

PLATE HEAT EXCHANGER

Energy Recovery Ventilation Specialist



Beijing Holtop Artificial Environment Technology Co., Ltd
ISO9001:2000 Approved company

COMPANY

BRIEF INTRODUCTION TO COMPANY



ENERGY RECOVERY VENTILATION SPECIALIST

Holtop is dedicated to the research and technology development in the field of indoor air quality. It is the leading company in China who professionally produces heat recovery ventilation system.

Covering a land of 20000 square meters, Holtop was created in May, 2002 furnished with first-class plants and equipments. Through innovation, it developed its own key components like plate and rotary heat exchangers for various heat & energy recovery systems. It provides now full lines of products covering 5 series and 98 specifications which can basically satisfy the needs of various airflows and installations worldwide.

Holtop is trusted by the users for its advanced technology, superb product quality and all-around services. By the end of year 2006, Holtop has supplied successfully to over 3000 customers in the domestic market and exported its products to Japan, Korea, Russia, Italy, Belgium, Australia, New Zealand, etc.

Let's join together to contribute to our commitment of energy saving and pollution reduction.

CONTENTS



BRIEF INTRODUCTION TO COMPANY

02

OUTLINES

04

UNDERSTANDING MODEL NUMBERS

05

MATERIALS OF THE HEAT EXCHANGER

05

CROSSFLOW PLATE HEAT EXCHANGER

06

CROSS-COUNTERFLOW PLATE HEAT EXCHANGER

09

COUNTERFLOW HEAT EXCHANGER

10

CROSSFLOW PLATE FIN TOTAL HEAT EXCHAGNER

11

HEAT PIPE HEAT EXCHANGER

13

APPLICATIONS

17

OUTLINES

Holtop heat exchanger is one of the air-to-air heat exchangers. Outdoor air and exhaust air are separated by the plates to ensure the air tightness while transferring the heat. It has no movement parts, so it's more reliable and has longer service life.

According to the airflow directions of the heat exchanger, it is categorized into cross flow type, counter flow type, and cross-counter flow type. According to the recovery functions of the heat exchanger, it is categorized into sensible heat type and total heat type.



Crossflow plate heat exchanger

- Made by flat aluminum foils of 0.12mm thickness
- Two air streams flow crossly.
- Suitable for room ventilation system and industrial ventilation system.
- Heat recovery efficiency up to 70%



Cross-counter flow plate heat exchanger

- Made by flat aluminum foils of 0.12mm thickness
- Partial air flows crossly and partial air flows counter
- Suitable for room ventilation system and industrial ventilation system.
- Heat recovery efficiency up to 90%



Counter flow plate heat exchanger

- Made by flat aluminum foils of 0.18mm thickness
- Two air streams flow counter
- Suitable machine room ventilation and telecom cabinets ventilation, as well as room ventilation system.
- Heat recovery efficiency up to 90%



Cross flow plate fin total heat exchanger

- Made by **third generation E.R. paper**
- Structured with flat plates and corrugated plates.
- Two air streams flow crossly.
- **Fire retardant and mold resistance, certified by national authority**
- Total heat recovery efficiency up to 70%



Heat pipe heat exchanger

- Made by **cooper tube with hydrophilic aluminum fin**
- Filled with special fluoride for heat exchange media.
- Heat insulation section in the middle for heat and cold source insulation
- **Free of maintenance, washable and longer service life**
- Total heat recovery efficiency up to 82%

UNDERSTANDING MODEL NUMBERS

Model Description

HB S - W 300/300 - 400 - 3 B - 1

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Stands for Holtop plate heat exchanger
- ② Function code: S - sensible heat exchanger, T - total heat exchanger.
- ③ Structure code: W - cross flow plate fin heat exchanger, ZF - cross flow heat exchanger, CF - counter flow plate heat exchanger, LB - cross-counter flow heat exchanger.
- ④ Stands for the cross section size (mm)
- ⑤ Stands for length of the heat exchanger (mm)
- ⑥ Stands for plate distance (mm)
- ⑦ Material: B - standard type, F - anti-corrosion, G - High temperature
- ⑧ 1/2/3, stands for air stream direction

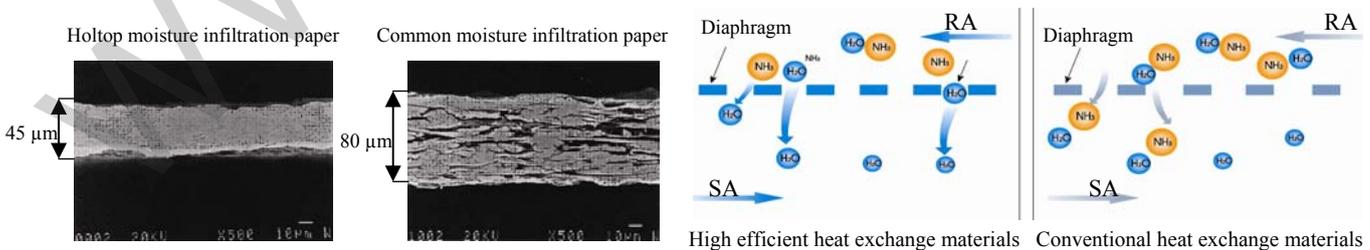
Material of the heat exchanger

Sensible heat exchanger

The plate is made of aluminum foils specially for air-to-air heat exchange. Various type are available for different applications.

Total heat exchanger

Total heat exchanger is made of ER paper which is featured by high moisture permeability, good air tightness, excellent tear resistance, and aging resistance. The clearance between the fibers is very small, so only the moisture molecules of small diameter can go through, the odor molecules of larger diameter are unable to pass through it. By this means, the temperature and humidity can be recovered smoothly, and prevent the pollutants infiltrating to the fresh air.



Gas molecules type	Carbon dioxide (CO ₂)	Ammonia (NH ₃)	Methane (CH ₄)	Vapor (H ₂ O)	The clearance of fiber
Diameters (nm)	0.324	0.308	0.324	0.288	0.3 (for reference)

CROSS FLOW PLATE HEAT EXCHANGER

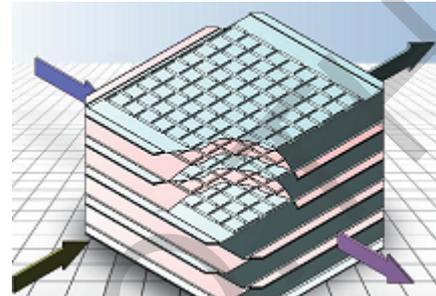


Application

Used in comfortable air conditioning ventilation system and technical air conditioning ventilation system. Supply air and exhaust air totally separated, heat recovery in winter and cold recovery in Summer

Working principle

Two neighbor aluminum foils form a channel for fresh or exhaust air stream. Heat is transferred when the air streams flow crossly through the channels, and fresh air and exhaust air is totally separated.



Material type

B series (standard type)

Heat exchanger is made of pure aluminum foils, with galvanized end cover and aluminium alloy wrap angle. Max. air temperature 100°C, it is suitable for most of the occasion.

F series (Anti-corrosion type)

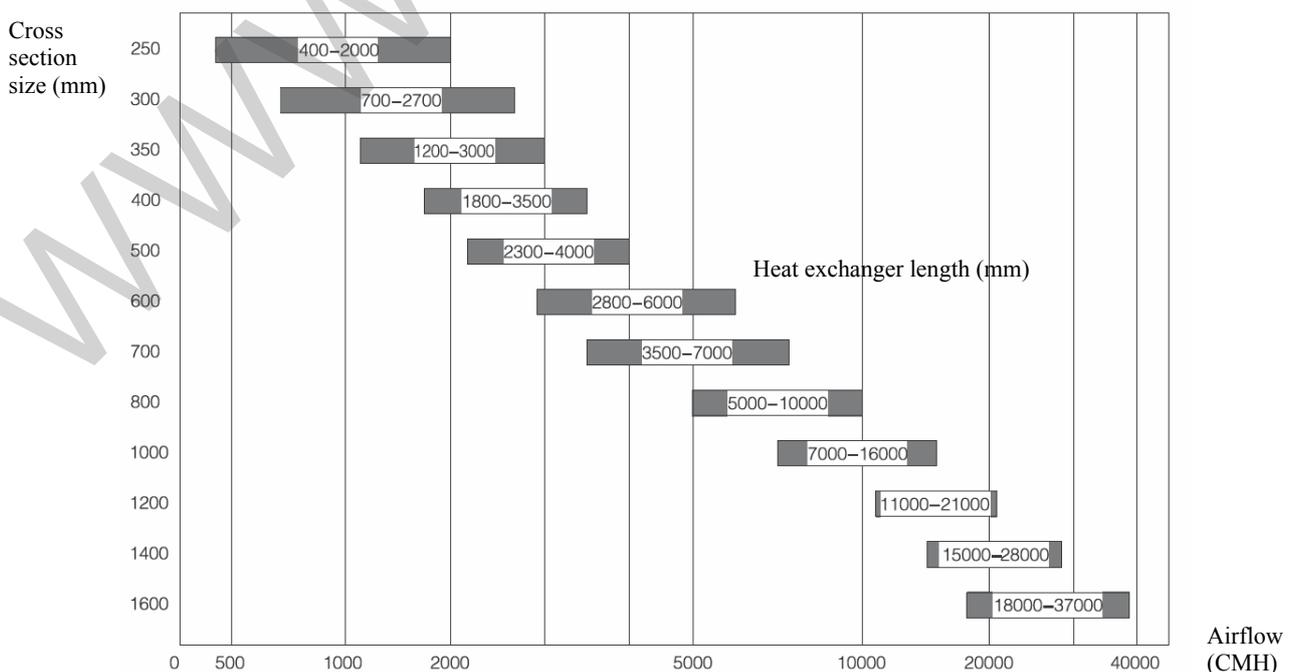
Heat exchanger is made of pure aluminum foils cover by special anti-corrosion material, with galvanized end cover and aluminium alloy wrap angle., it is suitable for the corrosive gas occasion.

G series (high temperature type)

Heat exchanger is made of pure aluminum foils, with galvanized end cover and aluminium alloy wrap angle. Sealing material is special and allow the Max. air temperature to be 200°C, it is suitable for special high temperature occasion.

Aluminum foils thickness range from 0.12 to 0.18mm because of the different specification heat exchanger.

Heat exchanger size and air volume



THE MAJOR IMPACT OF FACTORS

Heat exchange coefficient

According to research, heat exchange rate is based on the heat exchange coefficient, larger coefficient means higher heat exchange rate. Holtop use the special pure aluminum foils to produce heat exchanger, heat exchange rate is effectively improved.

Heat exchange area

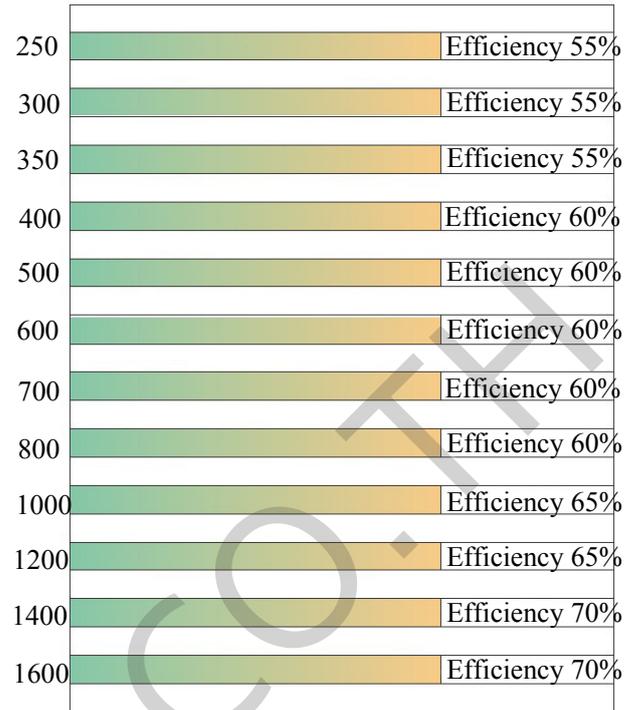
Heat exchange capacity is relevant to the heat exchange area. By changing the plate structure, increase heat exchange area, heat exchange efficiency is also increased. In order to increase the heat exchange area, Holtop heat exchanger has grooves in all the plates.

Plate distance

Small plate distance can increase heat exchange efficiency, but resistance also increased. Large plate distance means less resistance but efficiency is low. Only choose the suitable plate distance can have ideal heat exchange efficiency.

Turbulent flow

Because the special plate structure of Holtop heat exchanger, when airstream enter the heat exchanger will become turbulent so heat exchange efficiency increased.



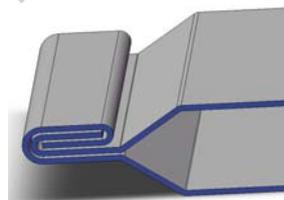
Efficiency of different specification heat exchanger

Main features

- Sensible heat recovery
- Total separation of fresh air & exhaust air streams
- Heat recovery efficiency up to 80%
- 2-side press shaping
- Double folded edge
- Completely joint sealing.
- Resistance of pressure difference up to 2500Pa
- Under pressure of 700Pa, air leakage less than 0.6%



2-side pressed shaping

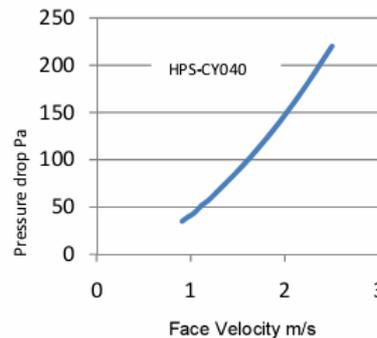
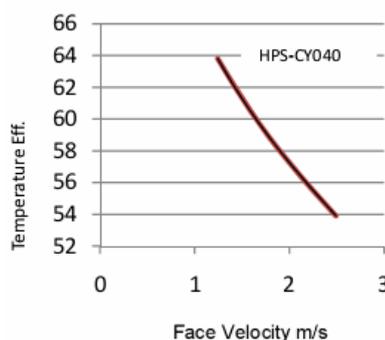


Double folded edge
@5 times plate thickness



Completely joint sealing

Performance chart

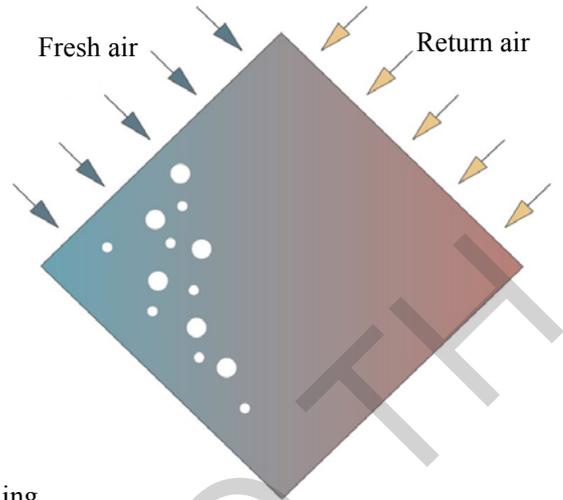


All data figured out above air tested according to GBT 21087-2007

INSTALLATION NOTES

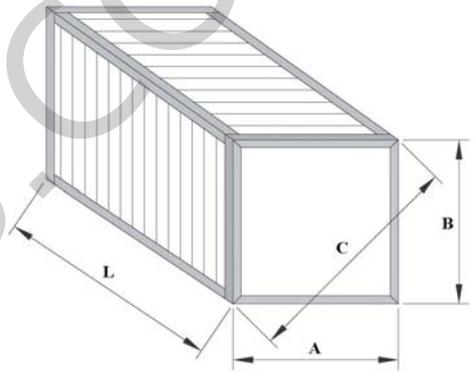
Heat exchanger vertical installation

When outdoor temperature is lower than indoor temperature, during heat exchanging if RA temperature is low enough (relative humidity 100%) then condensing water will come into being, once there is condensing water, heat exchange area inside heat exchanger is decreased, efficiency become lower and pressure drop increased, in order to eliminate the condensing water in time, heat exchanger vertical installation like the picture on right is the best choice.



Condensing water pan

When designing heat recovery functional section in air handling unit, under the heat exchanger should add the condensing water pan, in case of disorderly flow of condensing water



Specifications

Remarks:

- ① Length is customized, but should be within the specified range.
- ② Size C is for reference, size can be slightly increased according to heat exchanger length.

Model	A (mm)	B (mm)	C (mm)	Length per piece (L)	Optional spacing (mm)	Remarks
HBS-ZF250/250	250	250	356	≤400	4.0	One module
HBS-ZF300/300	300	300	427	≤400	4.0	
HBS-ZF300/300	300	300	427	≤500	5.0	
HBS-ZF350/350	350	350	498	≤400	4.0	
HBS-ZF350/350	350	350	498	≤500	5.0	
HBS-ZF350/350	350	350	498	≤550	6.0	
HBS-ZF400/400	400	400	568	≤400	4.0	
HBS-ZF400/400	400	400	568	≤500	5.0	
HBS-ZF400/400	400	400	568	≤550	6.0	
HBS-ZF500/500	500	500	710	≤550	6.0, 8.0, 10.0	
HBS-ZF600/600	600	600	851	≤550	6.0, 8.0, 10.0	
HBS-ZF700/700	700	700	993	≤550	8.0, 10.0	
HBS-ZF800/800	800	800	1134	≤550	8.0, 10.0	Four modules combined
HBS-ZF1000/1000	1000	1000	1417	≤500	8.0, 10.0	
HBS-ZF1200/1200	1200	1200	1702	≤500	8.0, 10.0	
HBS-ZF1400/1400	1400	1400	1985	≤500	8.0, 10.0	
HBS-ZF1600/1600	1600	1600	2265	≤500	8.0, 10.0	

CROSS-COUNTER FLOW PLATE HEAT EXCHANGER

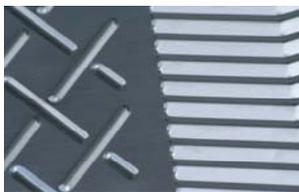
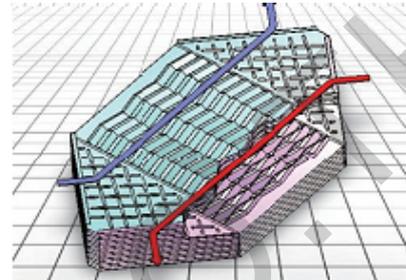


Working principle

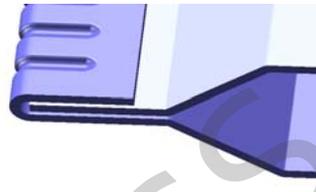
Two neighbor aluminum foils form a channel for fresh or exhaust air stream. Heat is transferred when the partial air streams flow crossly and partial air streams flow counter through the channels, and fresh air and exhaust air is totally separated.

Main features

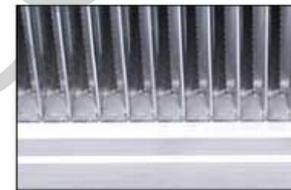
- Sensible heat recovery
- Total separation of fresh & exhaust air streams
- Heat recovery efficiency up to 90%
- 2-side press shaping
- Single folded edge
- Completely joint sealing.



2-side pressed shaping

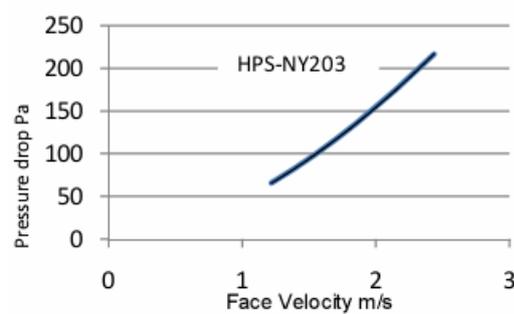
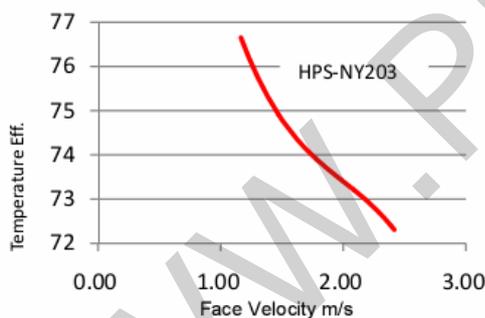


Single folded edge
@3 times plate thickness

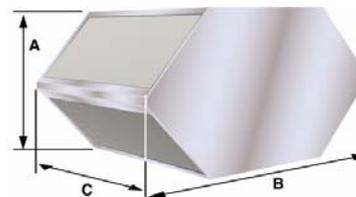
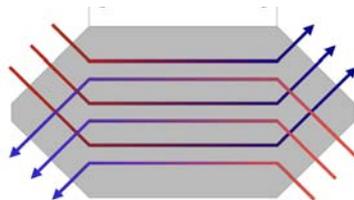


Completely joint sealing

Performance chart



All data figured out above air tested according to GBT 21087-2007



Specifications

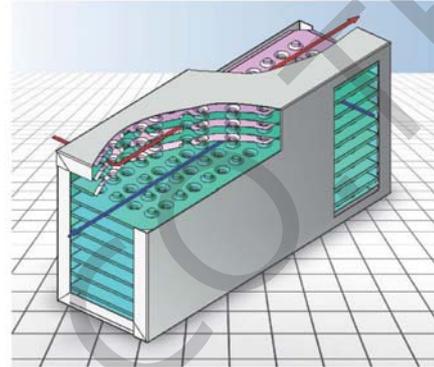
Model	A (mm)	B (mm)	Length per piece (C)	Optional spacing (mm)
HBS-LB539/316	316	539	Custom-made Max. 650mm	2.1

COUNTER FLOW PLATE HEAT EXCHANGER



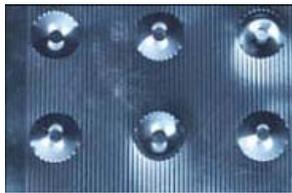
Working principle

Two neighbor aluminum foils form a channel for fresh or exhaust air stream. Heat is transferred when the air streams flow counter through the channels, and fresh air and exhaust air is totally separated.

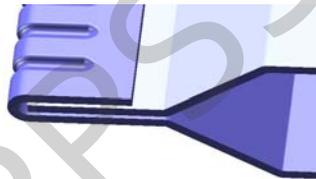


Main features

- Sensible heat recovery
- Total separation of fresh & exhaust air streams
- Heat recovery efficiency up to 90%
- 2-side press shaping
- Single folded edge
- Completely joint sealing



2-side pressed shaping

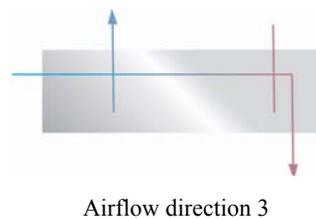
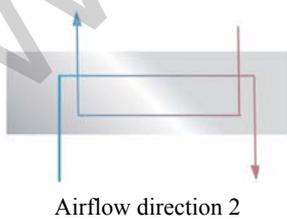
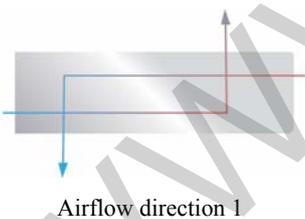


Single folded edge
@3 times plate thickness



Completely joint sealing

Airflow directions



Specifications

Model	A (mm)	B (mm)	C (mm)	Spacing (mm)
HBS-CF496/190	496	190	100-600	3.0, 4.5, 5.5, 6.5
HBS-CF596/190	596	190		
HBS-CF696/190	696	190		
HBS-CF796/190	796	190		

CROSS FLOW PLATE FIN HEAT EXCHANGER

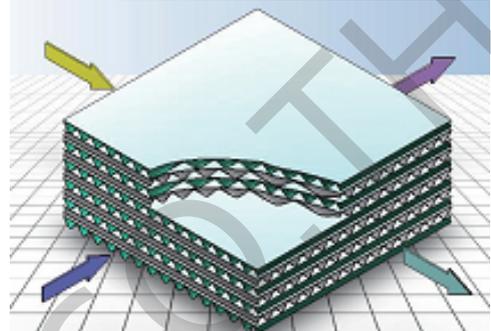


Application

Used in comfortable air conditioning ventilation system. Supply air and exhaust air totally separated, heat recovery in winter and cold recovery in Summer

Working principle

The flat plates and the corrugated plates form channels for fresh or exhaust air stream. When the two air streams passing through the exchanger crossly with temperature difference, the energy is recovered.



Performance standard of E.R. paper

Item	Unit	Heat exchange paper	Corrugated paper
Ration	g/m ²	60	80
Tightness	g/cm ²	>0.85	>0.50
Vertical tensile resistance	N/15mm	≥20.0	≥30.0
Horizontal tensile resistance	N/15mm	≥15.0	≥20.0
Wet vertical tensile resistance	N/15mm	/	≥2.00
Wet horizontal tensile resistance	N/15mm	/	≥1.50
Hygroscopicity (Cobb method)	g/m ²	≥20.0	/
Flame-retardant		Flame extinguishes after paper leaves the fire	
Antimicrobial		Has a bactericidal effect on E. coli 8099, Staphylococcus aureus ATCC6538, Klebsiella pneumoniae ATCC4352, Candida albicans ATCC10231	
Mildew resistance		Growing grade is 0	

Temperature efficiency: 70%
 Effective air exchange rate: 98%
 Mildew resistance grade: 0

Enthalpy efficiency: 60%
 Flame retardant grade: B2
 Antimicrobial: yes

E.R. paper performance introduction

Heat exchange paper: for heat and moisture exchange, the main performance standards are diathermancy, moisture-penetrability and air permeability.

Corrugated paper: to constructed the frame for the heat exchanger, flowing passages of the air stream.

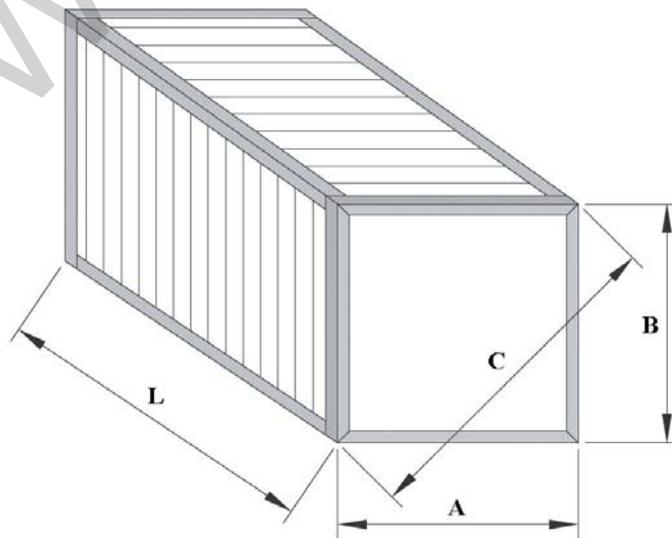
CROSS FLOW PLATE FIN HEAT EXCHANGER

Specifications

Model	A (mm)	L (mm)	C (mm)	Optional corrugation height (mm)	Remarks
HBT-W168/168	168	≤500	240	2.0, 2.5	One module
HBT -W202/202	202	≤500	288	2.0, 2.5	
HBT -W222/222	222	≤500	317	2.0, 2.5	
HBT-W250/250	250	≤700	356	2.0, 2.5, 3.5	
HBT-W300/300	300	≤700	427	2.0, 2.5, 3.5	
HBT -W350/350	350	≤700	498	2.5, 3.5	
HBT -W372/372	372	≤700	529	2.5, 3.5	
HBT -W400/400	400	≤700	568	2.5, 3.5	
HBT -W472/472	472	≤550	670	3.5	
HBT -W500/500	500	≤550	710	3.5	
HBT -W552/552	552	≤550	783	3.5	
HBT -W600/600	600	≤550	851	3.5	
HBT -W652/652	652	≤550	925	3.5	
HBT -W700/700	700	≤550	993	3.5	
HBT -W800/800	800	≤550	1134	3.5	
HBT-W1000/1000	1000	≤450	1417	3.5	
HBT-W1200/1200	1200	≤450	1702	3.5	
HBT -W1400/1400	1400	≤450	1985	3.5	
HBT -W1600/1600	1600	≤450	2265	3.5	

Note:

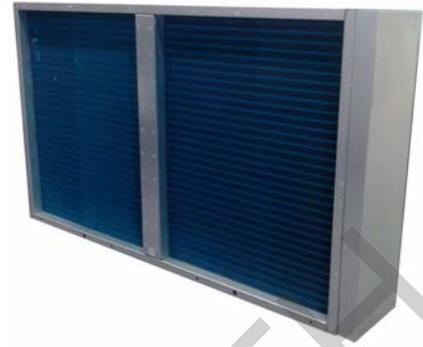
- ① The height of heat exchanger is customer-made, and the height of per single heat exchanger should be within the required range.
- ② Size C is for reference only, can be adjusted according to the length of heat exchanger.



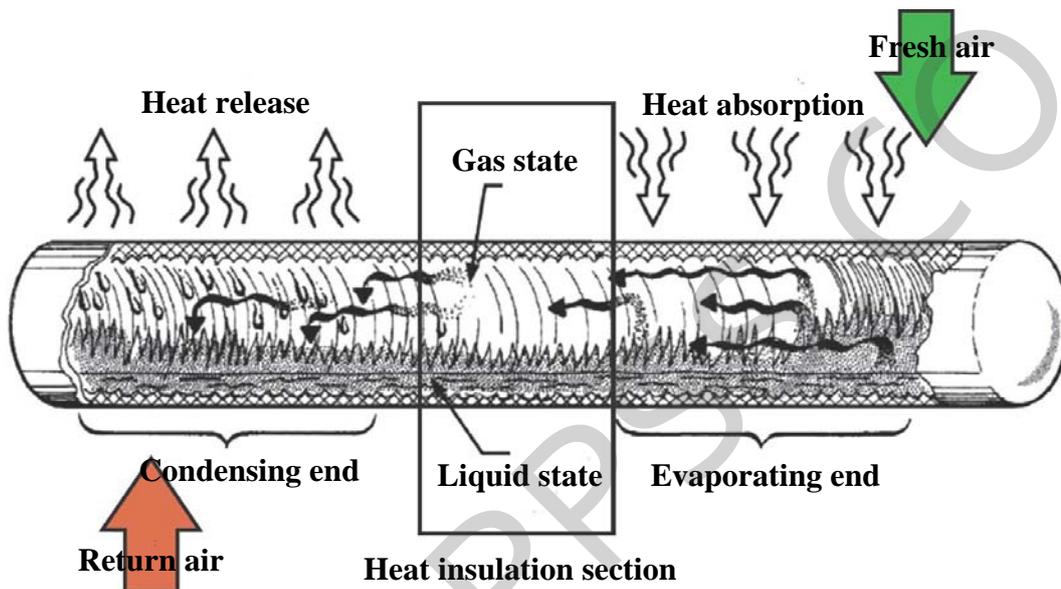
HEAT PIPE HEAT EXCHANGER

Working principle

When heating one end of the heat pipe, liquid inside this end evaporates, the steam flows to the other end under pressure difference. Steam will condense and release heat in the condensing end. Heat transfers from high temperature to low temperature finished, condensate flows back to the evaporating end. In the same way, liquid inside the heat pipe evaporates and condenses circularly, so, heat is transferred from high temperature to low temperature constantly.



Take summer as sample



Main features

1. Applying cooper tube with hydrophilic aluminum fin, low air resistance, less condensing water, better anti-corrosion.
2. Galvanized steel frame, good resistance to corrosion and higher durability.
3. Heat insulation section separates heat source and cold source, then liquid inside the pipe has no heat transfer to outside.
4. Special inner mixed air structure, more uniform airflow distribution, making heat exchange more sufficient.
5. Different working area designed more reasonably, Special heat insulation section avoids leakage and cross-contamination of supply and exhaust air, heat recovery efficiency is 5% higher than the traditional design.
6. Inside the heat pipe is special fluoride without corrosion, it is much safer.
7. Zero energy consumption, free of maintenance.
8. Reliable, washable and long life.

HEAT PIPE HEAT EXCHANGER

Model Description

HPS - 8 - 13.8 x 08 - L

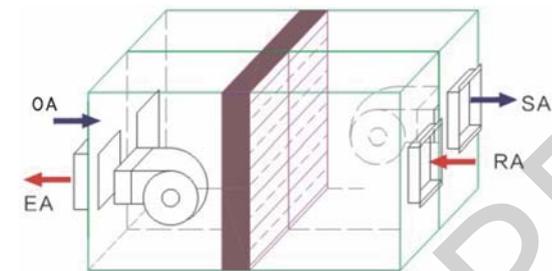
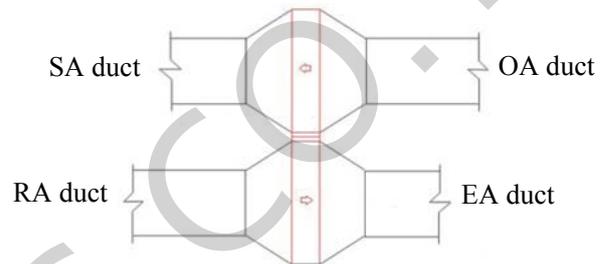
- ① ② ③ ④ ⑤

- ① Stands for Holtop heat pipe heat exchanger
- ② 8 rows pipe (2 rows, 4 rows, 6 rows and 8 rows available).
- ③ Width of windward side: number x 100 (mm)
- ④ Height of windward side: number x 100 (mm)
- ⑤ L is horizontal installation (0°), P is vertical installation (90°)

Application

Application 1: duct installation

Connect the air ducts to the heat pipe heat exchanger directly, installation is easy, investment saved and energy recovery.

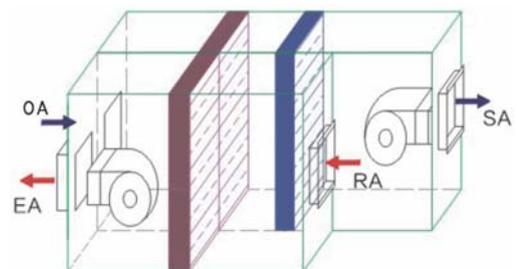


Application 2: Heat recovery ventilator

Heat pipe heat exchanger can be installed inside heat recovery ventilator horizontally, with the supply fan and exhaust fan to achieve energy recovery.

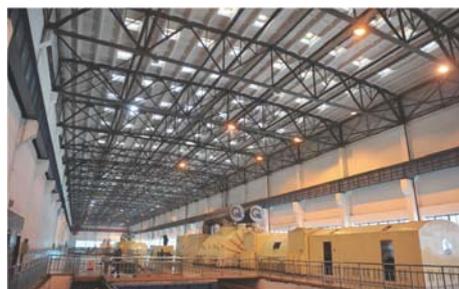
Application 3: Air handling unit

Holtop heat pipe heat exchangers are widely used in air handling units, it have functions of energy recovery, free dehumidification and re-heating, etc.



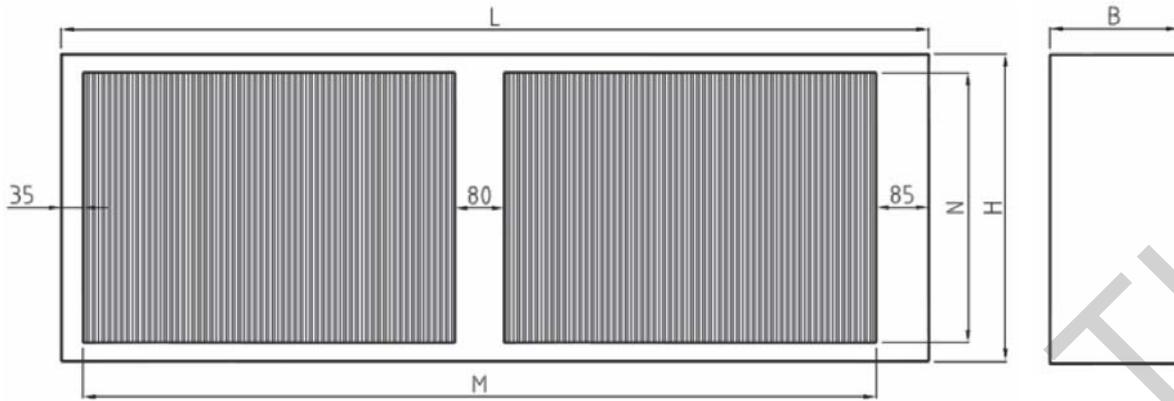
Application range

1. Residential ventilation system, HVAC energy recovery system.
2. Waste heat/cool recovery place.
3. Clean room.



HEAT PIPE HEAT EXCHANGER

Specification



Specification introduction

1. Pipe rows: 2 rows, 4 rows, 6 rows and 8 rows
2. Specification table:

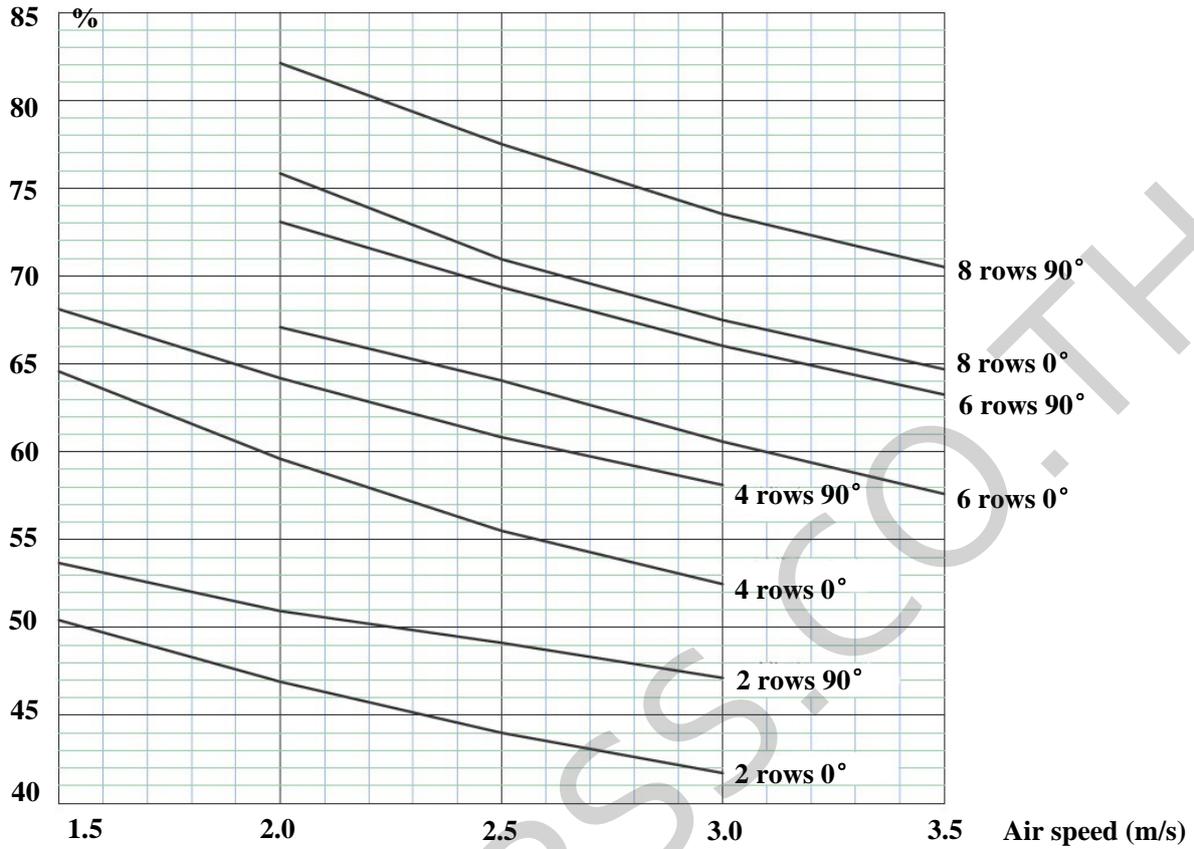
Item	Spec. code	Size (mm)
Width of windward side	M	780, 830, 880, 930, 980, 1030, 1080, 1130, 1180, 1230, 1280, 1330, 1380, 1430, 1480, 1530, 1580, 1630, 1680, 1730, 1780, 1830, 1880, 1930, 1980, 2030, 2080, 2130, 2180, 2230, 2280, 2330, 2380, 2430, 2480, 2530, 2580, 2630, 2680, 2730, 2780, 2830, 2880, 2930, 2980, 3030, 3080, 3130, 3180, 3230, 3280, 3330, 3380, 3430, 3480, 3530, 3580 Recommend incremental size is 50mm (above size includes heat insulation section 80mm)
Height of windward side	N	One layer: 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800 Two layers: 850, 900, 950, 1000, 1050, 1100, 1150, 1200, 1250, 1300, 1350, 1400, 1450, 1500, 1550, 1600 Three layers: 1650, 1700, 1750, 1800, 1850, 1900, 1950, 2000, 2050, 2100, 2150, 2200, 2250, 2300, 2350, 2400 Four layers: 2450, 2500, 2550, 2600, 2650, 2700, 2750, 2800, 2850, 2900, 2950, 3000, 3050, 3150, 3200 Recommend incremental size is 50mm
Width of outline	L	$L=M+120$
Height of outline	H	When $250 \leq N \leq 800$, $H=N+62$, one layer When $800 < N \leq 1600$, $H=N+124$, two layers When $1600 < N \leq 2400$, $H=N+186$, three layers When $2400 < N \leq 3200$, $H=N+248$, four layers
Thickness of outline	B	2 rows (150), 4 rows (250), 6 rows (400), eight rows (500)

Remarks:

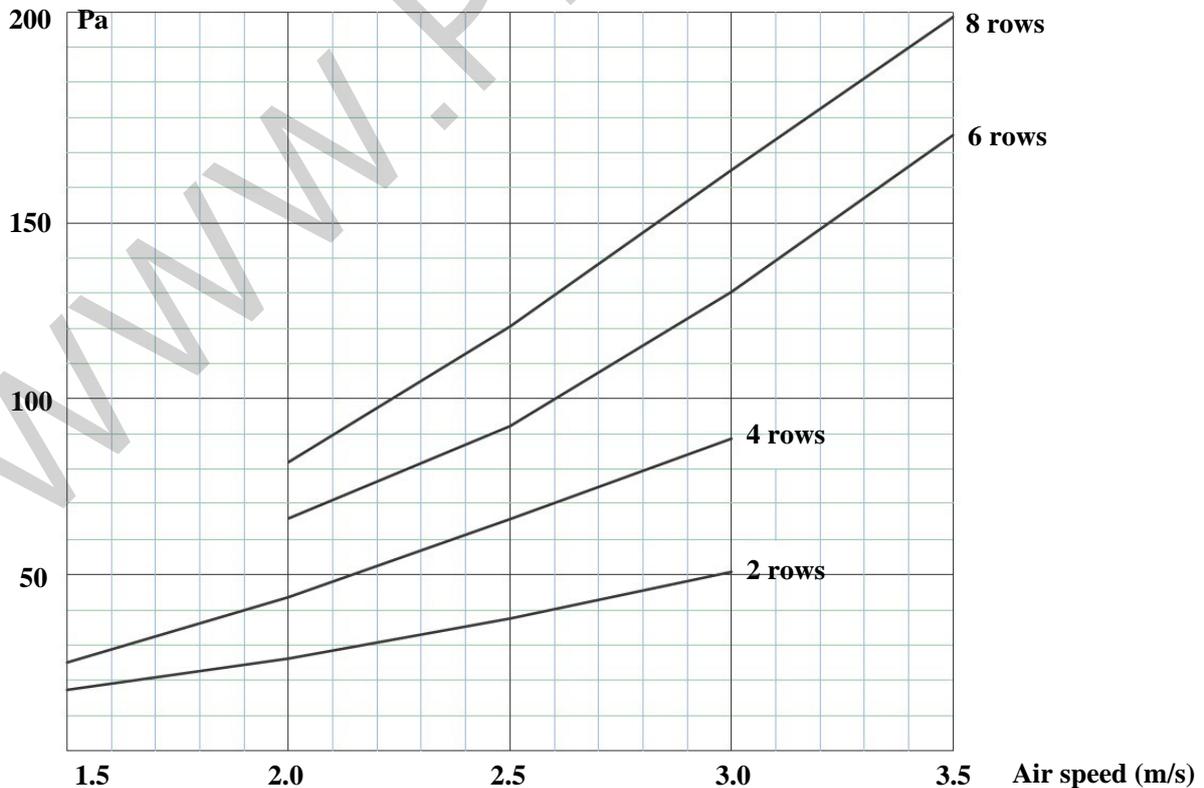
1. Width of windward side between 780mm to 3580mm can be manufactured according to request
2. Heat pipe heat exchanger is suitable for vertical installation in single cooling or single heating place, pay attention that the right side should toward up, namely 90° clockwise rotation according to above specification picture.

HEAT PIPE HEAT EXCHANGER

Heat exchange efficiency curves



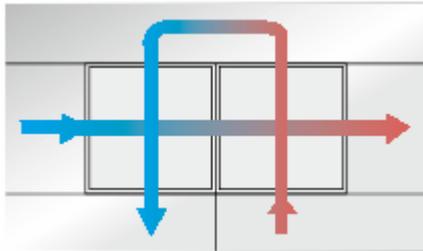
Air resistance curves



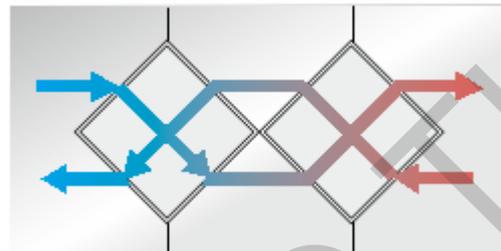
APPLICATIONS

Installation patterns

Pattern 1 and 2, to increase the heat exchange area, suitable for occasions requiring higher heat recovery efficiency, however, air resistance will increase accordingly.

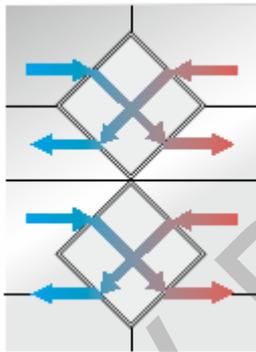


Pattern 1

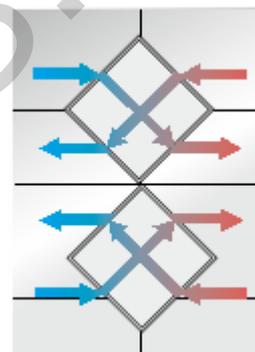


Pattern 2

Pattern 3 and 4, to increase the front face area, suitable for occasions requiring large airflow, both air resistance and heat recovery efficiency remain stable.

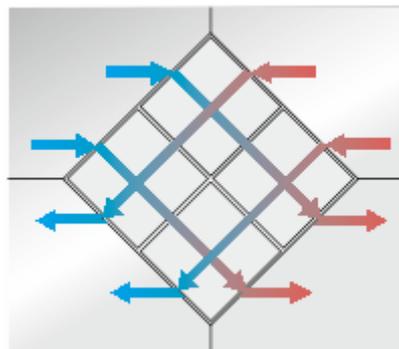


Pattern 3



Pattern 4

Pattern 5, to increase both front face area and heat exchange area, suitable occasions requiring higher heat recovery efficiency and large airflow.

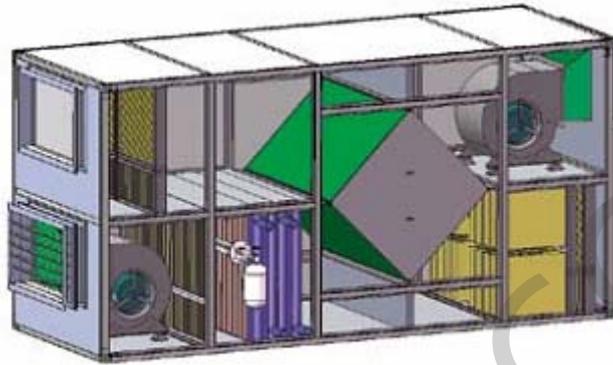


Pattern 5

APPLICATIONS

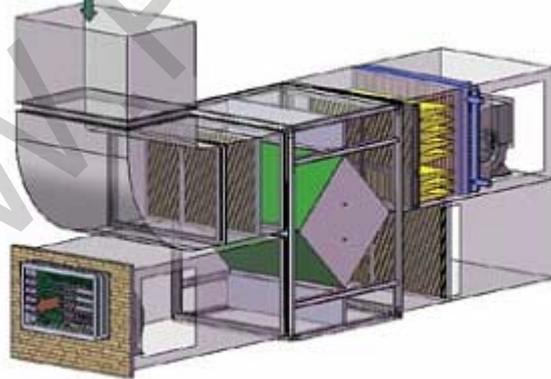
Installed in air handling unit

Holtop plate heat exchanger can be used in the air handling unit (AHU) as a main part of the heat recovery section, and the bypass can be built in when required.



Installed in ducts

It can also be installed in the ducts of ventilation system as a main part of the heat recovery section. The installation is very flexible.



Note: the size and patterns of the heat exchanger should be selected according to the application spaces as well as transportation capability and conditions at installation.

The logo for HOLTOP, featuring the word "HOLTOP" in a bold, blue, sans-serif font. The letter "H" is stylized with a small orange square above its top bar. The letters have a slight 3D effect with a dark blue shadow.

Beijing Holtop Artificial Environment Technology Co., Ltd

Factory address : No.158 Hanjiachuan Road, Haidian District, Beijing China

International marketing center

Address: Room 2-1108 Industrial Plaza, Tina An Hi-Tech Ecological Park,
No. 730 Yingbin Road, Panyu District, Guangzhou, China

Tel: 0086-20-39388201

Fax: 0086-20-39388202

Website: www.holtop.com

E-mail: info@holtop.com