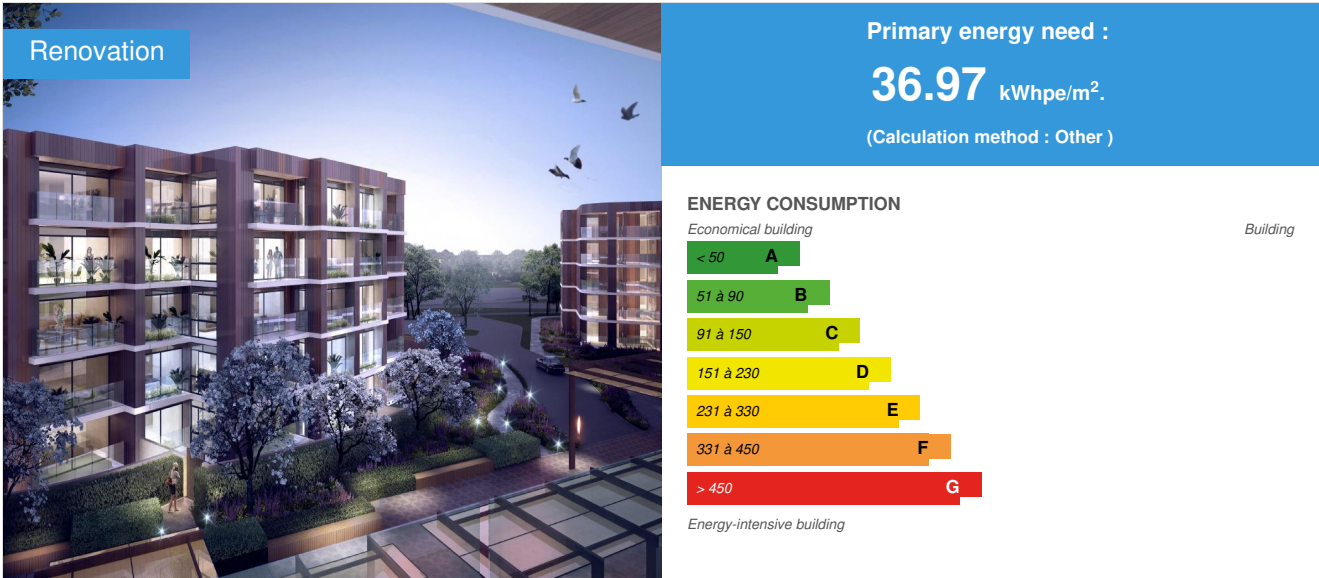


Landsea New Mansion Project

by / 2018-06-13 04:16:57 / Chine / 10774 / CN



Building Type : Collective housing > 50m
Construction Year : 2016
Delivery year : 2018
Address 1 - street : 200137 ,
Climate zone :

Net Floor Area : 16 994 m² Autre type de surface nette
Construction/refurbishment cost : 186 930 000 ¥
Number of Dwelling : 75 Dwelling
Cost/m2 : 10999.76 ¥/ m²

General information

New Mansion project is located in the western suburbs of Shanghai changning district qingxi road, covers an area of 13433 , construction area of 16994 , including 3 residential building (all are 5 stories). The building is a shear wall frame structure, which carries out the green construction concept of four-section one environmental protection when the project is reconstructed. The relevant technical application is as follows:

Land saving and outdoor environment:

a) Large trees and background shrubs will be retained in the community, which will provide natural shade in summer yet not affect sunlight in winter. Besides, vertical vegetation will be applied in the mechanical parking garage to increase the green area and the landscape ratio will reach 49%.

b)

Based on the results of the building shadow test, the main activity site will be located in the area with the best natural lighting, so that residents can enjoy their leisure time freely;

c) As the curtain wall material, ceramic plate is environmentally friendly and will not cause light pollution

d) On the premise that the brightness and density of the lighting of the car parking system meet the safety requirement of the car park, try to avoid the light pollution to the interior

e) Centralized layout of parking Spaces, using the latest mechanical parking equipment to meet the latest standards and requirements

Energy conservation and energy utilization

- a) The insulation design of the external facade uses 100mm thick, density not less than 100kg/m³ cubed mineral wool board to strengthen the insulation and reduce the building energy consumption
- b) The building adopts floor structure to achieve self-shading, and uses shading louvers locally to reduce solar radiation and reduce cooling energy consumption
- c) The air conditioning system uses the air cooled heat pump unit as the cooling/heating source, and radiant capillary grid ceiling as heating and cooling terminal, which has lower energy consumption
- d) Indoor and outdoor buildings and landscape lighting adopt energy saving lamp source, with less lighting energy consumption

Water conservation and utilization of water resources

- a) Water saving products are used in all sanitary appliances
- b) The water supply pressure of shower is controlled at 0.2-0.35mpa to ensure the comfort of shower
- c) Clean water throughout the house, including direct drinking water and soft water

Material saving and material resource utilization

- a) building form rules
- b) Construction materials shall be decorated with durable and easy to maintain decoration.

Indoor environment quality

- a) Set temperature sensor, humidity sensor, carbon dioxide concentration sensor, etc. to achieve indoor environment monitoring and linkage with door and window intelligent control.
- b) Landsea 3.0 air purification system, which can remove formaldehyde, VOC, PM2.5 and other pollutants, replenish fresh air and ensure healthy breathing;
- c) Adopt advanced and comprehensive noise control measures to achieve indoor noise criteria of 40 decibels during the day and 30 decibels at night.

Strict control of outdoor noise: vehicular road plant landscape configuration and vertical greening of the external wall of the garage. External Windows are made of 2-3 layers of glass, and mechanical parking products with the least noise are used.

Household sound insulation: soundproof felt is used as the sound insulation material between households. The door uses products with good mute performance, and extra carpets are added to local mobile areas.

Indoor noise reduction measures: quiet toilet is selected; the internal door is equipped with mute door locks and hardware; the ventilation system is provided with sound insulation and dustproof bar under the door. (The air supply pipe is equipped with attenuator, and the air velocity within the duct is strictly controlled to no more than 2.5m/s; sound proof materials are wrapped around the duct.)

Data reliability

Self-declared

Stakeholders

Contractor

Name :

Contact : liyalii@landsea.cn

<http://www.landsea.cn>

Construction Manager

Name :

Contracting method

General Contractor

Owner approach of sustainability

The New Mansion project adopts the unique 3.0 system of Landsea, and integrates the building upgrade, indoor upgrade and landscape upgrade, making the new western suburb project a new environment-friendly low-carbon residential project endowed with new vitality.

Sound environment 3.0: effectively isolate outdoor noise through landscape plant configuration, high sound insulation doors and Windows and external walls; The noise interference between neighbors is effectively prevented through the noise reduction and vibration isolation treatment of equipment and the use of household sound insulation materials. Mute equipment material selection, air duct sound attenuation, effectively reduce indoor noise.

Light environment 3.0: in the design of outdoor light environment, large deciduous trees are selected for landscape design, which can shade the sun naturally in summer, and do not affect the illumination in winter, so as to improve indoor comfort. People's main activity site is located in the best natural lighting area for

people's outdoor activities; In lighting design, outdoor energy-saving lamps meet the brightness and density while avoiding light pollution; In the design of indoor lighting environment, the function of indoor room should be combined to maximize natural lighting as much as possible and reduce lighting energy consumption. At the same time, indoor lighting is designed with energy-saving lamps.

Planning and landscape 3.0: maximize the efficiency of vehicle lane, and leave more space for landscape and people's activities; In order not to affect the household lighting, to increase or decrease the greening plants and level design; Increase green area, create warm and comfortable public space, truly achieve people and nature symbiosis.

Building 3.0: in the design of architectural plane, facade and window system, on the basis of considering the safety of the reconstruction project, external wall materials with good thermal insulation performance and window glass are adopted to reduce the building energy consumption as much as possible, so as to give consideration to both economic and environmental protection.

Architectural description

The New Mansion project adheres to Landsea's consistent core values of "humanism, sunshine and green", takes into account the multiple dimensions of human, nature and social sustainable development, and pays more attention to the needs of healthy living.

From the perspective of customers, the New Mansion project demonstrates the humanized design from multiple perspectives: for example the utilization of radiant ceiling air conditioning system combined with underfloor displacement fresh air system makes the indoor temperature distribution uniform, without cold draft. Zero formaldehyde control system and super clean fresh air system to ensure the respiratory health of the residents, the whole house water purification water system guarantee the habitat health, and the light of human nature (porch induction lamp set, important parts of local lighting, chest induction lamp set, etc.), convenient storage design (small objects receive design to prevent litter, children receive car design, design of locker room to receive, toilet stage basin cabinet design more accord with human body engineering, etc.), Security design (kitchen cabinets, shower water retaining design antiskid design, hardware design porch ark prevent children around cause safe hidden trouble, etc.), comfort design (USB socket design porch ark prevent residents often forget charging, intelligent switch in the porch place setting in the design of a power switch will home lighting lamps and lanterns), etc.

From environmental point of view, the New Mansion project uses a wide range of energy saving lamps and lanterns in order to reduce the energy consumption of lighting, building ontology using passive design (consider facade, doors and Windows insulation to minimise building heating energy consumption of air conditioning), the French window design can increase indoor natural lighting to minimize energy consumption of lighting, residential landscaping set not only reduce outside noise interference, also can increase the green area, making household closer to nature, to achieve harmonious coexistence between human and nature.

Building users opinion

It is very innovative to use the radiant heating and cooling, which is much more comfortable than the conventional air conditioning system Split system . The temperature is just right. Indoor formaldehyde, VOC, PM2.5 concentration and other pollutants can be seen from the Landsea screen. All the pollutant concentrations are up to the standard. The shading design of the external blinds can regulate the sunlight irradiation against demand, saving energy and creating comfort living conditions; The building is well insulated. Even without air-conditioning, the room temperature is acceptable in winter and summer. Besides, the sound insulation is very good. The interior also has many human nature to design, for example storages, the induction light design, etc, all of which follow the principle of building for humanity.

Energy

Energy consumption

Primary energy need : 36,97 kWhpe/m².

Primary energy need for standard building : 46,97 kWhpe/m².

Calculation method : Other

Final Energy : 36,97 kWhfe/m².

Breakdown for energy consumption :

Heating and cooling energy consumption: 18.72

General lighting: 18.25

Initial consumption : 86,35 kWhpe/m².

Envelope performance

Envelope U-Value : 0,39 W.m⁻².K⁻¹

More information :

Roof 0.32W/ m2 k

External wall 0.39W/ m2 k

External window (E/S/W/N) 1.2/1.3/1.2/1.4W/ m2 k

Entrance door to individual dwellings 2 W/ m2 k

Building Compactness Coefficient : 0,32

Indicator : GB/T 7106-2008

Air Tightness Value : 6,00

Systems

Heating system :

- Heat pump
- Radiant ceiling

Hot water system :

- Other hot water system

Cooling system :

- Reversible heat pump
- Radiant ceiling

Ventilation system :

- Double flow

Renewable systems :

- Heat pump

Smart Building

BMS :

The entrance part: whole house information center screen, central control host, system power module, switch, control box, etc.

Air monitoring: multi-parameter sensor, PM2.5 sensor, formaldehyde sensor, air sensor power supply, etc.

Smart home: track-type power controller, low-voltage lighting dimmer driver, two-channel thyristor dimmer, general line electric curtain, curtain rail, intelligent button panel, mobile detector, illumination sensor, etc.

HVAC control: temperature and humidity sensor, air valve control box, etc.

Security: curtain infrared detector, gas alarm detector, emergency button, alarm controller, infrared detector, etc.

Users' opinion on the Smart Building functions :

Curtain and lamplight control can be operated conveniently on the face plate, there is no need to pull curtain manually again. There is also lamplight mode of different scene, which can be conveniently operated, making life more convenient. The installation of various air monitoring equipment can monitor the indoor environment in real time, and also can check the data on the Landsea screen in real time, so that we can feel the environment of our own life easily and live at ease. Indoor security is also carefully implemented, such as gas alarm, alarm controller these, to the safety of our residents to provide good security, and overall satisfaction.

Environment

Urban environment

The New Mansion project is located at the intersection of Xianxia road and Qingxi road, in Changning district of Shanghai.

Public transportation: the surrounding traffic is extremely convenient, and the public transportation, rail transit and self-driving is very convenient -- 15 minutes from Hongqiao Airport and 30 minutes from Lujiazui, close to Yan' an west viaduct and central ring; It is only about 1.5 kilometers away from Beixinjing station, Weining Road station and Shuicheng road and Longxi road of No.10 rail transit line, and only 0.5 kilometers away from the middle ring line.

Peripheral accessories: Education has superior resources with the supporting resources of the whole age section at municipal level; There are many residential communities around, the fashion and leisure block of Xianxia road is close at hand, and the commercial and living facilities are very well, from the basic living facilities to the large shopping mall. Close to Changning Center Hospital, nearby medical treatment is guaranteed.

Land plot area

Land plot area : 13 433,00 m²

Green space

Green space : 8 326,00

Parking spaces

Mechanical parking space: 135 . With the latest mechanical parking equipment, there are 85 mechanical parking spaces, each of which can stop 2.35 tons of large vehicles, meeting the latest specifications and requirements.

Product

passive design

108

<http://www.landsea.cn>

Product category :

The New Mansion project uses passive design to reduce building heating and cooling energy consumption.

- High quality insulation materials are used for roofing and exterior wall structures, and 2-3 layers of glass are used for exterior windows.

The insulation design of the enclosure structure is as follows:

Roof: 100 mm extruded polystyrene foam board;

External wall: 100 mm mineral wool board;

External window: aluminum wood composite window 5low-e +12A+5+12Ar+5

- The building adopts floor structure to achieve self-shading, and USES shading louvers locally to reduce unnecessary solar radiation and reduce cooling energy consumption.

Use high performance insulation materials for external wall insulation, combined with good air tightness design, room temperature will not be too low even if there is no heating in winter; The external window adopts mechanical shading system, which can adjust the shading louver opening according to the demand and adjust the sunlight incidence, which not only improves the living comfort, but also reduces the energy consumption of air conditioning. Humanized vertical greening design not only reduces noise, but also makes residents closer to the nature, greatly improving happiness.



high insulation sliding door

518 27 2

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

Product category :

The New Mansion project selects a series of sliding door of Schuco ASS 70 HI series, which is a lifting push-pull system with high insulation performance, which can meet the highest requirements of energy-saving standards, and has a fine profile visible surface and large area glass.

The main advantages are:

- sturdy insulated aluminum profile with high insulation value;
- add e-slide: fully concealed electric controls;
- the new hardware system improves comfort and convenience;
- stainless steel track ensures smooth and quiet operation;
- the slender visual surface of the frame (108mm);
- anti-theft design enables the security level to reach WK2;
- continuous sealing strips on both sides improve sound insulation;
- water tightness up to 9A, insulation performance: $U_f < 1.8(W/m^2K)$, $U_w < 1.3(W/m^2K)$

Schuco high-performance sliding doors are beautiful in appearance, convenient to open and feel very good, its sound insulation performance is also very good. Similarly, because of excellent heat insulation, even close to glass sliding doors in winter, you won't feel cold.



Aluminum-Wood Window of Three-glass Two-Cavity

28 4

<http://www.sayyas.com>

Product category :

The New Mansion project selects wood Windows made of wood with excellent performance. On the basis of retaining the pure, friendly and natural nature of wood, its products can be repaired and improved through various advanced technologies, and its core performance is as follows: thermal insulation, energy saving, environmental protection and sealing.

Wood:

- Red pine is produced in Poland and Sweden, all of which are processed at the initial place of origin. The use of rubber is strictly controlled and environmental protection is practiced to the maximum extent.
- The whole process is constant temperature and humidity to prevent wood from cracking.

Paint:

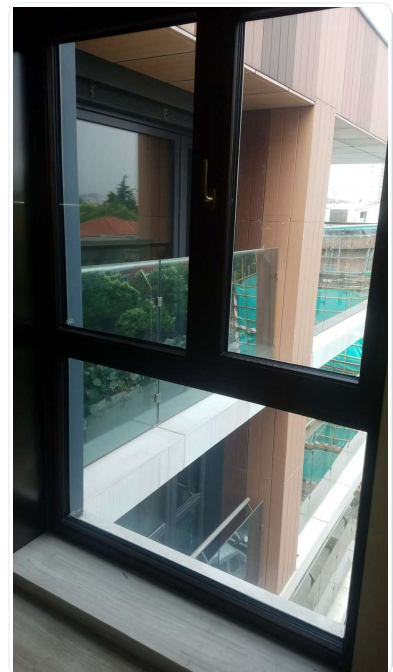
- Using a four-layer paint system, the finished paint is smooth, not easy to fall off, uv proof and free of air bubbles;
- Work in a humidity environment of about 70% to ensure paint drying;

Glass:

- All off-line low-e glass, with lower shading coefficient and heat transfer coefficient;
- Use butyl glue with a water molecular transmittance of less than 0.002 g/m, which is more airtight;
- Using Italian molecular polysulfide with good sealing and effective protection of water molecules from entering the cavity;

- All the insulating glass uses full-automatic air, filled with argon, which will last longer.

Excellent wooden structure, excellent workmanship; The exterior aluminum structure resists the sun, the wind and rain. Because of the off-line low-e glass, the product's insulation performance is guaranteed; Winkhaus as standard, silver nano-coating surface, stable without rust; Mushroom head lock point, more secure.



zero-formaldehyde control system

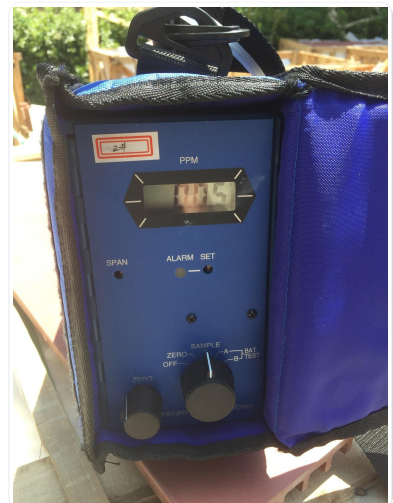
51 2 7

<http://www.landleaf-tech.com/>

Product category :

The New Mansion project adopts the strict zero-formaldehyde control system of Landleaf, which controls the whole process from material selection and testing to supervision, ensuring that the formaldehyde content indoor is no more than 0.03mg/m³, which is the most stringent level S1 standard in the world , ensuring the healthy living environment.

- After laboratory testing, the project team chose the supplier that meets the requirements of environmental protection standards for Landsea green decoration. The main products are as follows in the table.
- Real-time monitoring of process supervision: special engineer on site managed to sample incoming materials, conduct formaldehyde detection in each construction process and supervise the implementation of indoor pollution control of decoration unit.
- Assessment of air quality for completion acceptance inspection: professional air quality inspectors will be arranged for on-site inspection and analysis. According to the requirements of formaldehyde control of grade S1 in Finland, the formaldehyde concentration in all rooms is no more than 0.03mg /m³.



Landsea has a set of strict process system from the selection of building materials, construction to the maintenance and monitoring in the later stage, which ensures the green system of the whole cycle. The concentration of formaldehyde and VOC is kept under the safety line and even can meet the stricter standards of foreign countries. Residents can easily check the air indicators from the Landsea screen. The data is transparent, so the residents can live safely.

baseboard air supply system with the air distribution of bottom supply and upper return

108

<http://www.landsea.cn>

Product category :

- The innovative design is aimed at the problem of low height in the project (the floor height is only 2.8 meters, and the floor height will be too low if conventional ground air supply is adopted). The large plate structure system of the non-beam shear wall and the light-weight partition wall of the interior are adopted. The fresh air outlet is integrated with the kicking line and adopts the detachable air grate. Through daily inspection of the data of Landsea screen and the measured data of the indoor system, the air supply of the kick line meets the system design requirements, and the effect is good.

Main advantages:

- meet the system design requirements and operate well;
- solve the problem of low height in the New Mansion project, saving about 10cm height;
- less dust accumulation compared to surface air supply;
- more beautiful than surface air supply;
- more flexible than the location of air supply air outlets on the ground;
- kicking line air supply can be combined with furniture;
- tuyere color and style can be combined with variable kicking lines.



Landsea innovatively adopts the air conditioning system with baseboard air supply, and the air comes out along the kicking line, avoiding the strong feeling of downdraft, which can form a fresh air lake with high comfort. The air outlet and the building decoration mutually agree, does not occupy more place and affect the layer height.

capillary radiation heating & cooling system

Clina

info@clina.de

<http://www.clina.de/>

Product category :

The radiant heating and cooling system of the ceiling, which is mainly carried out by the way of radiation, is completely noiseless and will not generate any air blowing, which ensures excellent thermal comfort while saving energy. In difference in temperature is 8 °C, the rated refrigerating power is 71.4 W/m². Among them, the capillary network model is OPTIMAT SB 20.11, the distance between capillaries is 20 mm, and the size of capillaries is 4.3 x 0.8 mm. Plaster mortar model is KNAUF MP 75, coating thickness of about 10 mm. The main side insulation is 50 mm thick polystyrene WLG 040.

Some users do not like to open air conditioners because of the draft sensation. Landsea adopts the ceiling radiant heating and cooling system, which avoids the feeling of air blowing and ensures the even distribution of indoor temperature.



ultra-clean fresh air system

mao.huiyu@vtsgroup.com

<http://vtsgroup.com>

Product category :

In the New Mansion project, G4 crude filter + plate electrostatic filter +H11 sub-high efficiency filter is adopted to carry out efficient air filtration treatment. The PM2.5 filtration efficiency is up to 95%, which can effectively remove outdoor air pollutants and ensure clean air supply. Using rotary heat exchanger, the heat exchange efficiency can be more than 70%, effectively reducing fresh air energy consumption, and the service life is more than 10 years.



Fresh air purification system can filter PM2.5 and PM10 pollutants. Even in the haze days residents no longer to be afraid of the air pollution. Compared with the traditional air purifier, it not only solved the pollution problem, also can solve the problem that CO₂ concentration is too high. Indoor air is fresh and healthy, greatly improve the resident living comfort.

Costs

Energy bill

Forecasted energy bill/year : 351 000,00 ¥

Real energy cost/m² : 20.65

Real energy cost/Dwelling : 4680

Building Environmental Quality

Building Environmental Quality

- indoor air quality and health
- acoustics
- integration in the land
- mobility
- products and materials

Health and comfort

Water management

Consumption from water network : 10 950,00 m³

Water Consumption/m² : 0.64

Water Consumption/Dwelling : 146

The project sets up a whole house water purification system, including direct drinking water and soft water.

Direct drinking water system: adopting international advanced water separation concept and mature technology equipment, further purifying the clean water in the house, effectively removing the organic matter, heavy metal and other harmful substances in the water, retaining the trace elements and minerals that are beneficial to human body, water-soluble oxygen, reaching the direct drinking standard.

Soft water system: soft water treatment for indoor shower and laundry is beneficial to human skin care and reduce wear and tear. In addition, the water supply pressure of the shower is controlled at 0.2-0.35mpa, which is up to the standard of five-star hotel and ensures the comfort of the shower.

Indoor Air quality

Indoor CO₂ test concentration (mg/m³) in buildings: 990

Formaldehyde test concentration in building interior (mg/m³) : 0.025

TVOC test concentration in building interior (mg/m³) : 0.21

Indoor benzene test concentration (mg/m³) : 0.006 (self-test)

(The average concentration of PM_{2.5} in Shanghai in 2017 is 38µg/m³)

Landsea 3.0 air purification system is adopted to ensure indoor constant temperature, humidity and oxygen, and strictly control indoor pollutant content to protect the health of residents.

- Displacement ventilation system: The air handling unit includes heat recovery thermal wheel, high efficiency filter, electrostatic dust removal, total heat recovery, humidifier, supply fan, etc). Fresh air is delivered from the main riser into and the branches which locate in the ceiling void, and delivered into the living room and bedrooms through air outlet along kick line. Exhaust air vents locate at the ceiling level of the bathroom and the kitchen. The total amount of exhaust air is 80% of the total supply. The haze removal rate of fresh air reaches 95%. The fresh air system also comprises other functions, such as full heat recovery, humidification, de-humidification, etc. Through good control of temperature and humidity through the year, the indoor air quality is well maintained.
- Strict formaldehyde control system: control the whole process from material selection ,testing to supervision to ensure that the formaldehyde content indoor is no more than 0.03mg/m³, which is equal to the world's most stringent level S1 standard.
- Monitoring system: the smart Landsea screen shows indoor and outdoor temperature and humidity, PM_{2.5}, formaldehyde and other environmental parameters in real time.

Comfort

Health & comfort :

Indoor average temperature in January: 21 °C average indoor humidity: 40-60%

Indoor average temperature in July: 23 °C average indoor humidity: 40-60%

The New Mansion project follows the principle of passive design. The building has better insulation and air tightness, and the indoor temperature distribution is uniform and comfortable. The utilization of the radiant heating and cooling system avoids the uncomfortable feeling of air blowing caused by the traditional air conditioning system. It is also a more energy-saving heating and cooling strategy. Air is supplied at bottom and upper return. Fresh air can be evenly distributed throughout the lower zone where people reside. The indoor air replacement is more rapid and effective, and it also meets the requirements of indoor thermal environment and air quality requirement.

There are positive feedbacks from the residents: The living condition is very comfortable. It doesn't feel cold next to the window in winter. The humidity is also well controlled, it never feels damp in the summer or dry in the winter. The New Mansion project receives overall good satisfaction.

Acoustic comfort :

Acoustic performance: 40 dB by day and 30 dB by night.

Outdoor noise reduction measures:

- landscape soundproofing the roadway through plant allocation;
- reduce noise through vertical greening in combination with landscape design;
- use mechanical parking products with minimal noise;
- the external window is made of 2-3 layers of glass, and the noise can be reduced to 47 dB;
- the facade adopts ceramic plate as the main material, which is not only energy-saving and new building materials, but also sound insulation and noise reduction, which can reduce noise above 9 dB compared with other external materials;
- the roofing equipment is set separately according to the unit to reduce the impact of noise, and the roofing equipment is properly dealt with noise reduction and vibration isolation;

Neighbourhood sound insulation:

- the sound insulation blanket with convenient construction and fire protection is used as the sound insulation material for the separate rooms. The door uses the product with good mute performance, and the local activity area in the indoor area adds carpet, which prevents the influence of the upstairs and downstairs neighbors.
- the selection of mute toilet, the selection of piping and its connection with the wall all meet the mute standard;

Indoor noise reduction measures:

- o silent door locks and hardware are used for doors. The silent door-closing device by using the damping and pulling function eliminates the impact sound of door and door frame and achieves the mute effect.
- o Sound-proof and dust-proof strips under the door which is the automatic lifting seal installed at the bottom of the indoor door can block the interference caused by other Spaces;
- o noise insulation in fresh air system: mufflers are used in supply air ducts, and the wind speed in the air duct is strictly controlled to no more than 2.5m/s. Sound insulation and sound absorption materials are filled around the air ducts. The silence coefficient of other pipeline materials is also taken into consideration to the greatest extent to reduce noise pollution.

Carbon

GHG emissions

GHG in use : 37,05 KgCO₂/m²/

Methodology used :

China engineering construction association standard (CECS 374:2014)

GHG before use : 139,78 KgCO₂ /m²

Building lifetime : 40,00

, ie xx in use years : 3.77

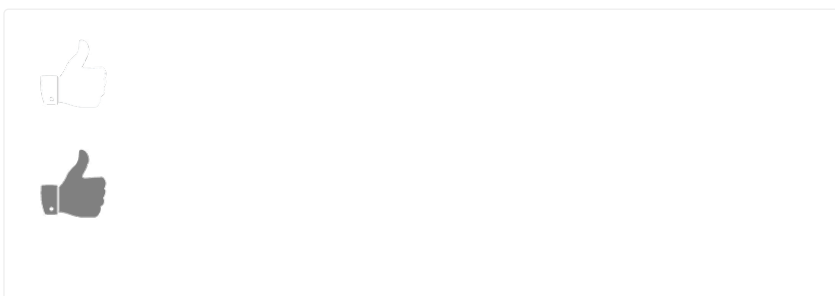
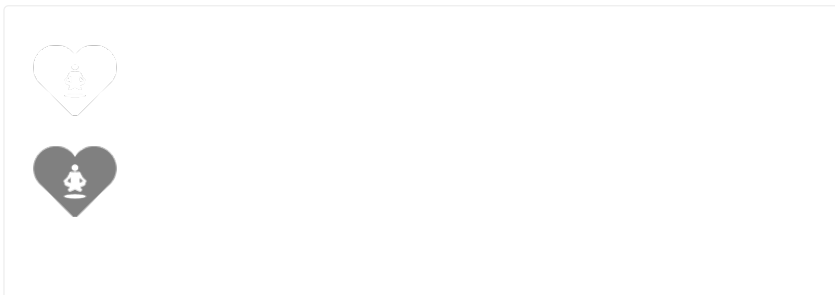
Contest

Reasons for participating in the competition(s)

As an artificial environment, architecture is an important part to meet the needs of human material and spiritual life. In recent years, China has been advocating energy conservation and green buildings, pursuing sustainable development. Landsea was the earliest poetry group to commit to green building exploration and research. After many years of accumulation of experience, international health standards are used in New Mansion project. Building energy efficiency was achieved by passive construction techniques and "people-oriented" enterprise idea is practiced in the practical application to ensure the sustainable development of society, environment and the enterprise. On the basis of meeting people's basic living function and aesthetic needs for housing, more attention is paid to the comprehensive balance of health, comfort, energy conservation, environmental protection and intelligence.

In this project, Landsea uses differentiated product technology for new green innovation - 4 technical innovations in New Mansion project (passive construction technology & intelligent furniture & formaldehyde control technology & ultra-clean fresh air technology) and 15 technology systems (envelope heat preservation system & super seal doors and windows system & louver shading system & air source heat pump system & capillary radiation system & three-way air filtration system & supply air along skirting line & air make-up system in kitchen & sound insulation and noise reduction system & Finland S1 formaldehyde control system & intelligent display and control system & intelligent control system of fresh air & large capacity system to receive & 24 hour-hot water supply system & water purification and softening system). After all-round renovation, the New Mansion project has become a low-carbon residence with new vitality, realizing the improvement of comprehensive quality, meeting the current higher customer demand and leading the green residential model.

Building candidate in the category





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