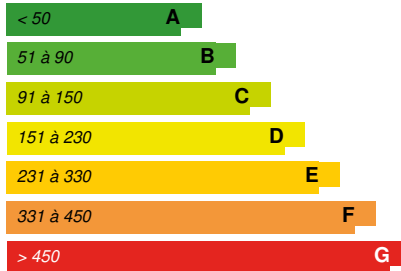


# ARTS Group Design & Research Center

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**Building Type :** High office tower > 28m  
**Construction Year :** 2012  
**Delivery year :** 2015  
**Address 1 - street :** 215000 ,  
**Climate zone :** [Cfa] Humid Subtropical - Mild with no dry season, hot summer.

**Net Floor Area :** 74 898 m<sup>2</sup>  
**Construction/refurbishment cost :** 350 000 000 ¥  
**Number of Work station :** 1 650 Work station  
**Cost/m2 :** 4673.02 ¥/ m<sup>2</sup>

## General information

ARTS Group Design & Research Center Project is a modern office building which embodies the concept of "continuation" architectural creation. Walking through the Design & Research Center, you can feel the designer's understanding and respect for traditional culture of Suzhou. ARTS Group Design & Research Center advocated the corporate culture of "happy work, healthy work" while you are strolling in the R & D center, you can have the feeling of "home" everywhere.

The project uses the GSHP (ground source heat pump) system, exhaust heat recovery system and rainwater reuse system, the annual operating cost saving is about RMB 700,000 with a short payback period.

Green building and smart concept are integrated into the whole building design. Using strategy of "active" and "passive" technology, the "space adjustment" and "equipment adjustment" are perfectly combined in order to save resources, protect the environment and reduce pollution as much as possible. Besides, a comfortable and comfortable environment is expected to be provided to occupants. This building also makes full use of solar energy, geothermal energy and other renewable energy to improve energy efficiency and reduce carbon emissions.

In the construction stage, protecting the environment, reducing pollution, preventing disturbing the residents, saving resources (energy conservation, saving land, saving water, saving building materials) are the priority. To ensure the quality of the project under the principle of environmental protection and efficient use of resources, the pursuit of environmental protection, high efficiency and low consumption are considered comprehensively to achieve environmental, economic and social benefits through green construction.

From the initial planning of the project to the design of the project, to the implementation of the project and after the completion of the operation and maintenance, "green" concept is always maintained throughout the project's life cycle. This practice is of great significance for reference.



## Data reliability

Self-declared

## Stakeholders

### Stakeholders

Function : Contractor

0512-62586258

<http://www.artsgroup.cn>

ARTS Group Co. Ltd is the design unit of the project, its subsidiary ARTS Group Construction Co., Ltd. is the consultant of the project, Zhongheng Design Group Engineering Consulting Co., Ltd. as the project c

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Function : Designer

0512-62586258

<http://www.artsgroup.cn>

### Contracting method

General Contractor

### Owner approach of sustainability

Passive Building Design Strategies In the planning and design stage of the building, we fully consider the use of natural energy, combined with computer simulation technology, optimize the layout of the building, facade, the maximum use of natural ventilation, natural lighting. Through the use of roof garden approach, make full use of roof space, so that the building can be integrated into the natural environment with less energy consumption.

Active energy saving Strategies: In order to improve the efficiency of HVAC units, ground source heat pump units is selected. Combined with

reasonable optimization of airflow distribution, the indoor thermal environment is good. In addition, many other energy saving measures are also used, including rainwater reuse technology, solar water heating system, hybrid photovoltaic-wind generation technology, etc. Indoor environment: The building has various functions. The public space is fully used while offering an open and comfortable communication space.

The construction process The environment management system was implemented to minimize the interference, reduce the pollution, and guarantee the quality. At the same time, A lot of plans were made to reduce the consumption of water, electricity and materials. And recyclable resources were used rationally.

Operation process: We have established a system of energy conservation management, water management system, material management system, green land management system; resource management with incentive mechanism. The air conditioning system, ventilation system, water supply and drainage systems' data are collected and monitored.

## Architectural description

This project considers green concept in all aspects of the building, the green technology and architectural functions are combined perfectly. The passive technology is prioritized while the active technology is assisted by which a energy efficient, comfortable, practical and beautiful "deep green" building is achieved.

ARTS Group Design & Research Center takes humanistic culture into the modern block. This people-oriented building fully considers the feeling and reaction of occupants in the environment. The towers is located in the north, the podium is placed in the south, the dislocation layout of the office units in podium and the detailed structure all contribute to well natural ventilation and lighting. The light well and side windows of the atrium in podium, light pipe and above-windows of the design office, sunken garden of the underground space etc. ensure the natural light and create a comfortable light environment. urtyard, etc., the full introduction of natural light, create a comfortable lighting environment for the staff.

A series of active energy-saving technology has also been introduced into the design: the project uses efficient cold and heat source unit, the whole heat recovery of fresh air units, effectively reduce energy consumption. Using solar water heater and ground source heat pump to realized hot and cold source from the "heaven and ground". Collecting rainwater for the green garden use. Using wind and solar powered generation system for the electricity use of fish pond.

ARTS Group Design & Research Center sets library, cafes, restaurants, indoor fitness place, roof art museum, roof farm, etc. for the staff in order to provide a healthy and comfortable working environment.

This center is innovative in architectural design, green building technology integration, indoor comfort and other aspects, which is a practical, demonstrateable green project by putting people into the first place.

## Building users opinion

"Open and comfortable office space coupled with the green roof which provides the feeling of relaxation and happiness by increasing the productivity distinctively."

"The building provides many spaces for relaxation and communication which is good"

"We have private fitness center which not only provides place for sports but also provides a place for communication between colleagues"

"The working place is well ventilated. we can breath the fresh air when there is a good weather. For most of working days, there is no need to turn on the light which saves energy and brings natural light in"

## Energy

### Energy consumption

Primary energy need : 43,24 kWhpe/m<sup>2</sup>.

Primary energy need for standard building : 54,75 kWhpe/m<sup>2</sup>.

Calculation method : Primary energy needs

Final Energy : 32,86 kWhfe/m<sup>2</sup>.

Breakdown for energy consumption :

HVAC: 16.6% General lighting socket equipment: 38.7% General power equipment: 39.8% Others: 4.9%

### Envelope performance

Envelope U-Value : 0,74 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

Outside the window heat transfer coefficient: 2.3; roof heat transfer coefficient: 0.55; ground heat transfer coefficient: 1.2;

Building Compactness Coefficient : 0,19

Indicator : GB/T 7106-2008

### Real final energy consumption

Real final energy consumption/m<sup>2</sup> : 32,86 kWhfe/m<sup>2</sup>.

Year of the real energy consumption : 2 016

## Renewables & systems

### Systems

Heating system :

- Geothermal heat pump
- Fan coil

Hot water system :

- Solar Thermal

Cooling system :

- Geothermal heat pump
- Fan coil

Ventilation system :

- Natural ventilation
- Double flow

Renewable systems :

- Solar Thermal
- Heat pump (geothermal)

Renewable energy production : 21,00

Solutions enhancing nature free gains :

The building faces the south which allows enough sunshine and avoid the dominant wind. In the summer, natural ventilation is achieved. Besides, indoor planting roof area sets open fan which allows airflow disturbance by taking advantage of plants.

## Smart Building

BMS :

The Building Management System can carry out remote multi-point real-time detection, control, record and information sharing for the building equipment. It can be used to centrally control devices like HVAC units across multiple locations, providing monitoring, metering, warning and recording functions. The energy consumption monitoring system monitors the building's energy consumption, including electricity, water, gas, heat, cooling, that allow facility and building managers to gather data and make more informed decisions about energy activities across the sites.

Users' opinion on the Smart Building functions : According to the results of user satisfaction survey, the user satisfaction rate for the control system is 100%.

## Environment

### Urban environment

The project is located in the block of Yiyuan Road South, Xinghu Street West block, Suzhou Industrial Park, in the southeast corner of the core area of the Moon Bay. The land is used for commercial financial industry. Within the project, vehicles and pedestrians go different path. The motorized owner's entrance is on the west side of the plot, and the sidewalk is set on the east side of the plot. In the project, there are 10 parking spaces and 516 underground parking spaces, and the underground garage entrance is located on the north side of the block. There are three bus stations and one metro station within 500m of the main entrance. Six bus lines and Metro Line 2 pass by, offering accessibility to public facilities.

The project is close to the Dushu Lake. Dushu Lake is a fresh water lake with an area of about 11.52 square kilometers. Since 2000s, Suzhou Dushu Lake Higher Education Town was gradually formed on the east bank. Xinghu Street goes through it, connects the Moon Bay to the CBD of Jinji Lake East. There are many commercial facilities around, including the Dushu Lake Neighborhood Center and Sharaton Hotel, which provides convenient and comfortable living environment.

### Green space

Green space : 3 356,18

### Parking spaces

Underground two to three for parking, all about 21836 square meters. Totally, there are 526 underground parking spaces, non-motor vehicle parking spaces 860.

## Products

### Product

TRANE RTWH440 Ground source heat pump unit

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<http://www.trane.com/commercial/asia-pacific/china/zh.html/>

Product category :

The project uses ground source heat pump model RTWH440, using R134a environmental refrigerant, the nominal cooling capacity of 1612.3kW, the nominal heating capacity of 1688.0kW. The temperature of the cooling evaporator is 12 °C / 7 °C, the temperature of the condenser is 18 °C / 29 °C, the temperature of the heating evaporator is 15 °C, and the temperature of the condenser is 45 °C. Compressor based on Trane's global R & D platform GP2 semi-enclosed twin-screw compressor with a low-speed direct drive motor, fully enclosed structure, the motor is cooled by refrigerant and does not touch the air for longer life. CH530 controller can precisely control the temperature fluctuation at + -0.3 degrees, small temperature fluctuations means higher comfort. At the same time CH530 controller also has a soft load function, effectively prevent the unit to start frequently. Condenser side hot water temperature up to 60C, and equipped with the corresponding control module, according to the heat load requirements to control the loading and unloading of the compressor to meet the



different heating needs of users.

Designers: Trane ground source heat pump not only to meet the design requirements, but also efficient energy-saving, control module to meet the different heating needs. Construction workers: equipment installation convenience, complete accessories, reducing a lot of work. Users: equipment is stable, in the winter and summer can meet the needs of heating and cooling.

#### BOSCH Solar 4000TF flat panel solar collectors

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<http://www.bosch-climate.cn/web/>

Product category : HLK / Heizung, Warmwasser

The project uses BOSCH Solar 4000TF comfortable flat plate collector. High selective PVD coating with high efficiency, stable and reliable quality, ensure an excellent thermal efficiency of collector. Ultrasonic welding technology ensure a tight connection between absorber sheet and riser tube, enhance the heat transfer capacity of collector. Lower iron solar structured safety glass with high light transmission rate and without light pollution. Optimization design of aluminum /copper full sheet absorber, collector is more competitive. Lower water volume required, quicker start-up of collector, quicker thermal reaction, and higher temperature difference achieved.

Collector frame is made of a single aluminum profile, only a connection on the frame, collector's mechanical rigidity is stronger, collector have a good airproof performance. The EPDM hermetic ring frame is elastic and have good resistance to ambient environment and UV. Standard size of 2.09 , easy to design on the roof Harp hydraulic design with lower pressure loss, 10 collectors possible to connect in series; easy to drain the water, reduce the stagnation phenomenon. Solid and light collector, easy to transport and install Fast connection unit provided, easy and fast to install with only a tool Complete accessories provided, more options for system configuring.

Design side: flat solar collector performance, light weight, easy to design layout, and have a longer life, have a higher economic efficiency. Construction workers: collector is very convenient to install, save time and effort, and supporting the components are very complete, you can choose a flexible. Uses: collector collector effect is very good, can effectively guarantee the demand for hot water.



#### TECE-PRAKTIKA Plus Fully Automatic Grease Separator

Product category : Außenanlagen / Müllsammlung und Aufbereitung

The project uses TECE-PRAKTIKA Plus automatic grease separator. Material for the 316 stainless steel, the design standards for the German standard EN 1825-1, automatic control. This product processing capacity, processing efficiency, emissions, small size, simple operation. The entire process is carried out in a fully sealed state, thus ensuring a good working environment. The unique design changes solid waste from traditional passive gravitational separation to more efficient active filtration separation; and is automatically controlled without human manipulation. The large separation space makes the oil separation time more fully and the separation effect is better. Grease area with electric heating system, and with a temperature sensor, can automatically adjust the temperature, to ensure the mobility of grease. Unique backwash water system to ensure long-term stable operation of the system. Control system for the SIEMENS intelligent programmable controller, and set aside a comprehensive alarm signal interface to the central control room.

Design side: equipment for the finished product automatic oil and water separation device, handling capacity, high efficiency, to meet the design requirements. Construction workers: Separator easy installation, but also according to the site environment to choose a different water and water direction, very flexible. Uses: equipment maintenance is simple, no wearing parts, lower operating costs. Closed design, to ensure a good working environment, automatic control, no personnel to operate.

## Costs

### Construction and exploitation costs

Renewable energy systems cost : 10 044 000,00 ¥

Cost of studies : 1 909 000 ¥

Total cost of the building : 350 000 000 ¥

Subsidies : 1 200 000 ¥

### Energy bill

Forecasted energy bill/year : 2 132 600,00 ¥

Real energy cost/m<sup>2</sup> : 28.47

Real energy cost/Work station : 1292.48

## Building Environmental Quality

### Building Environmental Quality

- acoustics
- waste management (related to activity)
- water management
- energy efficiency
- maintenance
- building end of life management
- integration in the land

- mobility

## Health and comfort

### Water management

Consumption from water network : 29 990,00 m<sup>3</sup>  
Consumption of harvested rainwater : 5 710,50 m<sup>3</sup>  
Water Self Sufficiency Index : 0.16  
Water Consumption/m<sup>2</sup> : 0.4  
Water Consumption/Work station : 18.18

## Contest

### Building candidate in the category

