hours in the year (Target Daylight factor $\text{DT} \geq \text{D300} = 1,9 \%$ in Paris)

AND

- Minimum daylight illuminance $\geq 100 \text{ lx}$ for 95% area of the space, for more than 50% daylit hours in the year (Minimum Target Daylight factor $\text{DTM} \geq \text{D100} = 0,6 \%$ in Paris)

- Minimum view out in a space : in at least one principal room, occupants should have a view out on at least 2 layers beyond sky, landscape and ground), at a minimum 1 meter distance from the facade

*excepted transit space



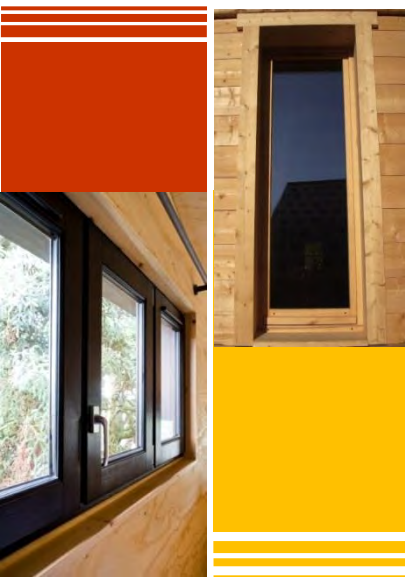
SENSITIVITY OF DAYLIGHT PROVISION TO AREA OF OPENINGS

CODIFAB Visualsense Project

Regulatory requirements :
 $DT \geq 1,9 \%$
 $DTM \geq 0,6 \%$
 (data for Paris from EN 17037)

Surface ratio of
 openings : 10 %
 $DT = 0,92 \%$
 $DTM = 0,36 \%$

Surface ratio of
 openings : 17 %
 $DT = 2,02 \%$
 $DTM = 0,73 \%$



SENSITIVITY OF DAYLIGHT PROVISION TO DISTRIBUTION OF OPENINGS

CODIFAB Visualsense Project

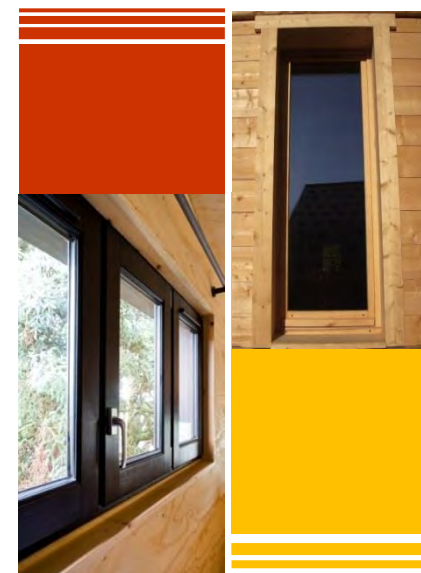
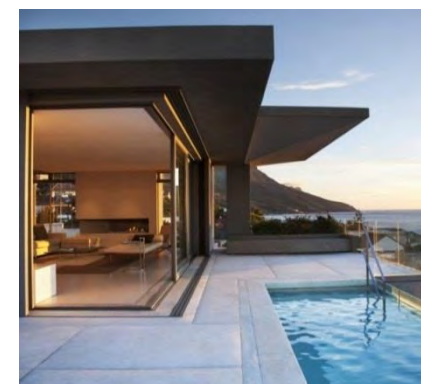
Regulatory requirements :
DT $\geq 1,9 \%$
DTM $\geq 0,6 \%$
(data for Paris from EN 17037)

Surface ratio of openings : 17 %
DT = 0,67 %
DTM = 0,19 %

For information without neighborhood masks :
DT = 1,87 %
DTM = 1,12 %

Surface ratio of openings : 17 %
DT = 1,22 %
DTM = 0,36 %

For information without neighborhood masks :
DT = 2,39 %
DTM = 1,26 %



OPTIMIZATION OF DAYLIGHTING

• Key parameters

○ Dimensions and position of openings

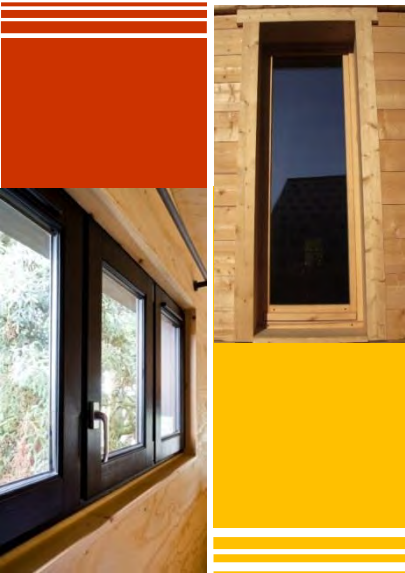
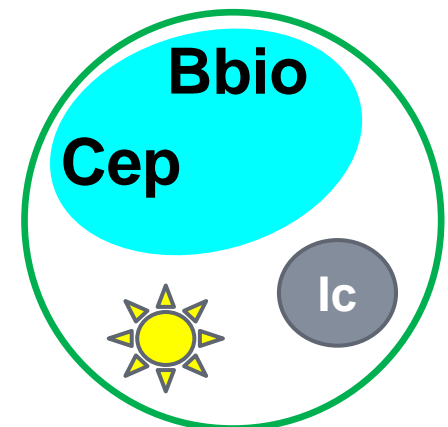
- Height and width
- 3D Position in the facade (plane and depth)

○ Useful data for illuminance (optical properties)

- Light Transmission TL of windows (direct and diffuse) with associated solar protections
- Neighborhood Masks (neighborhood)
- Properties of inner surfaces : color, reflectance

○ Global approach at building scale :

- Energy (Cep & Bbio)
- Summer comfort (DH)
- Carbon (Ic)
- Daylight (DT or 1/6th rule)



CONCLUSION



- Daylighting is **vital** for occupants
- Towards a **generalisation** to non residential buildings ?
- What solution to improve in existing buildings?
- Daylight provision and quality of view
 - **Global** Approach
 - **Early** Validation of project required
- New requirements RE2020 : an **opportunity** for conception

