

Zaranda House

Last modified by the author on 11/02/2013 - 00:00

Building Type : Isolated or semi-detached house
Construction Year : 2012
Delivery year :
Address 1 - street : Avda. Picos de Europa 141 21122 ALJARAQUE, (HUELVA), España
Climate zone : [BSh] Subtropical Dry Semiarid (Steppe)

Net Floor Area : 659 m² Superficie útil
Construction/refurbishment cost : 525 980 €
Number of Dwelling : 1 Dwelling
Cost/m2 : 798.15 €/m²

General information

Nearly zero energy single family home in warm climate, built with a massive construction system and a cost of less than 1000 €/m². The house gets a good level of the indoor comfort without air conditioning even at extreme summer conditions (temperatures in summer are above 40°C and 95% of relative humidity).

It takes full advantage of the passive systems at its disposal: large envelope insulation, carefully studied solar protection in the openings design, indoor air free-cooling using a buried pipe working as an earth-to air heat exchanger and night ventilation helped by the chimney effect produced in the covered patio

See more details about this project

<http://passiv.de/en/>

Data reliability

3rd part certified

Stakeholders

Stakeholders

Function : Designer
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Contracting method

Maximum Guaranteed Price

Owner approach of sustainability

The house owners are a married couple with medium purchasing power and a high cultural level. They do not have any particular sensitivity related to energy efficiency. They have classicist aesthetic preferences, but they are willing to listen and both are able to being advised. After several meeting to understand the true nature of the job, it took clear the four impositions of the property: - Oversized spaces. - Rooms organized around a central patio. - Large dressing room attached to the master bedroom. - The lowest maintenance as possible during the useful life of the house. The owners authorized the architectural firm (LAR Arquitectura) to make a proposal based on the specific conditions of the site and they agreed that the house was monitored and will be held control of it once inhabited. Already in the earliest sketches of the project that the architectural firm had the intention to built a house open to the south facing and organized around a central patio, which are two bases of bioclimatic architecture. The targets set by the architects in the early project are: - Choosing the right buildable plot to maximize the southern orientation. - Inner patio covered with a glazed skylight. - Big openings to relate indoors and outdoors spaces. - Removing all the architectural barriers. As demonstrated in the house final image, the architects believed that you could built a nearly zero energy house with the currently accepted aesthetic criteria and according to the wishes of the users, by having in mind (from the beginning of the design process) to encourage the use of the passive strategies indicated in our climate and the use of renewable energy: - It is very important to define the thermal envelope and the airtight envelope of the building from the earliest planning stages. - Use solutions to take advantage of the thermal inertia of the envelope to accumulate heat during the day and transfer it indoor spaces later in the evening. - Use a very low transmittance envelope to prevent the cold wall withdrawal. - The passive cooling needed in our climate is achieved using a pair of motorized windows in the skylight for night ventilation. - Large external openings to receive the most of natural light as possible. - Use horizontal cantilevers to shade properly the external openings and avoid a possible overheating in summer. - Use solar heater panels to produce domestic hot water and heating. - Installation of a buried pipe that works as an air-to-earth heat exchanger that accommodates the ventilation air temperature for free, both in winter and summer. All of this must be complemented by good materials (light colors on exteriors finishes, insulation), an exhaustive control of the execution of the building works (eliminating thermal bridges and air infiltration), on the side of a correct use of energy .

Architectural description

1. FUNCTIONAL ASPECTS The Building is divided into two upper floors and an underground one, connected by stairs and a lift. The basement is dedicated to garage and others like machine room, storage rooms, winery, etc. On the upper floors the house develops itself. The distribution is solved around an inside double height central patio from which access to the different rooms and where the vertical communication nodes are located. On the ground floor are the daytime rooms and a guest room with its private bathroom, while the main floor is for bedrooms and its annexed rooms and a library opened to the double height of the living room. The patio, meaning the open space locked inside a building, is a constant of Mediterranean architecture. Being in a warm climate, the patio can be used as a livable space of the house during most of the year. In addition to its symbolic importance as center of the house that helps us to find the meaning of the building, the patio is primarily serving enclosed spaces that lie around. The patio provides them with natural light and good ventilation and serves as an intermediate space between the outdoor conditions and interior ones. In winter, the house captures the most solar radiation possible through the skylight and the patio connects both floors, allowing air stratification. Hot air rises and is distributed through rooms on the upper floor. In summer, it allows fresh air circulation. Next to the skylight there is a white lacquered aluminum sill window with thermal bridge break for proper and checked night ventilation to cool the thermal mass of the walls that form the patio. During daylight hours the patio must be protected from solar radiation by extensible awnings so you can keep as much cold as possible that has caught overnight. It intended to create a strong relationship between inside and the outside space. The house opens to the southern facade by large glazed openings accompanied by horizontal solar protections because of their orientation. This search of convert the outdoor space into indoor one and gets more spatiality in the interior rooms causes

twists, inclinations and different heights that only pretend to serve housing users, away from purely aesthetic wishes. In the southern part of the plot is placed a pool and a lounge area attached to the enclosure wall that separates the house of the existing parkland existing in the complex. The lounge area will be covered with awnings and a very light metal pergola. As demonstrated in the house final image, you can get a very nearly zero energy building using currently accepted aesthetic standards.

2. CONSTRUCTIVE ASPECTS

The house is resolved with concrete structure consists of frames and second-order beams that supports unidirectional forged with joist and concrete filler blocks. For the foundation we have used a reinforced concrete foundation slab. Although in the geotechnical survey made in the plot there are not detected expansivity indices, 50% of the active layer below the support plane of the foundation was substituted by a selected filler material. Considering that the original level of the plot was lower than the access road, once the foundation is executed we proceeded to fill the plot with the land from the excavation. So is achieved that the entire plot has a final elevation equal to the access road. There are two roof types in the housing: 1) The higher one is projected as not visitable plane inverted cover with white rolled arid termination. The gables are formed by vapor barred made with an asphalt base; lightened concrete layer of 15 cm average thickness; regularization by mortar layer; modified bitumen membrane IBM-48 with double polyethylene reinforcement; perforation resistant protective layer and finished with light colored loose gravel of 5 cm thick. The roof is crown with a brick parapet wall on the full perimeter of the building finished with an artificial stone. 2) The cover of the outdoor terrace and the inclined plane are projected as a passable cover with the same light-covered finish of the facades. It is made with passable roof flaps formed by a vapor barrier made of asphalt base; extruded polystyrene sheet (8 mm thick); lightened concrete layer of 15 cm average thickness; regularization by mortar layer; modified bitumen membrane with 4 mm thickness with double polyethylene reinforcement; concrete protection layer and finished with stoneware tiles received with bastard mortar and joints of 8 to 10 mm. The building enclosures are composed, from outside to inside, of a cream color porcelain tiling (60x30 cm and 11 mm of thickness); cement mortar plastering of 20 mm thick; wall made with perforated ceramic bricks (225x100x90) to coat on its outer face and 15 mm thick of cement mortar; Isover Arena Plus insulation 2x45mm (90 mm final thickness); air space with an average thickness of 70 mm finished inside with a double hollow brick wall 230x100x90 mm and 15 mm thick plaster with Yesal s-70 and tiling made with large porcelain tiles. Interior partitions are projected as ceramic brick walls with different thickness as needed by acoustic requirements. In general, the facades of the house are placated with light colored stoneware tiles fixed to the enclosure. The external doors and windows are PVC frames with a thermal transmittance $U=1.7 \text{ W/m}^2\text{K}$. In addition to the concrete cantilevers that protect the south façade, openings are protected with an outer roller shade. All the glazed openings have a thermo-acoustic glass formed by a colorless 3+3 mm thick glass outside, dehydrated air space 12 mm thickness and colorless 6 mm thick glass inside, and metal drying separator frame with a double sealing at the perimeter, placed with continuous neoprene profile (U form) and fixed with glazing beads. The patio is covered with a skylight formed by a curtain wall made with 180mm white lacquered aluminum profiles anchored to the roof. Here it is used a glass made of 8 mm tempered glass outside, 12 mm of air space in the middle and a low emissive (sun guard, light gray colored) safety 3+3 glass inside. Next to the skylight there is a white lacquered aluminum window sill with thermal bridge break (model GPR-52 by Galisur). The house has all the typical systems of its type of building: polypropylene pipes plumbing, sanitation, electric system and lighting, grounding equipment, data system and gas system. It is also included an under floor heating system all over the house, except in the rooms which, by its use, is not considered to be heated.

3. ENERGETIC ASPECTS

The house is projected to consume as little energy as possible. The interior distribution and the study of their openings mean that, in summer, it is properly protected from the sun and allows good ventilation. The concrete cantilever above the large opening of the living room (which is maximized to favor indoor spaces, including the library upstairs) is oversized up to 4.5 m to generate a permanent shadow outdoor terrace, which is essential in order to use the house in summer in this location. Taking advantage of the south orientation and correct design of window protections, you can get a successful daylighting level in every room. Artificial illumination is resolved with LED luminaries to reduce the electricity bill. - Insulation It is used a higher standard of thermal insulation above the minimum according to Spanish legislation. The final thickness and type of insulation according to the zone is: 1) Double Isover Arena Plus panel, 2x45 mm (total thickness 90 mm) in facades. 2) Four layers of 40 mm thick high density cover rigid Isover 150 panel formed by waterproof Rockwool (total thickness 16 cm). 3) Under the ground floor, in addition to the under floor insulation, is placed a rigid panel of flooring formed by high density Isover mineral wool panel (2 cm thickness). 4) On the porches, to avoid thermal bridges, is placed a double semirigid mineral wool Arena Basics 45 mm (total thickness 9 cm) 5) For the insulation of the ducts and downpipes, is placed a wool rug Intraver Neto of 25 or 40 mm depending on the case. - Infiltration control In addition to the thermal envelope, we studied the airtight envelope of the building to prevent uncontrolled air throw. The result obtained in the Blow door test done in the house is $n_{50}=0.78$ air changes per hour through the envelope. - Cooling / Ventilation Conventional passive houses always include a ventilation system through a heat exchanger which, besides the air filter, controls humidity levels and collect indoor heat carrying indoor air and transfers it to the admission fresh. However, as it is not mandatory to use any particular system but it is the choice of the designer, in Zaranda House has been chosen not to include a mechanical ventilation system with heat recovery. Instead they opted for a heat exchanger consists of a buried pipe in contact with the soil under the house and which introduces preheated air in winter and pre cooled in summer. It is believed that with the pipe working it is not necessary an additional cooling system. A pre-installation of air conditioning is place for it is decided to install the machines in the future. With cantilevers over the terraces is achieved that, in summer, the sun does not penetrate inside the house. With the simple act of opening the windows of the north façade and the one on the patio skylight at night, introducing fresh air is achieved naturally and creates suitable airflows. Also, the pine trees around the house help improve the conditions of shade and coolness in summer as well as do water elements like the pool. - Equipment Six solar collectors are installed on the roof of the house for the production of 100% of the daily demand in winter of DHW and under floor heating at low temperature (placed at the express petition the property). The supply is made to two independent accumulator tanks. The under floor accumulator has no support system and starts working only when the hot water tank has reached the comfort temperature. In summer conditions, when the hot water is more abundant and less necessary (and with the under floor heating off), the excess energy is freed to the pool which acts as energy sink using a titanium plate exchanger (because of its saline debug). The entire system is equipped with a regulation and control automated and programmable system. For the general ventilation of the house is placed a buried pipe (38 m long, 2.5 m deep), which acts as an earth-to-air heat exchanger. It takes air from outside and by a forced circulation is driven inside by grilles located at strategic points in the house. The buried pipe is placed as a substitute for a heat recovery system to consider it an equivalent system better adapted to hot and humid climates. Being a house that does not need air conditioning in summer to achieve indoor comfort conditions does not exist, therefore, energy to recover it. Instead of it, and with the power of a low consumption fan (25 W), the outside air exchanges heat with the ground through the pipe, ensuring an uninterrupted supply of tempered air in conditions very close to those of comfort in both summer and winter. In addition, on appropriate external conditions, motorized windows in the skylight over the patio automatically open to allow free natural air circulation.

4. ECONOMIC ASPECTS

Get all of this with a contract budget of 525,980.19 €, including pool and urbanization-which affected a total floor (two ground floor and a basement) of 645.61 m² is a construction cost of 814.70 €/m². This limited budget supposed the need to make some sacrifices during the works. For example, the cover on the living room double height was projected inclined at 45° and facing south to solve the architectural integration of a photovoltaic mini-plant in which the collectors are were available directly on it without substructure auxiliary or affect the aesthetics of the house. For limited budgets, at the request of the property it was decided to remove it in the earliest phases of execution of work, being feasible anytime in the future.

If you had to do it again?

1) The Blower Door test should be run for the first time when the insulation is still accessible for easier deleting infiltrations detected. If done for the first time with the finished building, repairs to be made to assume a higher cost.

2) The shutter boxes are little or not recommendable from the viewpoint of air infiltration. If desired dimming as a carpenter always better to use type shutters shutters.

3) The fixed covers are cheaper and have less maintenance but do not work all year in the right way. Yes mobile protections that meet the needs of the moment.

The exterior shutters, while avoiding the heat input, do not let the natural light.

4) Should not be avoided placing blinds, execution should take care of the boxes and seal recessed inside the stone blocks.

5) As far as possible be avoided because they are little carpentry sliding watertight. If you want to open a full cloth, you can choose to place a carpenter osciloparalela as placed in the lounge.

6) Although it is understood that a home user with a basic, must be able to handle the mobile guards properly. Failure to provide proper operation, monitoring would be advisable protections. As the sun's movement is well characterized, can fine tune the necessary protections.

7) work best hollow protections abroad. When solar radiation crosses a translucent surface and bounces heating the interior surfaces, they begin to emit long-wave radiation to which the glass is opaque, leaving the heat trapped inside. So it is important not to let the radiation incident on the glass.

If aesthetic or environmental reasons (strong winds, sea influence, for example) could be placed guards on the outside, should be placed in glass. Has a higher initial cost, but has almost no maintenance. Their surfaces were not so dirty optical behavior before radiation is constant in time. If it could be placed outdoors or intermediate protections, should be placed on the inside, but as a lesser evil. Internal protections preferably be light colored.

8) In principle pvc frames and wood for carpentry work better than aluminum. The only solution if you have to put in place aluminum would work very effective insulation inside and use only as aluminum exterior finish.

9) As for thermal insulation in the woodwork, discard the idea that the greater the thickness of the air space between the glass of the best carpenters. What may benefit is soundproofing, but not heat. The closer the camera, the less likely is it to move the gas inside the chamber (remember that guarantee absolute vacuum chamber is nearly impossible, short-lived). The gas should be rested for not transmit heat by convection.

10) the woodwork joints do not fill with foam because the material usually autoexpansivas degrade over time, and we must ensure the durability of the building solutions adopted. If possible, it is preferable to use materials like laces tight, tape or pressure placed special profiles.

Building users opinion

Users are very pleased with the final image of the building and start to notice in the bill the reduction in consumption because they have spent their first summer in the house without having to install any air conditioning system.

Energy

Energy consumption

Primary energy need : 43,20 kWhpe/m².year

Primary energy need for standard building : 100,00 kWhpe/m².year

Calculation method : RD: 47/2007

Final Energy : 21,50 kWhfe/m².year

More information :

Pending that users inhabit the house for more than a full year to collect actual consumption data.

Envelope performance

Envelope U-Value : 0,33 W.m⁻².K⁻¹

More information :

U facade: 0.33

U openings: 1.6

U roof: 0.18

U floor: 0.50

Building Compactness Coefficient : 0,40

Indicator : n50

Air Tightness Value : 0,78

Renewables & systems

Systems

Heating system :

- Low temperature floor heating
- Solar thermal

Hot water system :

- Solar Thermal
- Other hot water system

Cooling system :

- Others
- Others

Ventilation system :

- Natural ventilation
- Nocturnal ventilation
- Free-cooling

Renewable systems :

- Solar Thermal
- Micro wind

Environment

GHG emissions

GHG in use : 8,80 KgCO₂/m²/year

Methodology used :
Calener VYP

Building lifetime : 75,00 year(s)

CALENER

Water management

Consumption from water network : 122,25 m³

Referencing "Typology of buildings and water consumption in the metropolitan area of Barcelona" (Saurí, D. Barcelona, 2004), we estimate that, for a detached house consumption is 203.23 liters per person per day.

To optimize the water consumption of the housing have been installed:

- Sprinklers both in all showers and bathtub in the master bedroom.
- All toilets incorporate a dual flush system.
- The toilet and sink aerators have.
- Both the washer and the dishwasher are high efficiency A +.

With these improvements, is estimated to have achieved a 45% savings in water consumption in the home network.

As Zaranda House is a home for 3 occupants and implementing savings measures described above, the estimated water consumption m³/year 122.25 network.

Indoor Air quality

The site acts as a huge thermal mass whose temperature varies little throughout the year. One meter below the surface, the ground temperature becomes a constant value which is equal to the mean annual air temperature. This means that the ground temperature is well below the air temperature in summer and winter over, giving us a great potential for cooling or heating the house with an auxiliary power supply very low. To utilize this potential installing a buried pipe which works as a heat exchanger between the outside air and the ground. During the construction work has left a temperature probe stuck into the ground to study the evolution of ground temperature as a function of depth to study the true performance of the tube. Pending such data, as L. And J. Brunat Escuer, in the Iberian Peninsula, the underground temperature can be taken as 15 ° C at a depth of 2m. With the optimization of the isolates, improved quality in external joinery, eliminating thermal bridges and strict enforcement of the housing is intended to reduce the influence of the external environment on the internal conditions of comfort. Worth remembering that the buried pipe system will not function properly if the air and circulate energy burden uncontrolled through the thermal envelope of the building and the potential savings in summer will be much less if the house is not well insulated. The ventilation system using a land-to-air heat exchanger is an air conduction buried, replacing the access of outside air, so that the fresh air is tempered by the heat exchange with the ground. The air is taken from a stand located on the outside of the plot. Is passed through a PVC-U tube of circular section of diameter 150 mm inner FERROPLAST Security Plus model, positioned in a spiral. It has a length of 39 m on straight sections and two more 11 semicodos elbows. He is buried at a depth of 2.5 m and 3 m. As power supply for forced air circulation, place a low profile fan heliocentrifugo, ECOWATT TD-500/150 model of Soler & Palau, coupled to the buried pipe. The engine characteristics are: -Speed: 2600 rpm - Maximum input power: 48 W -Maximum current consumption: 0.35 A Free download-Flow: 580 m³ / h -Maximum working temperature: 60 ° C - Sound pressure level: 36 dBA -Duct Diameter: 150 mm -Weight: 2.7 kg The motor has a built-in power regulator ECOWATT REB, which enables regulation of 0 to 10 V. -Maximum power consumption 50% adjustable: 18 W Flow-regulated at 50%: 424 m³ / h The pipe is buried under the front lawn of the home, located north of the plot. Enter the house through the north wall of the basement and runs through the basement ceiling that rises up vertically out through the vents located in the vertical partition between the lounge and patio. In the space from which the tube is in contact with the ground until it exits through the air discharge vents has a length of 12 meters. The tube is bifurcated, after passing through the fan, in two tubes of 90 mm diameter and each ends in an outlet plenum with two drive racks. The two branches are conveniently isolated by a shell of elastomeric foam rubber base 19 mm thick Armaflex model IT, Armacell Iberia, 0'037 thermal conductivity W/ mK, density 70 kg/m³ and grade M-1 UNE 23727:1990. This insulation thickness is conveniently calculated on the basis of the difference in temperature between the air circulating inside temperature and basement itself. On the wall between the living room and patio are placed four grids, two to each room, tempered air driving. As the house is virtually airtight, continually pushing air through these vents, the house is in overpressure. No air consuming equipment whose interior (gas stoves, etc.) And can cause a drop in the pressure level of the room. System performance depends on external conditions we have at that moment. Will be higher the higher the temperature difference between the external environment and the system temperature. That is, it will be more efficient in the months ends. Moreover, while pushing air inside the house do not get the indoor comfort conditions, represents a very significant advance. The energy that will provide support will be much less because now just about varying the temperature a few degrees. During the night, when outside temperatures are favorable, the possibility exists that the buried pipe stop working, open motorized skylight windows and patio obtain free cooling by night ventilation.

Products

Product

Isover Arena Plus

Isover Saint Gobain

isover.es@saint-gobain.com

<http://www.isover.es>

Product category : Obras estructurales / Sistema pasivo

Rigid panel mineral wool with a recycled content greater than 50%, made in the City of Guadalajara Azuqueca de Henares (Spain), whose main raw materials are recycled natural materials whose extraction and production are at an average radius of 300 km away to the production center. These are products which are 100% recyclable and can be reused infinitely long as they maintain their original structure.

- TECHNICAL PROPERTIES:

Thermal conductivity: 0.034 W / (m * K)

Specific heat of about 800 J / (kg * K)

Water vapor resistance: 1

Reaction to fire: A1

nonhydrophilic

Airflow resistance > 5 kPa * s/m²

Thermal Resistance: 1.30 (m² K / W)

- HOW TO USE: Placed on facades.

- ESTIMATED COST: 7'20 € / M²

Very good acceptance

Ventanas Kömmerling

Kömmerling

info@kommerling.es

<http://www.kommerling.es>

Product category : Acabados / Carpintería exterior - Puertas y Ventanas

Profiles with a minimum depth of 70 mm and isolation chambers 5. It can accommodate special glasses and thick. Inclined rebate for better evacuation and double gasket seal.

SGG Planitherm Ultra N

Saint-Gobain Glass

<http://es.saint-gobain-glass.com/b2c/default.asp>

<http://es.saint-gobain-glass.com/b2c/default.asp>

Product category : Acabados / Carpintería exterior - Puertas y Ventanas

SGG PLANITHERM ULTRA N is a low emissive glass high performance destined to be assembled in double glazing SGG CLIMALIT PLUS.

For its manufacturing lines magnetron layers of Saint-Gobain Glass, colorless float glass used SGG PLANILUX high-quality raw material, on which are deposited atomic layers of composition and unique formulation, which give the glass exceptional insulation performance thermal.

Thus, the exclusive SGG PLANITHERM ULTRA N reflects the far infrared radiation and minimize heat losses through the glazing.

Arena Basics

Isover Saint Gobain

isover.es@saint-gobain.com

<http://www.isover.es/Aislamiento-en-la-EDIFICACION/Productos/ARENA-BASIC>

Product category : Obras estructurales / Sistema pasivo

Rigid panel mineral wool with a recycled content greater than 50%, made in the City of Guadalajara Azuqueca de Henares (Spain), whose main raw materials are recycled natural materials whose extraction and production are at an average radius of 300 km away to the production center. These are products which are 100% recyclable and can be reused infinitely long as they maintain their original structure.

- TECHNICAL PROPERTIES:

Thermal conductivity: 0.038 W / (m * K)

Specific heat of about 800 J / (kg * K)

Water vapor resistance: 1

Reaction to fire: A1

nonhydrophilic

Airflow resistance > 5 kPa * s/m²

Thermal Resistance: 1.15 (m² K / W)

- HOW TO USE: Placed on the underside of the concrete cantilevers to solve the thermal bridge representing, as they are part of the thermal envelope of the building

- ESTIMATED COST: 3'45 € / M²



Panel Solado

Isover Saint Gobain

isover.es@saint-gobain.com

<http://www.isover.es/Aislamiento-en-la-EDIFICACION/Productos/PANEL-SOLADO>

Product category : Obras estructurales / Sistema pasivo

Panel rockwool rigid high density, high compressive strength, with a recycled content greater than 50%, made in the City of Guadalajara Azuqueca de Henares (Spain), whose main raw materials are recycled natural materials whose extraction and production stood at an average radius of 300 km of distance to the center of production. These are products which are 100% recyclable and can be reused infinitely long as they maintain their original structure.

- TECHNICAL PROPERTIES:

Thermal conductivity: 0.036 W / (m * K)

Specific heat of about 800 J / (kg * K)

Water vapor resistance: 1

Reaction to fire: A2-s1, d0

nonhydrophilic

Dynamic stiffness: 17 MN/m3

Thermal Resistance: 0.55 (m2 K / W)

- HOW TO USE: Placed under floating floors hearth at least 4 cm.

- ESTIMATED COST: 3,50 € / M2



Intraver Neto de Isover

Isover Saint Gobain

isover.es@saint-gobain.com

<http://www.isover.es/Aislamiento-TECNICO-Climatizacion-Industria-y-Marina/Productos2>

Product category : Acabados / Acabado, aislamiento

Arena mineral wool blanket, coated with a black colored glass fabric with a recycled content greater than 50%, made in the City of Guadalajara Azuqueca de Henares (Spain), whose main raw materials are recycled natural materials whose extraction and manufacturing stood at an average radius of 300 km of distance to the center of production. These are products which are 100% recyclable and can be reused infinitely long as they maintain their original structure.

- TECHNICAL PROPERTIES:

Thermal conductivity: 0.032 W / (m * K)

Reaction to fire: A2-s1, d0

Thermal Resistance: 0.75 (m2 K / W)

Airflow resistance > 5 kPa * s/m2

- HOW TO USE: Place for duct insulation.

- ESTIMATED COST: 5'95 € / M2



Panel Cubierta Isover 150

Isover Saint Gobain

isover.es@saint-gobain.com

<http://www.isover.es/Aislamiento-en-la-EDIFICACION/Productos/PANEL-CUBIERTA-ISOVER-150>

Product category : Obras estructurales / Sistema pasivo

Rigid panel consisting of high density rock wool waterproof, coated with a black colored glass fabric with a recycled content greater than 50%, made in the City of Guadalajara Azuqueca de Henares (Spain), whose main raw materials are materials recycled natural whose extraction and production are at an average radius of 300 km of distance to the center of production. These are products which are 100% recyclable and can be reused infinitely long as they maintain their original structure.

- TECHNICAL PROPERTIES:

Thermal conductivity: 0.039 W / (m * K)

Reaction to fire: A1

Specific heat: 800 J / kg * K

Water vapor resistance: 1

Thermal Resistance: 1 (m2 K / W)

Airflow resistance > 5 kPa * s/m2

- HOW TO USE: Placed on deck.

- ESTIMATED COST: 9.30 € / M2

Costs

Construction and exploitation costs

Global cost : 600 000,00 €

Reference global cost : 560 000,00 €
Renewable energy systems cost : 53,00 €

Energy bill

Forecasted energy bill/year : 1 500,00 €

Urban environment

The property is located in the urbanization "La Monacilla" in Aljaraque (Huelva) Aljaraque has an area of 3,436 hectares. Located between 37 ° 15'6" N, 7 ° 01 'W. Bordered on the north and west by the municipality of Gibraleón, east of Huelva, south while it does with the Odiel Marshes. It has a height above sea level of 35 meters. The Monacilla is one of four districts. It is a luxury development currently under construction. At the time of commencement of work most of the residential plots are yet to sell, so it is understandable that the immediate environment of the house was a huge pine forest. In the municipality of Aljaraque There are two immediate ecosystems with a very interesting landscape, such as the marshes of the Odiel and Pinares. The latter are a forested area set on materials related mainly with thermophilic sands with some clay banks. The vegetation is represented by a regular pastry from monospecific reforestation of pine in a state of fustal low (normal diameter to 1.30 m soil between 20 and 35 cm), with low presence of natural regeneration and density high, where the values of canopy cover, fcc, are close to 80% and often the tangency between drinks. As the shrub layer, at an average grade of soil cover, is represented primarily by various species of Cistaceae as jara sticky, jara curly, white cistus or spurge. The pine, which sits on a completely flat relief, is configured as a high value for its quality, density and degree of development taking shape as a prominent area for relaxation and recreation due to its scenic added. The many benefits surrounding vegetation to a building: produces opaque shade on the walls reduces the reflectivity of the surrounding ground and decreases outside air temperature by adiabatic cooling, that is, that part of the energy of solar radiation is intended to evaporate vegetation water instead of to heat the environment. It creates a microclimate around the house, more like a urban environment by almost rural paved area shortages around and because the five housing facades are exposed to the wind. This is a private access only to the residents themselves. Located on a golf course, homes are placed in rectangular plots along a winding road. The layout of the plots with the short side giving access road, not the most flattering from the energy point of view to design a passive house. The ideal way would be to orient the south elevation live longer, but that would mean fewer parcels. No point landforms likely to throw shade on housing. It is unknown if in the future be erected adjoining parcels east and west but it is known that the South is an area for vegetation and housing north bordering the road of urbanization. Upon the completion of this construction there is no work across the road. The green area, but has not been conditioned, if we look at other existing green spaces in the area will be left as a pine forest as it is now and shall be conditioned with a play area for children and seating areas. The access road to the property include a travel lane and a parking lane in each direction separated by a median planted with oleanders and lights up. Left as mentioned factors influencing our house is that, in the area, dominated by compact buildings on two floors, with a flat roof and clear finishes. Have traditionally been used in this area white architectures with passable flat roofs that were used for sunbathing, the best views of the landscape that nt to housing and drying clothes. For the Arab influence is very common to find closed facades and winding narrow streets to prevent the passage of the sun. After a first bay that opened itself to the street, the houses were overturned to courtyards, always covered with awnings, overgrown. They used a massive building with walls. In this way they managed to maintain a constant internal temperature regardless of the different conditions between day and night. The holes are protected with shutters, shutters or type mats, to let the air and not completely block the passage of light into the interior. When meeting the sun amidst a residential area there are no nearby noise sources. The access road to the village, the A-492 (Huelva-Aljaraque) is quite removed from the plot and the road chosen interior is only access to housing and has a speed limit of 30 km / h. No trials have been done to assess the ambient noise but given the low volume of vehicles on the road inside the complex that no significant community uses (schools, shops, markets, etc.) In the vicinity, we can say noise is almost nil. No problems are foreseen pollution discharges or accumulation of pollution by sewage channels. However, we must not forget that in this type of residential private vehicle use is almost essential for most daily activities. It would be desirable to improved mobility plans aimed at greater use of public transport.

Land plot area

Land plot area : 817,00 m²

Built-up area

Built-up area : 28,00 %

Green space

Green space : 583,00

Parking spaces

The parking located in the access road to the plot is delimited by grass semicircles in the entrance of every house.

