Municipal Technical Center - La Roche Sur Yon

by Tugdual ALLAIN / 2018-04-17 11:29:05 / Francia / 7970 / FR

Primary energy need :

59.1 kWhep/m².an

(Calculation method : RT 2012)

ENERGY CONSUMPTION

Economical building

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

Energy-intensive building

Building **A**

Building Type : Factories
Construction Year : 2014
Delivery year : 2015
Address 1 - street : 85000 LA ROCHE SUR YON, France
Climate zone : [Cfc] Marine Cool Winter & summer- Mild with no dry season.

Net Floor Area : 1 270 m²
Construction/refurbishment cost : 823 819 €
Number of Installed Kw : 12 Installed Kw
Cost/m2 : 648.68 €/m²

Certifications :

General information

On this project, **the initial objective of the contracting authority was the partial demolition of municipal technical center and the creation of a new building with a standard thermal performance level** (RT2012 for the office and workshop area at 12 ° C therefore outside the box RT). The project manager convinced the client to build the building according to the Passivhaus standard, assuring him that the initial budget would be retained. **In the end, the building was built for less than the budget: the initial budget was € 1,700,000 excluding tax for a total construction cost of € 1,471,400 excluding tax.** To achieve this level of performance at low cost, the passive concept was applied to this industrial building using simple and prefabricated industrial construction processes, coupled with a simplification of technical systems. The building envelope is made of **metal frame with walls made of polyurethane sandwich panels, usually used in the development of negative cold rooms** . The concrete floor of the locker room is also insulated with polyurethane while for the workshop, it has been favored a vertical peripheral insulation of a height of 1.2m. The roof in steel tank is insulated uniformly on the 2 areas with placement of rockwool and polyurethane (U = 0.106W / m².K). Finally, this powerful thermal envelope is completed by the establishment of **triple joinery glazing on the cloakroom AND on**

the workshop (MINCO chassis for locker rooms and STABALUX for the workshop) as well as insulating and waterproof sectional doors (DPU from Hormann: Up = 0.44W / m².K) With these constructive methods set a rigorous implementation, **the airtightness reached at the end of construction is 0.44 volume per hour on 50 Pascal.** To ensure air renewal, **a single Passivhaus-certified Helios double flow control unit** is used. **The building thus designed has a heating requirement of 8kWh / m².an** (12 kWh / m² for the locker rooms and 7 kWh / m² for the workshop) with an average temperature of 20 ° C in the changing rooms and 17 ° C in the workshop.
For heating, given the very low requirements and in order to reduce the overall cost, the transmitters are simple electrical panels in the locker rooms and electric radiant cassettes for the workshop. The production of domestic hot water of the workshop is also electric, with the installation of small balloons near the points of drawing. The sanitary hot water of the locker rooms is produced by a solar thermal system from Viessmann with installation of vacuum panels installed on the plane of the sunscreens of the South facade. This passive building is in the process of being certified. It guarantees users exceptional comfort compared to the level initially planned.

Sustainable development approach of the project owner

The choice of passive construction is part of the energy saving approach of the city

Architectural description

The building is industrial type meeting the needs of functionality and economy.

Stakeholders

Contractor

Name : City of Roche sur Yon
Contact : M. Damien BULTEAU - bulteaud@ville-larochesuryon.fr - 02.51.47.47.52
http://www.larochesuryon.fr/

Construction Manager

Name : KASO Architecte
Contact : M. Bruno MARTIN - bruno.martin@kaso-archi.fr
http://www.kaso-archi.fr/

Stakeholders

Function : Thermal consultancy agency

Equipe Ingénierie

M. Tugdual ALLAIN - t.allain@equipe-ing.fr - 02.41.55.35.21

http://www.equipe-ingenierie.fr/
Thermal design office, structure, construction economics and OPC + prime contractor

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Function : Other consultancy agency

SETHEL

M Jean Marc LE CANN - contact@sethel.fr

Fluid studies office

Contracting method

Separate batches

Type of market

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Energy

Energy consumption

Primary energy need : 59,10 kWhep/m^2.an
Primary energy need for standard building : 132,10 kWhep/m^2.an

Calculation method : RT 2012

CEEB : 0.0001

Breakdown for energy consumption : According to PHPP calculation Heating = 9.6kWh / m².year ECS = 11.8 kWh / m².year Lighting = 19.0kWh / m².year Ventilation = 1.1kWh / m².year Other uses = 0.9kWh / m².year

Real final energy consumption

Final Energy : 42,40 kWhef/m^2.an

Real final energy consumption/m2 : 18,00 kWhef/m^2.an

Real final energy consumption/functional unit : 1 460,00 kWhef/m^2.an

Year of the real energy consumption : 2 016

Envelope performance

Envelope U-Value : 0,18 W.m^{-2}.K^{-1}

More information :
Internal metal structure wrapped by walls of polyurethane sandwich panels usually used for the walls of negative cold rooms.
For locker rooms, the walls are 150mm Kingspan polyurethane panels with a complement of 140mm inner glass wool for performance U = 0.1W / m².K
For the workshop, the walls are in Kinspan KS 1180 AB sandwich panels of 220mm for a performance U = 0.11W / m².K
The slab of the locker room is insulated on the underside by 120mm of polyurethane (U = 0.182W / m².K)
The slab of the workshops is not insulated on the underside. Vertical peripheral insulation of 120mm is implemented over a height of 1.2m.
The roof is made of polyurethane insulated steel tank and rock rock wool for a performance U = 0.10W / m².K
The thermal envelope is completed by the implementation of wood-aluminum triple-glazed joinery for cloakrooms and aluminum for the workshop (Uw implementation = 1.05W / m².K)
Sectional doors are also very efficient, Hormann type DPU (U = 0.44W / m².K)

Building Compactness Coefficient : 0,48

Indicator : n50

Air Tightness Value : 0,44

More information

The monitoring of actual consumption in 2016 and 2017 shows that the final energy consumption of the building is 18kWh / m².year against 42kWh / m². year in the PHPP calculation. It is explained by: - the low use of heating in the workshops (0.9kWh / m².year against 8.8kWh / m².year estimated in the calculation) - the less important use of the lighting of the building (9.1kWh / m².year against 19.0kWh / m².year in the calculation PHPP For ventilation and heating cloakrooms, consumption is very similar to PHPP calculation

Renewables & systems

Systems

Heating system :
- Electric radiator

Hot water system :
- Solar Thermal

Cooling system :
- No cooling system

Ventilation system :
- Nocturnal ventilation
- Single flow
- Double flow heat exchanger

Renewable systems :
- Solar Thermal

Renewable energy production : 10,00 %

Other information on HVAC :
Helios KWL EC 1400 Double Flow System certified by PHI (82%) for changing rooms
Workshop ventilation linked to the process: 2 exhaust extractors and an extractor linked to the welding workshop with compensation but with a maximum operation of 2h / j

Solutions enhancing nature free gains :
Ventilation naturelle estivale des ateliers et des vestiaires pour éviter de rafraichir

Environment

Urban environment

Land plot area : 36 292,00 m^2

Built-up area : 25,00 %

The project is part of an industrial site gathering all the technical activities of the city of rock on yon.

Products

Product

Metal sandwich panel Ks 1180 AB

Kingspan

https://www.kingspan.com/fr/fr-fr/contact

https://www.kingspan.com/fr/fr-fr

Product category : Table 'c21_spain.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 = '8'

Metal sandwich panel with 220mm filling of polyurethane

Costs

Construction and exploitation costs

Cost of studies : 134 500 €

Total cost of the building : 1 471 400 €

Health and comfort

Water management

Consumption from water network : 38,00 m^3

Consumption of harvested rainwater : 1 488,00 m^3

Water Self Sufficiency Index : 0.98

Water Consumption/m2 : 0.03

Water Consumption/Installed Kw : 3.17

Data from water meter readings.

Recovery of rainwater roofing in tarpaulins (3x50m3) for the supply of sanitary facilities, the vehicle washing station and the maintenance of outdoor spaces

Carbon

GHG emissions

GHG in use : 94,38 $KgCO_2/m^2$/an

Methodology used :

Calculation following label E + C- (software pléaide)

GHG before use : 848,54 $KgCO_2$ /m^2

Building lifetime : 50,00 année(s)

, ie xx in use years : 8.99

GHG Cradle to Grave : 47 000,00 $KgCO_2$ /m^2

Perimeter on the building only. Calculation method of the E + C label

Resultat E3 C2

Life Cycle Analysis

Eco-design material :

No ecomaterial for a project whose objective was the low cost of construction with the best energy performance (Passivhaus).

The use of prefabricated industrial materials is consistent with the function of the site.

Contest

Reasons for participating in the competition(s)

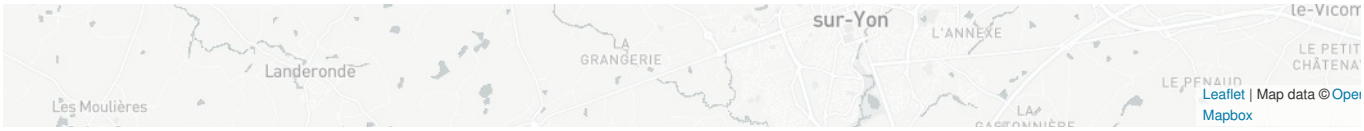
- **Energy =** The building complies with the Passivhaus standard with heating requirements of 8kWh / m².year and total primary energy consumption of 92 kWhEP / m².year, all with a construction price of 800 € / m² (excluding process), lower than the initial budget of the customer who wanted a building compliant with the French regulatory standard. The overall cost of the project is really optimized and the operating and maintenance costs are very low given the simplification of systems.
- **Comfort** = Compared to the initial demand of a standard building, the gain in comfort is very important because there is no thermal obligation to isolate an industrial building simply maintained at 12 ° C. With the passive design, all the walls are insulated to guarantee a U performance.

Building candidate in the category

Energie & Climats Tempérés

Coup de Cœur des Internautes

Prix des Etudiants



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