


## REEFLEX

by Rodolphe Deborre / 2015-05-21 09:31:10 / Francia / 19742 / FR



**Primary energy need :**

57 kWhep/m<sup>2</sup>.an

(Calculation method : RT 2012 )

**ENERGY CONSUMPTION**

*Economical building*

< 50	<b>A</b>	<i>Building</i>
51 à 90	<b>B</b>	
91 à 150	<b>C</b>	
151 à 230	<b>D</b>	
231 à 330	<b>E</b>	
331 à 450	<b>F</b>	
> 450	<b>G</b>	

*Energy-intensive building*

**Building Type** : Student residence  
**Construction Year** : 2014  
**Delivery year** : 2015  
**Address 1 - street** : 59650 VILLENEUVE D'ASCQ, France  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 14 500 m<sup>2</sup>  
**Construction/refurbishment cost** : 21 400 000 €  
**Cost/m2** : 1475.86 €/m<sup>2</sup>

**Certifications :**



### General information

REEFLEX is a different international student residence that combines residence and hotel residence. This unique concept meets the housing needs short and medium stay (a few nights to months) of students, international students under exchange agreement and visiting scholars.

The residence is part of the policy of the University of Lille in environmental and energy transition and respect for the environment, politics embodied in the Covenant (Think, Act, Building for environmental and energy transition University Lille) and Zero Carbon goal in the regional context of the third industrial revolution in Nord-Pas-de-Calais (TRI).

REEFLEX meets the profile of certification Habitat & Environment.

### Sustainable development approach of the project owner

The sustainable development approach Rabot Dutilleul Construction is in line with that of the group Rabot Dutilleul. All operations we work on, are eco-designed with an AFNOR-certified ecodesign tool.

Here the REEFLEX residence : a living place designed to educate its occupants :

→ The architectural choices are explicit: differentiation of facades after a bioclimatic thoughtful approach between AMO and architects

→ The measuring equipment and support to track behavior in favor of the environment (see Reeflex website)

## Architectural description

The architectural peculiarity and innovation lie in the simplicity of the design and the fact that the project was designed as an educational tool. Absence of complex envelope elements allows a compacity that serves both thermal performance and maintenance as well as the aesthetics of the project.

## If you had to do it again?

Rabot Dutilleul Construction builds and designs such buildings every day with the goal to contribute improving territories as much as possible. Improvement in the meaning of 3 sustainable development pillars.

Especially in the Nord Pas de Calais region, the will to go further in the performance of Third Industrial Revolution: Renewable energies production and storage onsite, circular economy for the structural work.

## See more details about this project

<http://reeflex.univ-lille.fr/Etudiant-Telecom/Appartements/>

## Stakeholders

### Stakeholders

Function : Other consultancy agency

SYMOE

Victor Jumez

<http://www.symoe.fr/>

BE ENVIRONMENT

Function : Construction company

Rabot Dutilleul Construction

Thomas Poughon

<http://www.rabotdutilleulconstruction.com/>

Project director

Function : Designer

Boyeldieu Dehaene Architectes

## Contracting method

Other methods

[Conception Realisation](#)

## Energy

### Energy consumption

Primary energy need : 57,00 kWhep/m<sup>2</sup>.an

Primary energy need for standard building : 94,00 kWhep/m<sup>2</sup>.an

Calculation method : RT 2012

Breakdown for energy consumption : Heating: 19.2 kWhep / m<sup>2</sup> / year

Cooling: 0 kWhep / m<sup>2</sup> / year

Hot water: 30.5 kWhep / m<sup>2</sup> / year

Lighting 3.2 kWhep / m<sup>2</sup> / year

Auxiliaries 0.6 kWhep / m<sup>2</sup> / year

Ventilation 5.1 kWhep / m<sup>2</sup> / year

### Real final energy consumption

Final Energy : 53,00 kWhfep/m<sup>2</sup>.an

## Envelope performance

Envelope U-Value : 0,53 W.m<sup>-2</sup>.K<sup>-1</sup>

### More information :

Compositions of walls

Walls with external insulation :

16cm-thick concrete panel with external TH39 complement (11cm; foamed polystyrene)  $R \geq 2,82$  [m<sup>2</sup>.K/W]

Printed concrete wall with external insulation (only some parts of the groundfloor) :

18cm-thick concrete panel with external TH39 complement (11cm; foamed polystyrene) and 7cm-thick printed concrete  $R \geq 2,82$  [m<sup>2</sup>.K/W]

Printed concrete wall with internal insulation (only in some parts of the groundfloor) :

7cm-thick printed concrete wall, 18cm-thick concrete panel with 11cm-thick internal TH39 complement (foamed polystyrene).  $R \geq 2,82$  [m<sup>2</sup>.K/W]

Inner walls in non-heated rooms

17cm-thick concrete panel with 8cm-thick TH34 complement (Calibel type or equivalent).  $R \geq 2,35$  [m<sup>2</sup>.K/W]

Low floor and low floor on terrace :

20cm-thick reinforced concrete slab with 8cm-thick rigid TH34 insulation (foamed polystyrene).  $R \geq 2,35$  [m<sup>2</sup>.K/W]

Low floor in non-heated rooms or on the outside:

20cm-thick reinforced concrete slab with 15cm-thick TH36 insulation under the slab (FibraXtherm type or equivalent).  $R \geq 4,17$  [m<sup>2</sup>.K/W]

Common roof

20cm-thick reinforced concrete slab with 22cm-thick rigid TH34 external insulation (foamed polystyrene).  $R \geq 6,47$  [m<sup>2</sup>.K/W]

Steel trough roof (only on groundfloor)

Steel trough with 22cm-thick mineral wool external insulation TH37  $R \geq 5,95$  [m<sup>2</sup>.K/W]

Menuiseries aluminium à rupteurs de ponts thermiques intégrant un double vitrage (4/16/4 à remplissage Argon à 90%) pour les façades rideaux du rez de chaussée  $U_w = 1,6$  [W/m<sup>2</sup>.K]

Double-glazed PVC joinery (4/16/4 Argon-filled 90%) and PVC roller shutters according to the architect's blueprints (in all bedrooms).

$U_w = 1,4$  [W/m<sup>2</sup>.K]

$U$  (roller shutters casings) = 2 [W/m<sup>2</sup>.K]

Indicator : I4

Air Tightness Value : 0,75

## Renewables & systems

### Systems

Heating system :

- Urban network
- Water radiator

Hot water system :

- Urban network

Cooling system :

- No cooling system

Ventilation system :

- humidity sensitive Air Handling Unit (hygro A)

Renewable systems :

- No renewable energy systems

## Environment

### Urban environment

Land plot area : 28 150,00 m<sup>2</sup>

Built-up area : 4 300,00 %

Green space : 20 600,00

5 minutes walk to the metro; the residence is located at the heart of the Lille University Campus.

## Products

### Product

SOLEAL

TECHNAL

Resp commercial

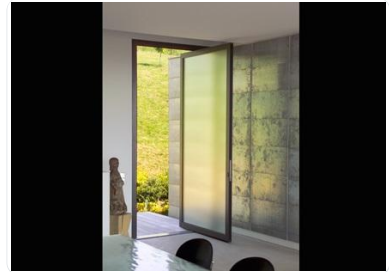
<http://www.technal.fr/fr/>

**Product category :** Table 'c21\_italy.innov\_category' doesn't exist SELECT one.innov\_category AS current,two.innov\_category AS parentFROM innov\_category AS oneINNER JOIN innov\_category AS two ON one.parent\_id = two.idWHERE one.state=1AND one.id = '10'

Joinery aluminum with thermal breakers incorporating double glazing (4/16/4 filled to 90% Argon) for curtain walls on the ground floor  $U_w = 1.6 [W / m^2K]$

Residence recognized for the quality of light

<https://www.construction21.org/france/data/sources/users/4713/12-chassisaluminium.doc>



Poplar wood siding openwork retified

Retiwood

contact commercial

<http://www.retiwood.com/>

**Product category :** Table 'c21\_italy.innov\_category' doesn't exist SELECT one.innov\_category AS current,two.innov\_category AS parentFROM innov\_category AS oneINNER JOIN innov\_category AS two ON one.parent\_id = two.idWHERE one.state=1AND one.id = '6'

Elegant and designed, openwork wood cladding permits various effects. Retification allows for Poplar, traditionally highly putrescible, to become a perfectly suitable essence for cladding. RETIwood Poplar, like other essences, is the subject of a specific supply mainly French.

No problem

<https://www.construction21.org/france/data/sources/users/4713/4-bardage-peuplier-retifie.doc>



## Costs

### Construction and exploitation costs

Cost of studies : 1 170 000 €

Total cost of the building : 21 400 000 €

## Health and comfort

### Indoor Air quality

Aqueous solvent-free paints were systematically used with heavy-metal-free mineral pigments. European Ecolabel was demanded, except in case it was impossible for the type of paint. Values 2010 European Directive 2004/42 / EC 4 on the limitation of VOC (Volatile Organic Compounds) are consistently met.

We banned even labeled:

- The products containing more than 2.5% of organic solvent and / or a VOC (volatile organic compounds) greater than 1.5 g / l of product.
- Products containing pigments based on heavy metals (lead, cadmium, chromium).
- Products containing glycol ethers classified as reprotoxic class II.

Floor coverings:

The falls have been recovered and stored in big bags and collected by the supplier specifically with recovery certificate. PVC flooring proposed must contain a minimum of 25% recycled material. Other types of soils were subjected to validation E. VOC and formaldehyde emission rate of these products are known and communicated to BE HQE. Flooring manufacturing factory certified ISO 14001.

Indeed, for the housing of the residence, the floor is PVC-type category UP4 (recycled and natural) with zero tolerance vis-à-vis the emissions of volatile organic compounds. For commonplaces (movements, in living areas, ...), the majority of soil is tiled so no VOC emissions.

"Our childcare center: a healthy space, a space of life"

The coating of the crib will be without emission of volatile organic compounds and artificial green spaces are antibacterial certified to ensure good health of children who occupy it. These supports are specially designed for use in a nursery. Artificial grass is fire resistant, tear and easy to clean.

The murals are also certified VOC.

## Carbon

### GHG emissions

GHG in use : 21,00 KgCO<sub>2</sub>/m<sup>2</sup>/an

### Life Cycle Analysis

**Eco-design material** : The openwork wood cladding used on the international residence and the childcare center is made of retified poplar. Traditionnally very putrescible, poplar transforms into a very suitable essence for cladding, once retified. The wood use din this building is healthy, treated against fungus and insects. It complies with CE, NF, FSC, PEFC, CTB.

<https://www.construction21.org/france/data/sources/users/4713/lmh010proroefflexnote-environnementalesymoe.doc>

## Contest

### Reasons for participating in the competition(s)

The REEFLEX residence : a living place designed to educate its innocupants :

- Architectural choices (distinct façades) were made from bio-climatic principles
- Monitoring equipments give the possibility of an environmentally-friendly behaviour.

Environnemental orientations

- East/West orientation of the façades facilitates sunlight inputs
- Compacity and 11cm-thick wall insulation allow a 20% greater performance than the RT2012 levels (French Thermal regulation) matching the Effinergie+ label.
- Large window bays boost the Daylight factor and permit the innocupant to live without artificial lighting 50% of the time.
- Light input is controlled by roller shutters.
- Choice of low environmental impact materials (wooden façade, non-polluting materials, matériaux non-polluants, PVC floorings)

Life inside the residence

- Circulations with natural light offer an atmosphere of great quality.
- Effective acoustic work in the common areas and in the housings in accordance with themtics AI and AE of the "Habitat & Environnement" referential.
- The building is fully accessible to people with disabilities and reduced mobility, according to the Accessibility thematic of the "Habitat & Environnement" referential.
- Outside areas offer humid zones contributing to summer comfort.

Controlled global consumptions

- Consumptions reduced by 10% compared to RT2012 (60% vs the RT2005) or 10,000€/year (50,000€/year for RT2005).
- The processes implemented to control the power consumptions (switches with badges) generate 5,000€/year savings.

### Building candidate in the category



Matériaux bio-sourcés et recyclés





Bâtiment zéro énergie



Santé et confort



Date Export : 20230310050530