



Vicot Solar Intermediate Temperature Applications Introduction

Vicot Air Conditioning Co., Ltd., Dezhou, Shandong
Chinese Solar Cooling Conference, Shanghai, March 27th 2015

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- 4 Demonstration projects**

Chapter 1 About us



VICOT-----Global Leading Solar Energy Collection System

Chapter 1 About us

- **Vicot Group is a high-tech corporation specialized in R & D, production, sales and service of renewable energy products. Vicot locates in the ‘solar city’ Dezhou Shandong, China.**
- **Solar energy products of Vicot include Solar Air Conditioning System and Solar Industrial Boiler System. Vicot has more than 20 sales branches in China and has successfully built more than 200 projects through 5 years’ efforts.**



Chapter 1 About us

Registered capital : USD5 million

Total assets : USD100 million

Factory Area : 150,000m²

Workshop : 80,000m²

Nos. of Employee : 2000

Designed annual yield : USD500 million

Add: Jingshi Road 65, Lixia District 250014,

Jinan, Shandong Province, P.R.China

Tel: 0086-531-82355566

Fax: 0086-531-82357911

Email: export@vicot.com.cn

Products :

Solar Air Conditioning System

Solar Absorption Chiller & Heating System

Solar Heat Pump System

Solar Industrial Boiler System

Solar Thermal Oil Boiler

Solar Steam Boiler

Solar Hot Water Boiler

Electric HVAC



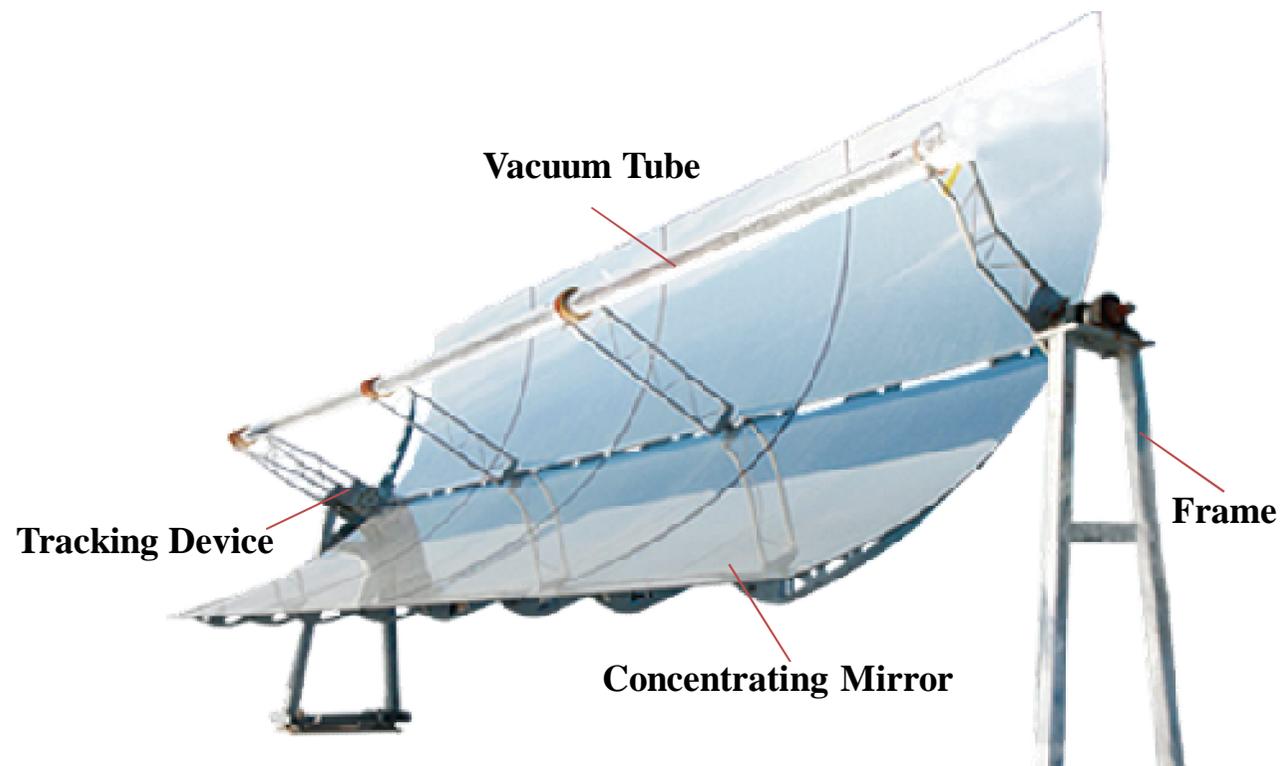
VICOT AIR CONDITIONING CO.,LTD.

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Chapter 2 Product introduction

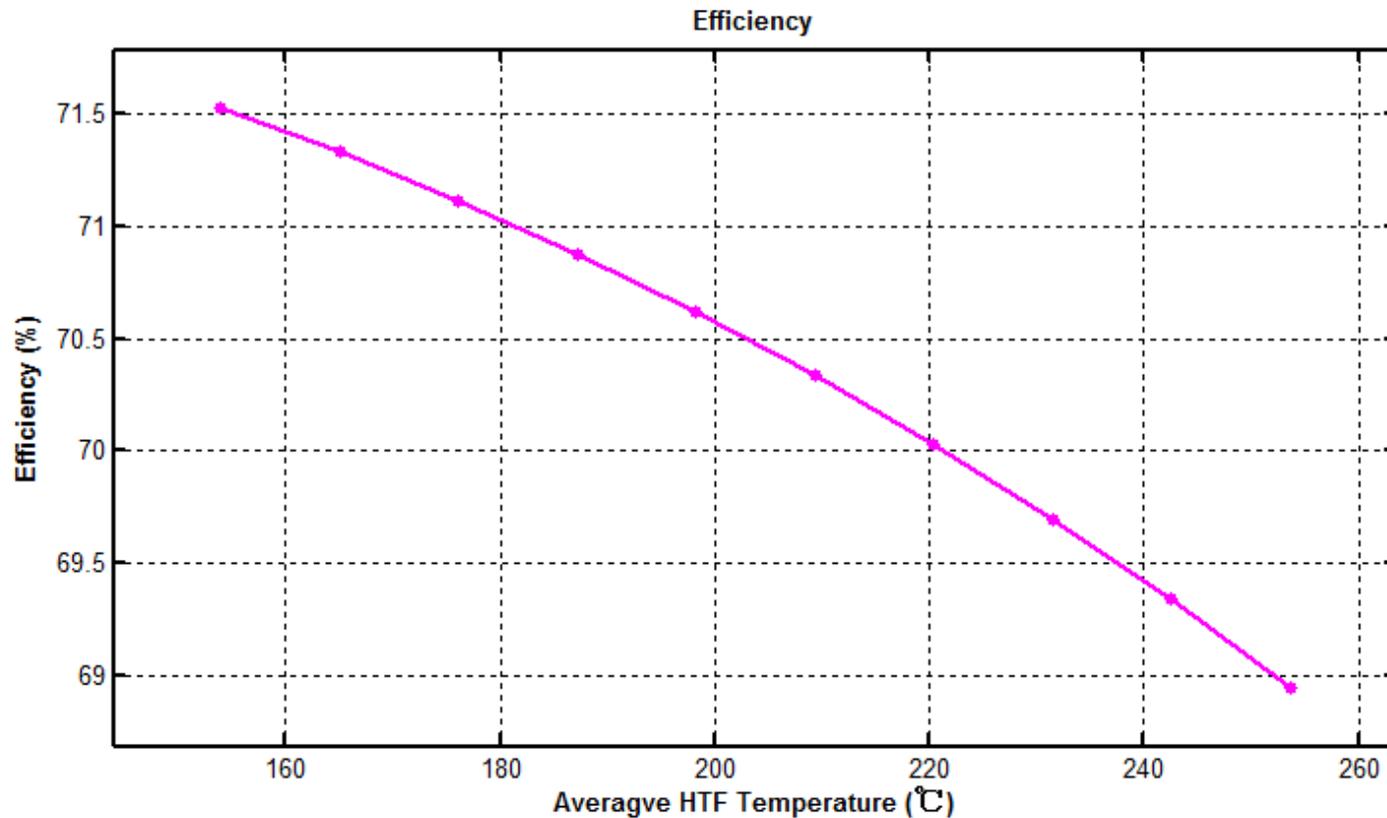
- **Vicot parabolic trough solar collectors are completely developed by our company independently.**



Parabolic Trough Solar Collector

Chapter 2 Product introduction

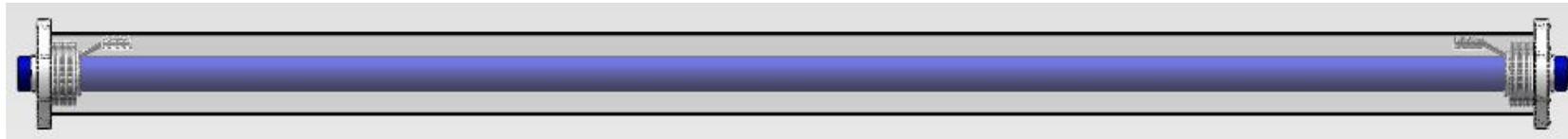
➤ Theoretical efficiency



Parabolic Trough Solar Collector

Chapter 2 Product introduction

➤ Straight-through solar collector vacuum tube



Size	Length	2035mm
	Glass tube	High borosilicate glass3.3 ; Φ102*2.8mm
	Metal absorbers	Φ42*2mm
Weight		8.8kg
Operating pressure		≤3MPa
Absorber coating	Absorptance	$\alpha > 93\%$;
	Emittance	$\varepsilon < 10\%$ (200°C)
Vacuum		(1~3) ×10 ⁻² Pa
Tmax		280°C
Work temperature		-40°C~55°C
Impact resistance		No damage to the vacuum tube, impacted by Φ30mm solid steel ball free fall from 0.5m height.

Chapter 2 Product introduction

- **Vicot Accumulator:**
- **Phase change enthalpy 290J/kg**
- **Phase change temperature ranges 190°C-200°C**
- **High energy accumulation density, and small size.**



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Chapter 3 Solar intermediate temperature applications

◆ Solar Air Conditioning System

◆ Solar Absorption Chiller & Heating System

◆ Solar Heat Pump System

◆ Solar Industrial Boiler System

◆ Solar Thermal Oil Boiler

◆ Solar Steam Boiler

◆ Solar Hot Water Boiler

Chapter 3 Solar intermediate temperature applications

■ Solar Air Conditioning System

- **Solar Absorption Chiller & Heating System** : Vicot Solar Absorption Chiller System is a renewable energy system that uses solar energy instead of conventional energy. It is an energy saving and eco-friendly product that has good energy saving effect and high economic benefit without any emission and pollution. It consists of solar collector, absorption chiller and accumulator.

Solar Absorption Chiller System



Chapter 3 Solar intermediate temperature applications

■ Solar Air Conditioning System

- **Solar Heat Pump System:** Vicot Solar Heat Pump System provides heating by air sourced absorption heat pump directly driven by the energy collected by trough solar collector, it combines the utilization of solar with air source energy perfectly and naturally, which is the latest global technology in the field of clean energy.

Solar Heating System

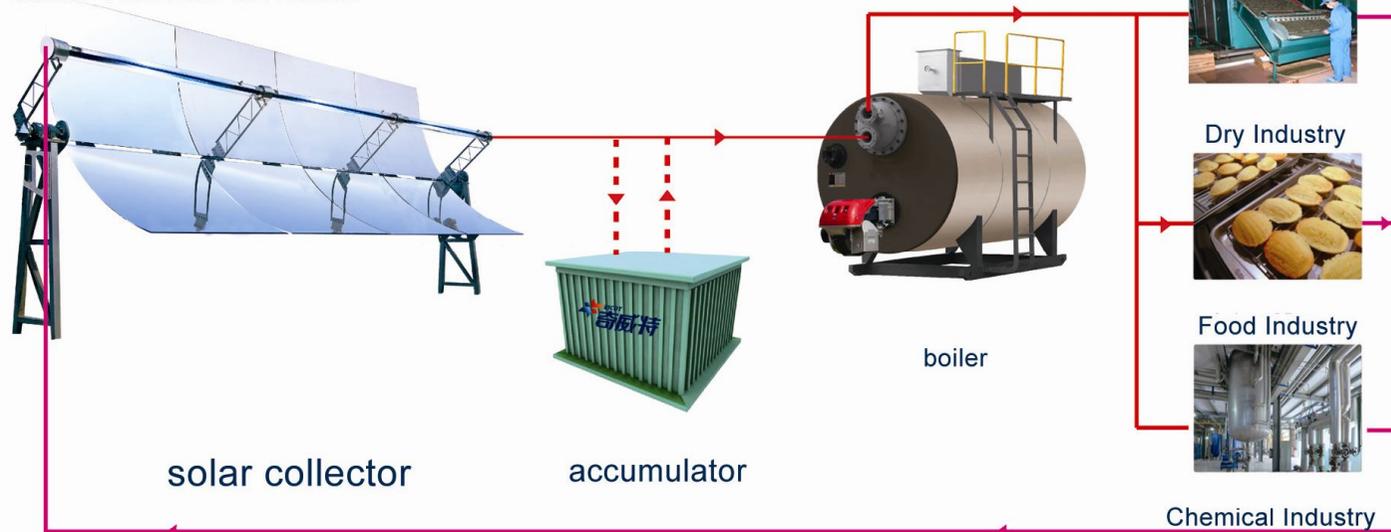


Chapter 3 Solar intermediate temperature applications

■ Solar Thermal Oil Boiler

- **Vicot Solar Thermal Oil Boiler System** is a boiler system which uses solar energy for heating oil, and to stabilize the output, mainly by solar collectors, accumulators, oil boiler and other components.
- **Main applications:** food processing, chemical, rubber, electronic components, wood processing and other needs of high-temperature thermal oil as the heat source of the industry, the maximum output temperature of 300 °C.

Solar Thermal Oil Boiler

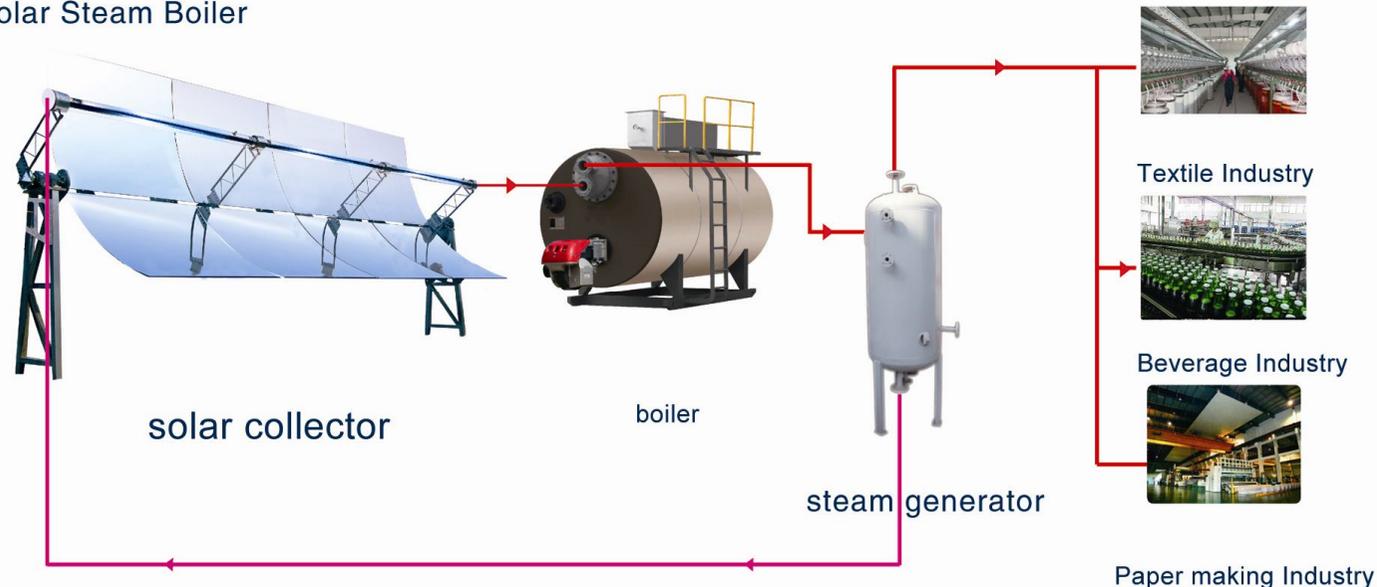


Chapter 3 Solar intermediate temperature applications

■ Solar Steam Boiler

- Vicot solar steam boiler system is a boiler system which uses solar energy to heat water to produce high pressure steam, mainly by solar collectors, thermal oil boiler, steam generator and other components.
- Main applications: pharmaceuticals, chemicals, printing and dyeing textile, food and beverage industry needs to steam heat with the steam pressure not higher than 0.8MPa system.

Solar Steam Boiler



Chapter 3 Solar intermediate temperature applications

■ Solar Hot Water Boiler

- Vicot solar hot water boiler system is a boiler system which uses solar energy to get hot water, mainly by solar collectors, exchanger, hot water boiler and other components.
- Main applications: heating, printing, food processing and other industries requiring hot water of no higher than 100 °C.

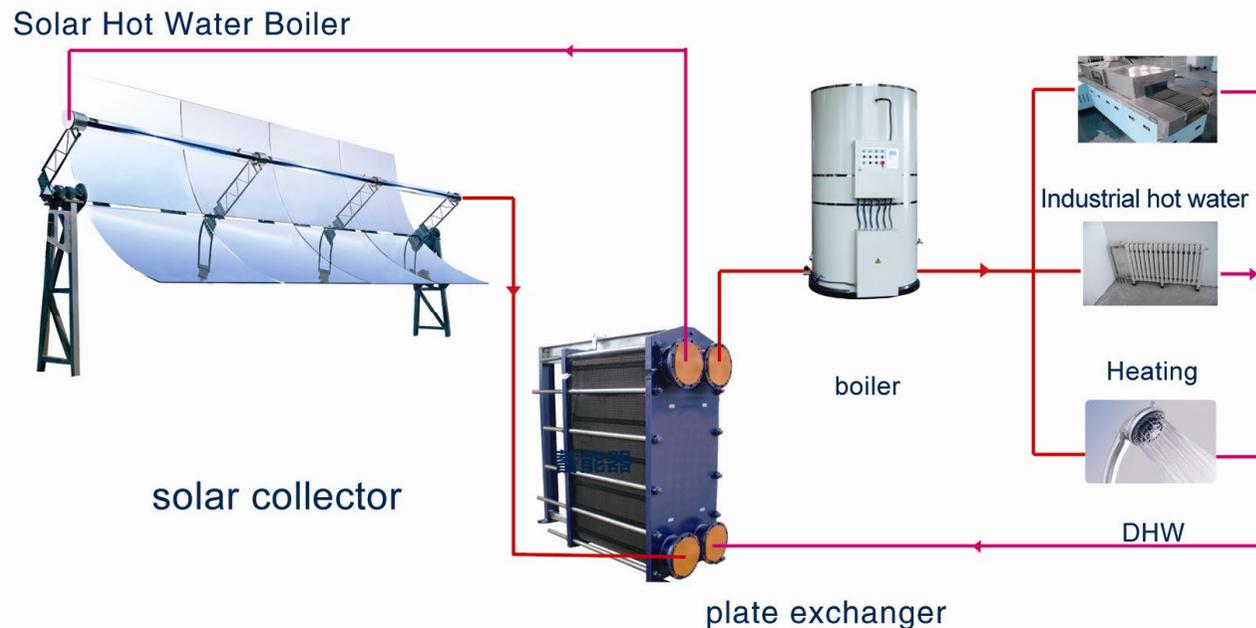


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Chapter 4 Demonstration projects

■ Vicot Solar AC Demonstration Base



Vicot Solar AC Demonstration Base

Chapter 4 Demonstration projects

■ Project Introduction

- **The project is located in Dezhou Economic Development Zone, Shandong Province, north of the Hongdu Road, 1000 m to the west of Jinghua Avenue. Office building is of five layers, with a total construction area of 2970m².**
- **This project uses solar absorption chiller system which is mainly composed of parabolic trough solar collectors, accumulator, absorption chiller heating unit, power center, centralized controller and other components. Collector aperture area 360m² , installed capacity 200kW.**
- **This system provides cooling in summer (8: 00-17: 00) and heating in winter for office building.**

Chapter 4 Demonstration projects

■ Performance Testing

- **In October 2013, assessed by National Center for Quality Supervision and Testing of Solar Heating Systems (Beijing), solar guaranteed rate 67.6% and collector system efficiency 55.2% have all reached 1 level.**
- **Test standards reference to Evaluation standard for application of renewable energy in buildings.**
- **Vicot solar air conditioning system is stable, energy saving effect is remarkable, after actually running experiments and authority assessment.**

Chapter 4 Demonstration projects

■ Test Equipment



Parabolic trough solar collector arrangement drawing



Pyranometer for recording the solar radiation



Data logger for recording the ambient temperature, radiation and wind speed

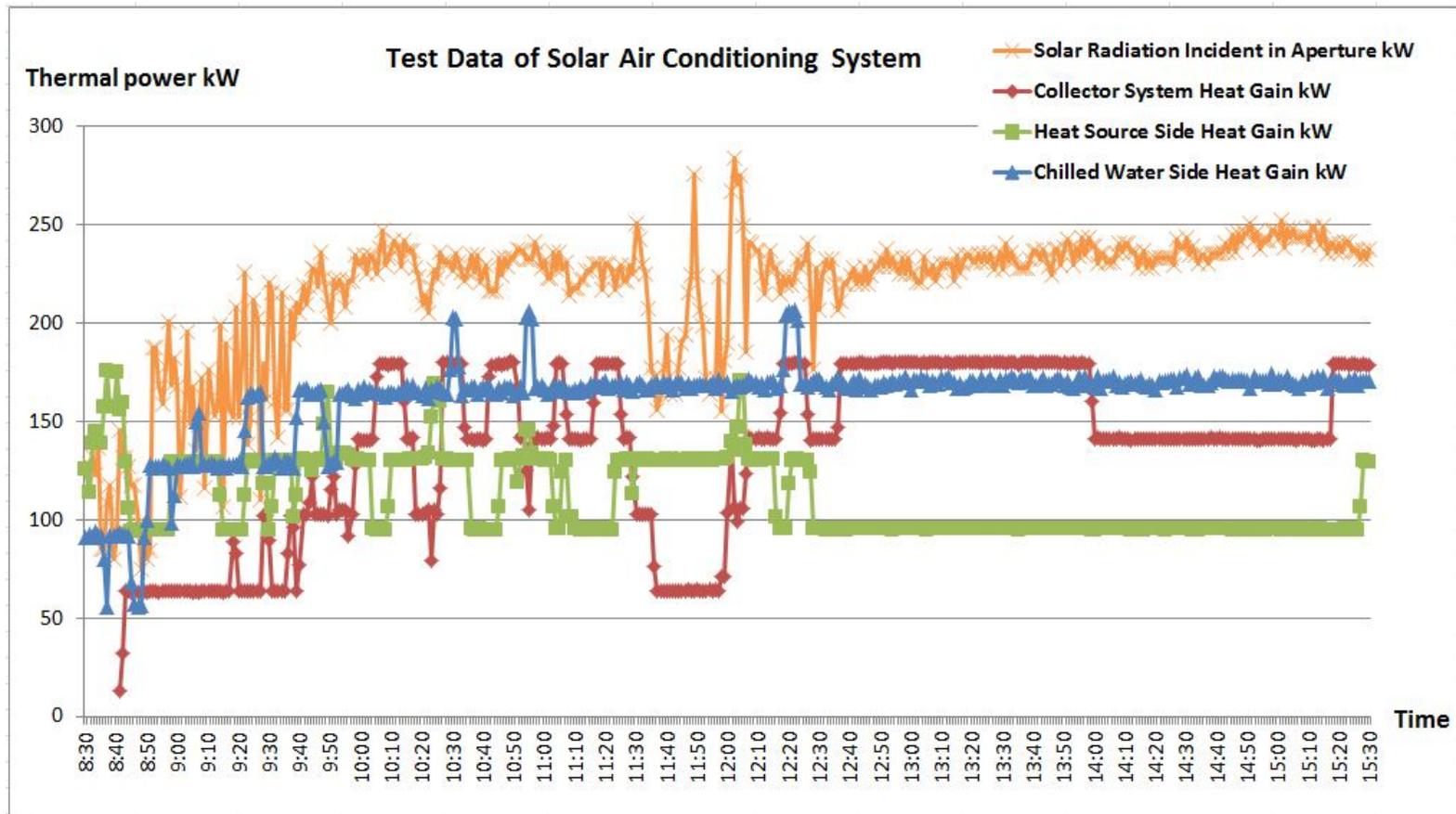


Anemometer for recording the wind around collectors.

Vicot Solar AC Demonstration Base

Chapter 4 Demonstration projects

■ Test Data



Vicot Solar AC Demonstration Base

Chapter 4 Demonstration projects

■ Test Reports






检 验 报 告

TEST REPORT

国太质检(委)字(2013)第TX18号

工程名称	奇威特办公楼太阳能空调系统
Name of Project	奇威特办公楼太阳能空调系统
委托单位	山东威特人工环境有限公司
Client	山东威特人工环境有限公司
设计单位	山东威特人工环境有限公司
Design units	山东威特人工环境有限公司
安装单位	山东威特人工环境有限公司
Construction	山东威特人工环境有限公司
检验类别	委托检验
Test Category	委托检验

国家太阳能热水器质量监督检验中心(北京)
National Center for Quality Supervision and Testing of
Solar Heating Systems(Beijing)

国家太阳能热水器质量监督检验中心(北京)

检 验 报 告

报告编号: 2013TX18 共9页第 1 页

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委托单位:	山东威特人工环境有限公司																										
设计单位:	山东威特人工环境有限公司																										
安装单位:	山东威特人工环境有限公司																										
检测类别:	委托检验																										
检测日期:	2013.8.22、8.24、9.4、9.9																										
检测地点:	山东威特人工环境有限公司办公楼																										
检测项目:	太阳能空调系统制冷工况: 1、集热系统得热量; 2、集热系统效率; 3、制冷机组太阳能制冷性能系数; 4、太阳能保证率; 5、室内温度; 6、判定和分级。																										
检测结果:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>序号</th> <th>项目</th> <th>评价结果</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>太阳能保证率 (%)</td> <td>67.6</td> </tr> <tr> <td>2</td> <td>集热系统效率 (%)</td> <td>55.2</td> </tr> <tr> <td>3</td> <td>常规能源替代量 (kge)</td> <td>9243.6</td> </tr> <tr> <td>4</td> <td>能效比 (元/kWh)</td> <td>0.57</td> </tr> <tr> <td>5</td> <td>二氧化碳减排量 kg</td> <td>22831.7</td> </tr> <tr> <td>6</td> <td>二氧化硫减排量 kg</td> <td>184.9</td> </tr> <tr> <td>7</td> <td>粉尘减排量 kg</td> <td>92.4</td> </tr> </tbody> </table>	序号	项目	评价结果	1	太阳能保证率 (%)	67.6	2	集热系统效率 (%)	55.2	3	常规能源替代量 (kge)	9243.6	4	能效比 (元/kWh)	0.57	5	二氧化碳减排量 kg	22831.7	6	二氧化硫减排量 kg	184.9	7	粉尘减排量 kg	92.4	判定和分级	
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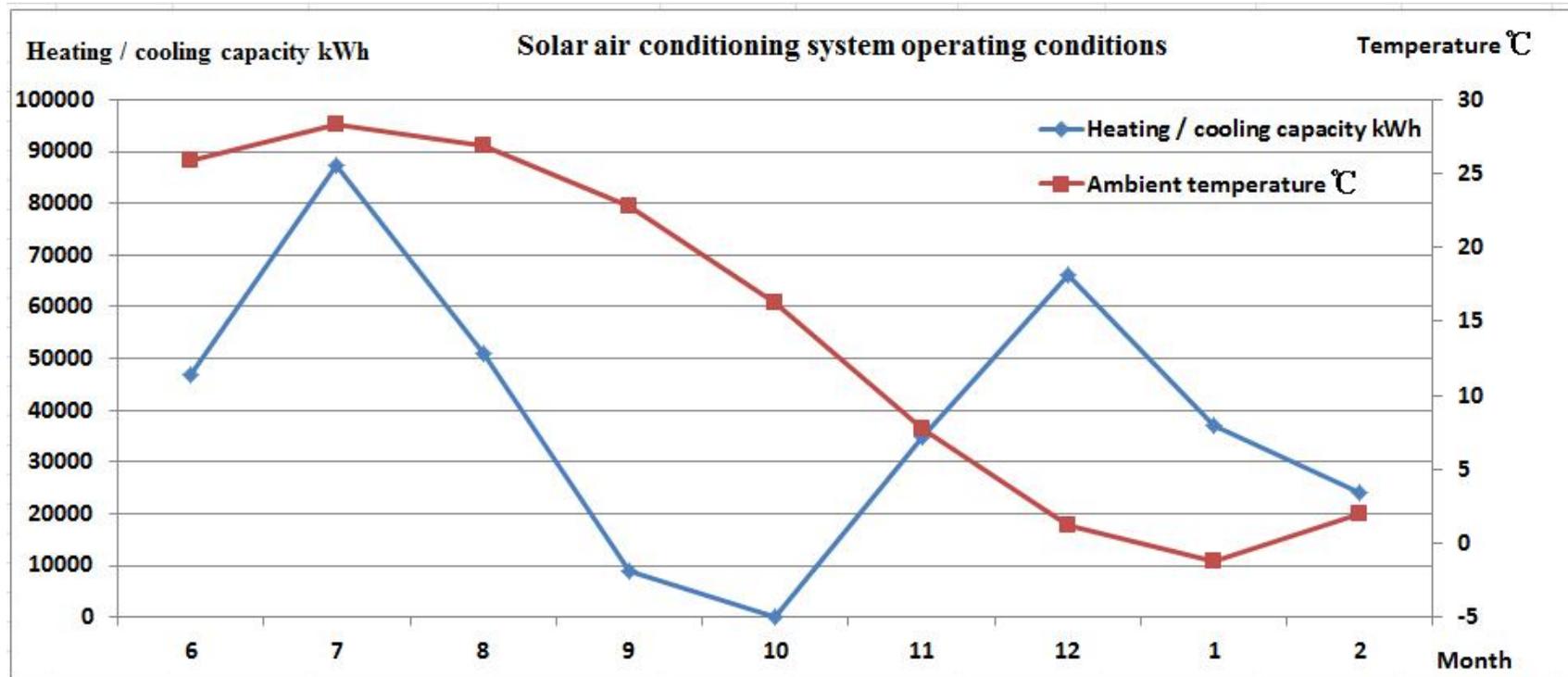
检验鉴定章
签发日期: 2013年10月24日

批准: 何涛 审核: 张红宇 主检: 黄银建 张银

Vicot Solar AC Demonstration Base

Chapter 4 Demonstration projects

■ Actual Operating Conditions



Vicot Solar AC Demonstration Base

Chapter 4 Demonstration projects

■ Actual Operating Costs



Vicot Solar AC Demonstration Base

Chapter 4 Demonstration projects

■ Conclusions

- **The project has been stably running for 4 years, since 2011. It runs four months in summer for cooling, four months in winter for heating.**
- **The annual operating cost is RMB 84,800, compared to traditional gas air conditioning and gas fired boiler which cost RMB 150,000 annually, energy-saving effect is remarkable.**

	Building load	Building load per unit area	Cooling / Heating capacity	Operating costs	Operating costs per unit area	Energy price
	kW	W/m ²	kWh	RMB	RMB/m ²	RMB/kWh
Cooling	217.7	73	194,000	39,800	13.4	0.21
Heating	180	60	162,000	45,000	15.2	0.28
Annual	199	66.5	356,000	84,800	28.6	0.24



Dezhou Ecological Technology Exhibition
Central Solar Air Conditioning Project



Taiyuan Armed Police Corps
Solar Air Conditioning Project



Tibet University Solar Heating Project



Dezhou College School Solar Heating Project



Guyuan County of Zhangjiakou Ganhua Malls
Solar Heating Project



Siemens THVS Solar Boiler System Project



Ningbo Hotel Solar Hot Water Project



Huaibei Yuandian Second Mine
Solar Hot Water Project

A close-up photograph of two hands shaking in a firm grip. The hands are positioned in the center of the frame. The person on the left is wearing a dark suit jacket and a light blue dress shirt. The person on the right is wearing a dark suit jacket and a white dress shirt. The background is a light blue gradient with a faint, darker blue world map. At the bottom of the background, there are white lines forming a grid pattern.

The end
Thank you