CELEBRATION 50th ANNIVERSARY

Business Line

Plate-fin Heater, Air conditioner

Erofin Heater, Air conditioner

Unit Heater, Air conditioner

Tubular Exchanger

IHC Inoue Heater Corporation

Main Office, Factory 4-1-43 Nishinomiyahama, Nishinomiya-shi, Hyogo 662-0934

Main Phone No. & FAX No. TEL：0798-37-0501 FAX：0798-37-0530

Direct to Sales dept. : Phone No. TEL：0798-37-0542 FAX：0798-37-0870

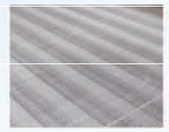
Website ：http://www.ihc-japan.co.jp/ E-mail ：ihc@ihc-japan.co.jp

Catalog No.7

INOUE HEATER

COPORATE & PRODUCTS GUIDE





Standing at the starting point, and challenge the future.

We’ ll meet a various needs by advanced technology.

We, Inoue Heater Corporation was born in 1966 when the Beatles came to visit Japan for the first time. We have prided ourselves on being a pioneering maker in the field of heat-exchange unit mainly on heater and cooler for industrial use with the history on development and manufacturing for about one century including the forerunner.

Not lay on our history and achievement in the past, we would like to get back to the starting point and address technical innovation through a trial and error process for meeting customer’ s needs. Also, we aggressively work on environmental conservation such as clean drainage and recycling for living well with communities.

Our continued posture is to provide high quality products that meet customer’ s various needs with the view on starting point of manufacturing.

Toward a creative factory with “I”

I believe that the thing which should be nurtured in the soil so-called ‘factory’ is an “imagination” . Being different from mass production factory, we, Inoue Heater receives order from the engineering makers, develop and manufacture a heat exchanger for each customer. In order to meet user’ s needs, flexibility which defies stereotype and technology which gets into shape are required.

For instance, our factory is similar to the artist’ s studio. There is a constant passion of engineers at the base for realizing user’ s ideals. After a process of trial and error, a creative idea is generated. This is what we think as a “Creative Factory” . The reason why we, Inoue Heater has been a leading company in the industry since our company started is just the effort of employees, who always work hard, more than anything else. The “ISO9001” permitted facility “Inoue Heater Corporation” . We think the initial letter “I” (pronounced in Japanese as “AI”) represents the “love” for manufacturing and “love” for customers. We’ ll continue to create not only the high quality products but also the products that bring surprise and happiness to all the customers.

CEO **Masaharu Inoue**

Company Profile

Company Name	INOUE Heater Corporation.
Foundation	April 1, 1966
Capital	12million yen
Representative	CEO Masaharu Inoue
Number of Employees	36
Banking Relationship	Amagasaki Shinkin Bank (Kyobashi branch)
	Osaka Shinkin Bank (Miyakojima branch)
	Eiwa Shinkin Bank (Umeda branch)
	Mitsubishi Tokyo UFJ Bank (Miyakojima branch)
	Mitsui Sumitomo Bank (Ten-roku branch)

Main Office

Address : 2-5-22 Zengenji-cho, Miyakojima-ku, Osaka (Dolce Vita 1F)

Overview of Main Factory

Address: 4-1-43 Nishinomiya-hama, Nishinomiya-city

・Total site area	: 2,701m²
・Office/Factory	: 1,311m²
・Acid cleaning process area	: 43m²
・Dining hall/Welface room/Storage/Others	: 175m²

Business Line

Boilers, first class pressure vessels manufacturing
Fin-tube heat exchanger
Hot air generator
Cooling and heating/ Air-conditioning system/
Economizer for exhaust heat recovery
Air cooler for roots blower
Equipment appropriate to boilers, first class pressure vessels
Small drying machine
Other special heat exchanger

Corporate Development

April 1966 — Spun off from “INOKIN” . Inoue heater corporation was founded as a special maker for heater, cooler and heat exchanger.
Main office and factory were placed in Miyakojima-ku, Osaka, and manufacturing started.

September 1970 — Main factory was expanded according to the increase in production and growth in size of product.

February 1980 — Machining factory and storage were built.
Intensification of production was achieved.

September 1998 — Became permitted facility for manufacturing boilers and first class pressure vessels (209-1)

September 2000 — **ISO9001 certification obtained (Registration No.00QR-396)**

September 2003 — **ISO9001 (2000 version) certification obtained**

June 2004 — Permission for “Law on supporting business innovation of small and medium enterprises” obtained.

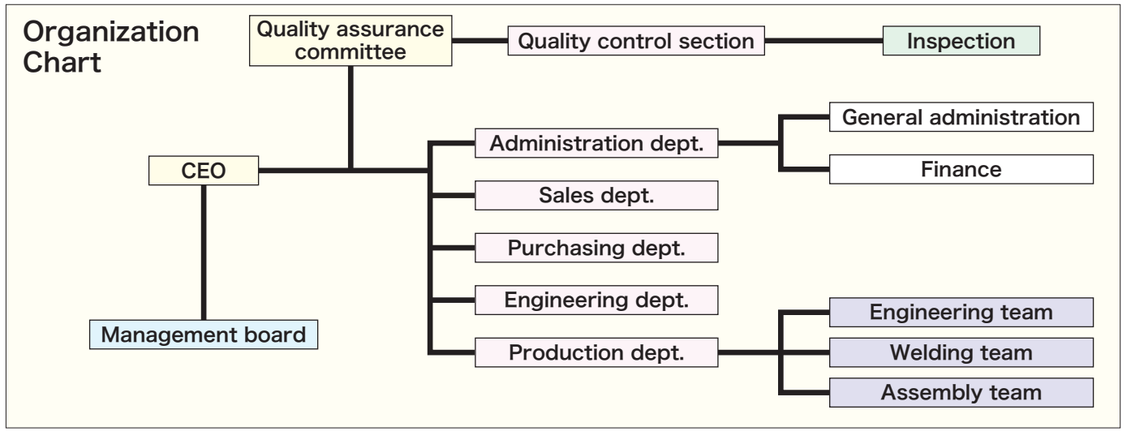
September 2005 — Main factory moved to new factory in Nishinomiya-
Main factory moved to new factory in Nishinomiya.

October 2006 — Permission for extension of term of “Law on supporting business innovation of small and medium enterprises” obtained

November 2006 — Permission for “Hyogo small and medium enterprises technology evaluation system” obtained

and... to the future

Organization Chart



Main Customers

IHC

Inoue Heater's technology is utilized in a wide range of fields.

Machinery, Metal

アマノ株式会社
アルストム株式会社
石川島播磨重工業株式会社
株式会社市金工業社
株式会社荏原製作所
株式会社大川原製作所
大川原化工機株式会社
川崎重工業株式会社
木村化工機株式会社
協和化工株式会社
株式会社栗本鐵工所
株式会社クロセ
株式会社クボタ
晃栄興業株式会社
株式会社神戸製鋼所
三興空気装置株式会社
株式会社ササクラ
佐竹化学機械工業株式会社
株式会社サタケ
新日本製鐵株式会社
株式会社神鋼エンジニアリング＆メンテナンス
神鋼電機株式会社
株式会社伸興
住友重機械工業株式会社
積水アクアシステム株式会社
ダイキン工業株式会社
株式会社大昌鉄工所
三菱マテリアルテクノ株式会社
株式会社タクマ
株式会社日本サーモエナー
田熊プラント株式会社
株式会社ダルトン
田辺工業株式会社
中外炉工業株式会社
中国プラント株式会社
トリニテイ工業株式会社
株式会社徳寿工作所
東洋ハイテック株式会社
永田醸造機械株式会社
日本電炉株式会社
株式会社日本製鋼所
株式会社日本アルミ
株式会社西村機械製作所
日本化学機械製造株式会社
ボルカノ株式会社
株式会社パウレック
株式会社ヒラカワガイダム
日立造船株式会社
不動興業株式会社
不二パウダル株式会社
株式会社古川製作所
ホソカワミクロン株式会社
株式会社北海
株式会社松井製作所
丸谷化工機株式会社
モリミ加工機株式会社
株式会社三宅製作所
ミウラ化学装置株式会社
三菱重工業株式会社
三井造船株式会社
三井鉱山株式会社
株式会社村上製作所
株式会社ムサシノキカイ
株式会社武藤電機
株式会社横山製作所
株式会社よしみね

Trading Company

泉株式会社
株式会社オグマ商会
三興商事株式会社
西華産業株式会社
新和機械商会
住友商事株式会社
第一実業株式会社
大明工機株式会社
椿本興業株式会社
株式会社トキワ
東京産業株式会社
轟産業株式会社
株式会社西村商会
橋本興業株式会社
扶桑産業株式会社
株式会社守谷商会
三菱商事株式会社
株式会社山産
株式会社和広商会
リックス株式会社
ティーメックス株式会社
日弁化工機株式会社

Paper, Pulp, Rubber

王子製紙株式会社
オーツタイヤ株式会社
紀州製紙株式会社
株式会社巴川製紙所
中越パルプ工業株式会社
日本製紙株式会社
ニッタ株式会社
フジコピアン株式会社
三島製紙株式会社
三菱製紙株式会社
リンテック株式会社
株式会社ノダ
レンゴー株式会社

Engineering

旭化成エンジニアリング株式会社
宇部テクノエンジ株式会社
エス・ケーメンテナンス株式会社
カネカエンジニアリング株式会社
大阪ガスエンジニアリング株式会社
クラレエンジニアリング株式会社
コマツエンジニアリング株式会社
株式会社ダイキンアプライドシステムズ
チッソエンジニアリング株式会社
千代田化工建設株式会社
東洋エンジニアリング株式会社
東レエンジニアリング株式会社
日産エンジニアリング株式会社
日曹エンジニアリング株式会社
ディックテクノ株式会社
JSRエンジニアリング株式会社
三井造船プラントエンジニアリング株式会社
住友ケミカルエンジニアリング株式会社
三菱レイヨン・エンジニアリング株式会社
エルゴテック株式会社
四電エンジニアリング株式会社

Food and Drug

味の素株式会社
上野製薬株式会社
協和発酵工業株式会社
塩野義製薬株式会社
大日本住友製薬株式会社
武田薬品工業株式会社
日本コーンスターチ株式会社
日清食品株式会社
日澱化学株式会社
ハウス食品株式会社
不二製油株式会社
丸大食品株式会社
明治製菓株式会社
大塚食品株式会社
新田ゼラチン株式会社

Fiber

旭化成株式会社
KBセーレン株式会社
グンゼ株式会社
株式会社クラレ
帝人株式会社
東洋紡績株式会社
日東紡績株式会社
日本エクスラン工業株式会社
三菱レイヨン株式会社
ユニチカ株式会社
ダイワボウレーヨン株式会社

Chemical Industry

宇部興産株式会社
大阪ガス株式会社
花王株式会社
株式会社カネカ
三洋化成工業株式会社
堺化学工業株式会社
四国化成工業株式会社
住友化学株式会社
住友精化株式会社
住友電気工業株式会社
住友ベークライト株式会社
積水化学工業株式会社
太陽化学株式会社
ダイセル化学工業株式会社
ダイソー株式会社
チタン工業株式会社
チッソ株式会社
帝人デュポンフィルム株式会社
テイカ株式会社
天馬株式会社
東レ株式会社
利昌工業株式会社
東京ガス株式会社
東リ株式会社
戸田工業株式会社
日本たばこ産業株式会社
日産化学工業株式会社
日本合成化学工業株式会社
株式会社日本触媒
シャープ株式会社
JSR株式会社
ジャパン・エア・ガシズ株式会社
ライオン株式会社
東ソー株式会社
株式会社トクヤマ
日本食品化工株式会社
日本ウエーブロック株式会社
日本酸素株式会社
富士チタン工業株式会社
三井化学株式会社
三菱化学株式会社
三菱化学ポリエステルフィルム株式会社

E N G I N E E R I N G

Using a high-performance CAE and CAD, every conditions provided by customers are input. Ideal is realized.

It's been half a century since company was founded. All the technical know-how regarding manufacturing each heat exchanger acquired during that period is accumulated into a main computer as a massive database. In the Engineering department, referring to the database, specification requirements obtained by customers are analyzed. Every requirement such as fluid, wind velocity, temperature, pressure, material used is cleared one by one for formulating the best design. The completed CAD data is sent to the manufacturing factory online.

Speedy and precise drawing by CAD

Engineering dept. and Sales dept.

We'll realize customer's ideal by the organic network.

There are various requests on heat exchanger from the customer.
With Inoue Heater, through a careful meeting with he sales person who has a wealth of technical knowledge and consideration with Engineering/Production dept., the heat exchanger with the best specifications will be proposed.

S A L E S

We'll create an outline by all the customer's requests on heat exchanger.

Mission of Sales is an interface between customer and production field. This is where high technical information is required. The Sales department receives a various needs from the customer such as the purpose of using heat-exchanger, spec condition, facilities and environment and budget etc. for formulating the best plan. Also, we spend time for internal meeting so that we are always capable of proposing the best items through the experiences and case study.

Sales person having meeting on the requirements from customer.

P R O D U C T I O N

With a pride for ISO9001 permitted facility, we are thoroughly about manufacturing high quality product

In 2000, our factory became ISO9001 permitted facility that is an international standard in quality management and quality assurance. Each team is working on a thorough quality management in order to eliminate the trouble during production. Using an internal permission system, carrying on the technology is addressed.

Joint meeting by Sales and Production dept. for discussion on improvement.

Plate representing ISO9001 permitted facility placed on our main entrance

Laser processing machine

Cuts/processes the metal plate which will be a case for heat-exchanger. The output is 4kW which is the highest level as a laser processing machine. Cutting of 12mm (stainless) and 25mm (iron) is available. It synchronizes with the CAD of Engineering dept, therefore cutting of complicated shape and hole making can be conducted.

Press Brake

Bends the plate cut by laser. The maximum of 255t can be applied. Bending 6mm thickness and 3m length stainless plate can be bent.

NC Drill Machine

Makes a hole to the metal plate which is to be attached to the header of heat-exchanger. It reads the information input to the PC. Based on the information obtained, it automatically performs from positioning to making a hole.

Automatic Plate Fin Insertion Machine

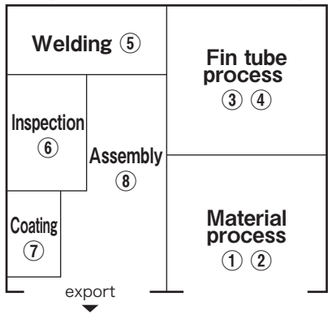
Inserts aluminum or stainless fin (radiator plate) into the tube cut one by one, and press it. The element which includes the completed fin-tube moves to welding factory.

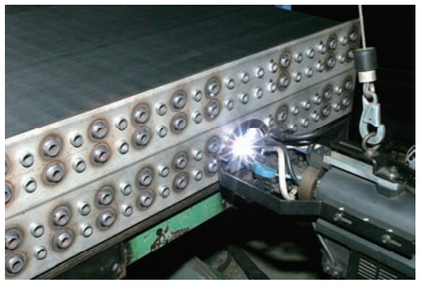
1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 *Delivery*

Advanced facilities and wisdom, we're proceeding a thorough quality management.

Inoue Heater follows the quality management manual which complies with the requirements for obtainment of ISO9001 and manufactures mainly fin tube type heat-exchanger.
The latest facilities are adopted in many places and engineer's originality/ingenuity
for maintaining the high level production line.

【 Layout of Creative Factory 】





Welding Machine

Welds U-shaped bend and header cover that combine each fin-tube. Arc welding and argon welding are used properly according to the material. Robotic welding is used for a simple part, and for the part which requires high technique such as bend part, the one who has experience in welding more than 2 years and passed internal special welding test.

Inspection/Inspecting system

Our production process consists mainly
of engineering, welding and assembly areas.
In order to obtain a thorough quality management,
strict test are conducted in each area.

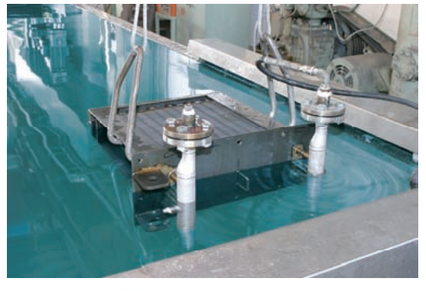
〈Engineering〉 Diameter test/Groove process test
〈Welding〉 Diameter test/PT test/RT test/Submersion leak test/Air proof & pressure proof test
〈Assembly〉 Diameter test/Coating completion test

■Mechanical Appliances

- Automatic plate fin insertion machine……2
- Large size laser process machine…1
- Air compressor……3
- Water pressure test pump……1
- Tank for test (10.5m×2.5m×4.8m)…1
- Turing machine (4m) ……1
- NC drilling machine ……2
- Bending machine ……2
- Brake press ……1
- Horizontal automatic seal welding machine …2
- Arc welding machine ……13
- Argon welding machine ……13
- Carbon dioxide semiautomatic welding machine …7
- Komatsu high speed shearing ……1
- Komatsu hydraulic shearing ……1
- Power press ……3
- Jib crane (1t) ……5
- Traveling crane (10t) ……1
- Traveling crane (4.8t) ……1
- Traveling crane (2.8t) ……1
- Traveling crane (2.5t) ……1
- Automatic band sawing machine……2
- Flat plate groove process machine …2

Traveling Crane

For transferring a heavy load, total of 4 cranes such as a traveling ceiling crane with lifting capability of 10t connect each line in the factory.



Air proof Test

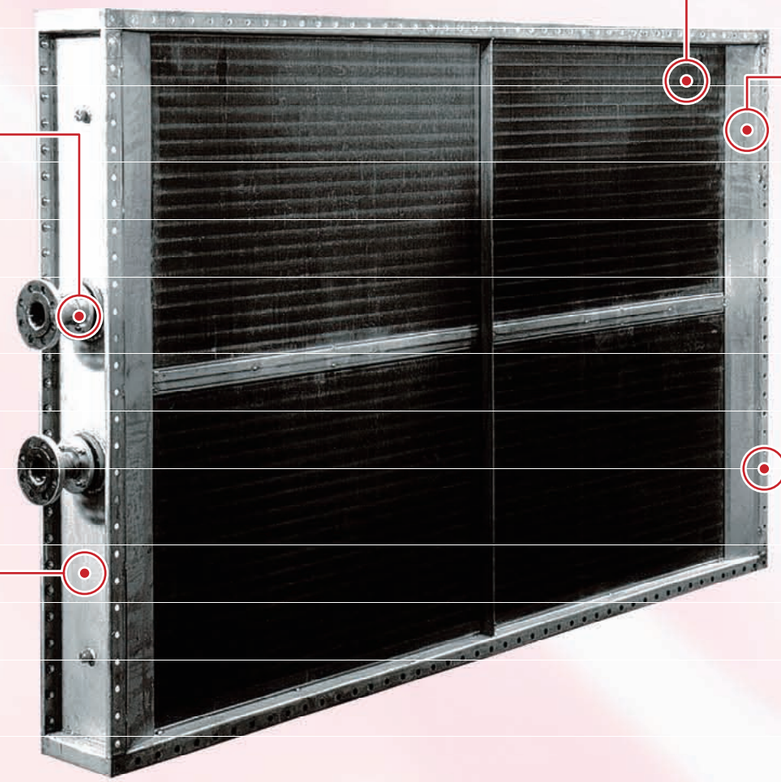
Apply certain air pressure to a tube of the element to which welding is completed, and sink it in a tank. Check it for the bubble leak.

Acid Cleaning/ Coating/ Finishing

Pour the acid solution to the "welded" part for cleaning. Keep the solution after use in a pit underground and drain after neutralizing in the neutralization machine. Also, outer covering is a heat-resistance silver cover. Because the heater in use becomes high temperature, a coating material with a high heat-resistance is selected.

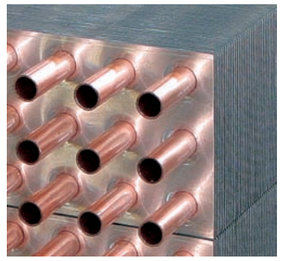
Structure and feature of plate fin heater

Structure of plate fin heater is that heat carrier such as steam, heat oil agency and heating water are flown into inside of tube and low temperature gas is hit against tube outside and inserted fin (radiator plate) to perform heat exchange. Principle for plate fin cooler is the same, however, in the case of air conditioner, cooling water, brine and refrigerant liquid are put in tube and cool high temperature gas.



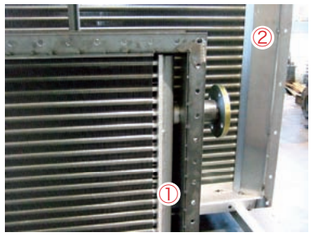
Fin tube

In our company, fin tube is called as 'plate fin' . Coiled material of thin board is pressed to form to increase degree of adhesion to tube, and pressed into the heater one by one. Tube arrangement (lattice arrangement) designed at our company establishment has high estimation since particles are not easily piled up and energy exchange loss is low.



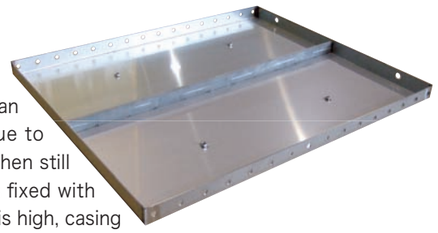
Current plate

When gas gets through casing housing the header, gas flow to entire fin tube becomes bad and efficiency of heat exchange decreases; therefore, gas are accurately led to fin tube with using the current plate. Picture 1 shows that current plate is not installed. Picture 2 shows that current plate is installed.



Casing

Casing is pressed to box shape and its structure can endure shape change due to heat and still pressure. When still pressure is low, casing is fixed with bolts. When still pressure is high, casing is welded to be fixed, and we pay attention to gas leak prevention. When still pressure is high, casing with welding structure is used.

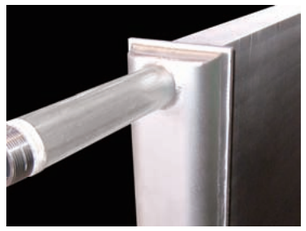


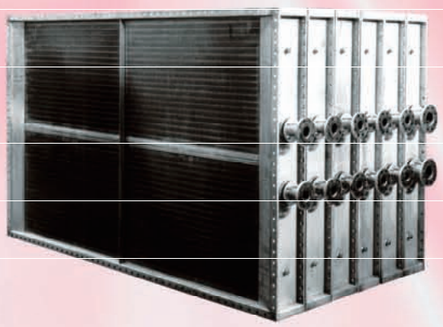
Countermeasure against heat expansion

In cooling unit of heater type, fin tube contracts due to liquid agency flown inside of fin tube and edge with casing may cut. For the countermeasure against the heat expansion, we have our original plaque for nozzle. The pictures are nozzle plaques used when gas pressure is low. When airtight is necessary, it can be kept with gland seal and bellows.

Header

As for the header structure, cover and tube plate are welded and can be tighten with bolts for air conditioner. Header cover structure can endure high pressure. Maximum attention is paid to tube plate hole finish (pitch and hole diameter).





■Types of plate fin coil

IHC plate fin coil is designed to achieve heat transmission efficiency at a maximum. Special processed fin is inserted into tube of thin board (t0.3) fin material (aluminum, stainless steel and SPCC) to increase heat transmission efficiency with special pressing machine.

■An example of plate fin heater

We manufacture wide variety of plate fin heater to correspond with the customer use.
The large heater in the picture is installed in silo as a part of dry facility.

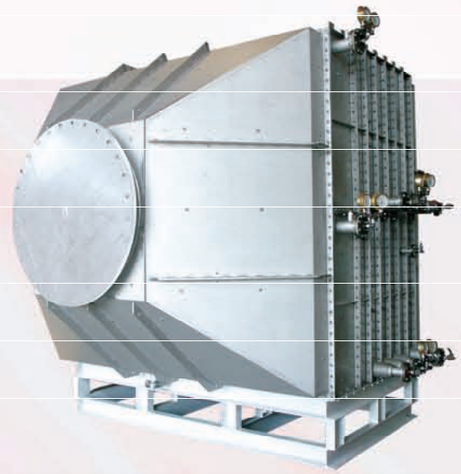


Plate fin coil treated by our company

Plate fin is the heart of heat exchange. There are 3 types of fin coil depending on tube periphery; P-5 (Ø15.9), P-10 (Ø 17.3) and P-20 (Ø 27.2). Please select them depending on each use condition and purpose.

Plate fin

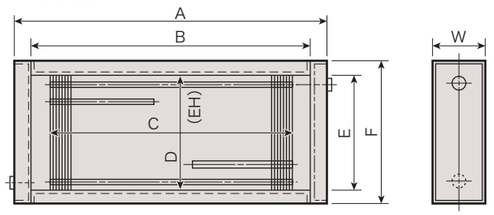
P-10型・P-5型

They have large heat transmission area and economic, so that they are widely used. P-5 model uses boiler steel pipe for tube material and is especially used for high pressure. Steel pipe is used for air conditioner.

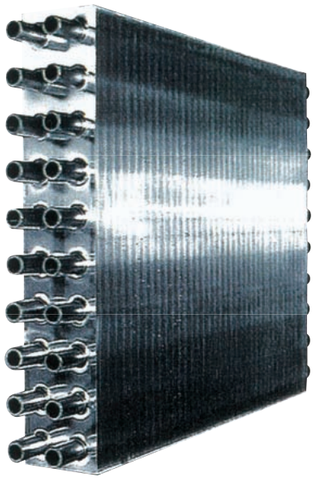
■Standard specification

1. Tube diameter	P-5 model (Ø15.9) P-10 model (Ø17.3)
2. Fin	Thickness t 0.3 fin pitch 3mm(our company standard)
3. Fin tube valid length	MAX3000mm
4. Rows	1 to 5/ depending on section assortment
5. Header	Structure and board thickness may change depending on use pressure
6. Casing	2.3mm, 3.2mm Made with steel plate (our company standard specification) *When stainless steel or steel pressure is high, this model will be made with optimal board thickness.

■寸法図



☆We will manufacture plate fin with materials (stainless steel and copper) other than standard specification.
☆We will manufacturer plate fin in any size with use conditions.



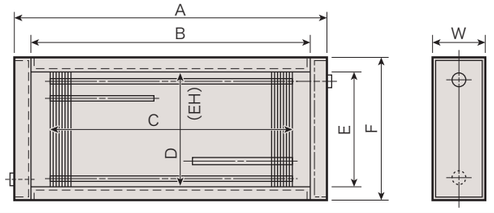
P-20型

This has the largest heat transmission area and can endure cruel use. This is the best for large heater.

■Standard specification

1. Tube diameter	P-20 (Ø27.2)
2. Fin	Thickness t0.3 fin pitch 4mm (our company standard)(minimum 4.0mm to any pitch
3. Fin tube valid length	MAX3000mm
4. Rows	1 to 3/ depending on section assortment
5. Header	Structure and board thickness may change depending on use condition
6. Casing	2.3mm, 3.2mm Made with steel plate (our company standard specification) *When stainless steel or steel pressure is high, this model will be made with optimal board thickness.

■寸法図



☆We will manufacture plate fin with materials (stainless steel and copper)other than standard specification.

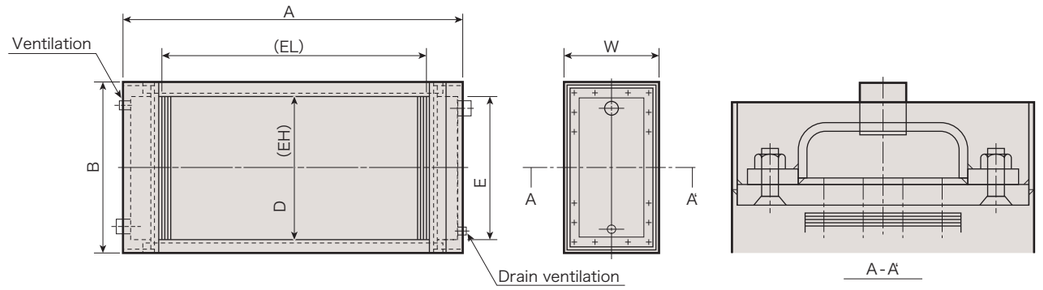
P-10 Plate fin water coil

Header removal coil can be recommended for the following cases.

1. Water stain generated by cooling water (industrial water and well water) and other dust is periodically necessary to clean.
2. Amount of wafer is large, so water pressure in the coil is necessary to lower as much as possible.

■Structure of header removable coil

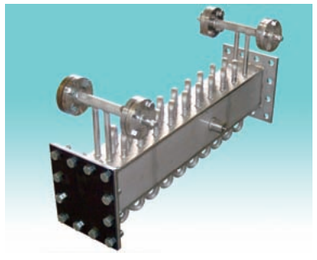
1. Header cover is made with steep plate. The cover has inlet/outlet of cooling/heating water and socket for air/drain release and rooms divided according to the inner necessary number of bath.
2. Heat transmission tube is welded to tube plate or expanded. Header cover fixed to the tube plate with bolts.

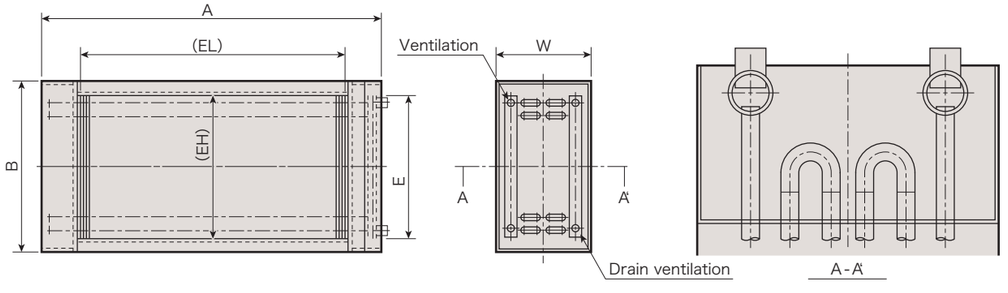


U-bend shape coil

■Structure of U-bend shape coil

1. The header has inlet/outlet of cooling/heating wafer and socket to air/drain release.
2. Heat transmission tube and header is welded and solidly united.
3. Each heat transmission tubes are connected with U-bend according to number of bath, so water resistance is low and can be used effectively.

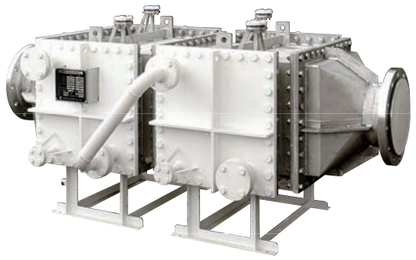




Heater (Cooler)

Line heater (line cooler)

When static pressure of gas is high and there is pulsation, permanence of the fin will be asked. Our cooler (heater) has a strong casing structure and is ready for severe condition such as vibration.
Also, regarding the fin tube, the adhesion between fin and tube has been improved and special molding fin tube with high strength joint has been introduced.

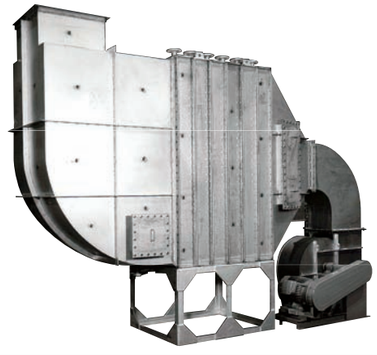


Tank-type heater (cooler) for high pressure gas

When gas becomes high pressure, we recommend a heater (cooler) with built-in fin tube in the tank-type casing.
Its structure is superior in pressure resistance therefore trouble due to gas pressure can be prevented in advance.

Hot (cold) air generator

We conduct assembly in the form of setting an air blower to our heat exchanger and mount it to the common base. With this assembly, installation space can be reduced.



Other option

Simplified mechanical temperature controlling unit

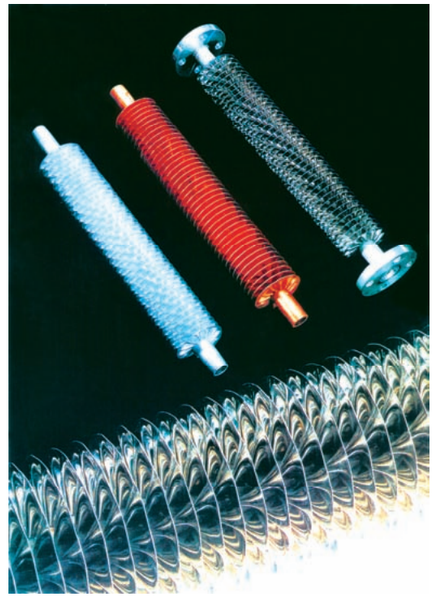
Drain trap unit

Filter unit etc.

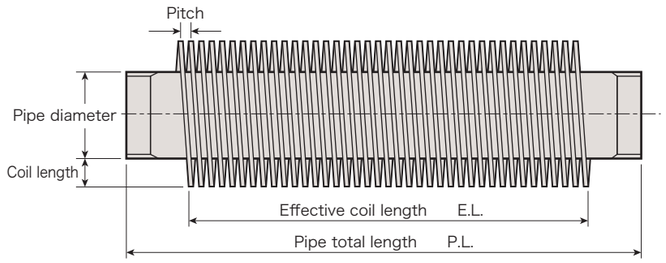
Erofin Tube

Erofin Tube

A standard size of the IHC erofin tube is as shown in the Table 4 below. However, pipe diameter, length, coil length and pitch can be made as desired.
Please specify the shape of tube, coating, material etc. for the estimate.



■Dimensional drawing



■Table 4

Diameter of tube (gas tube)	Area of heat release in erofin coil m²/m						
	25m/m Coil length				32m/m Coil length		
	8m/m Pitch	9.5m/m Pitch	11.1m/m Pitch	12.7m/m Pitch	9.5m/m Pitch	11.1m/m Pitch	12.7m/m Pitch
20A	—	1.35	1.17	1.03	1.93	1.67	1.47
25A	—	1.47	1.28	1.13	2.08	1.79	1.59
32A	—	1.60	1.39	1.23	2.23	1.93	1.71
40A	2.05	1.73	1.50	1.33	2.39	2.07	1.83
50A	2.34	1.98	1.72	1.53	2.69	2.34	2.06
65A	2.63	2.23	1.94	1.73	—	2.60	2.30
80A	2.93	2.48	2.16	1.93	—	2.86	2.53
100A	3.52	2.99	2.61	2.32	—	3.40	3.02

■Standard heat discharge of IHC erofin tube (Table 5)

Diameter of tube (gas tube)	Heat release kw/m (outside air pressure : 760mmHg, Steam pressure : 0.034MPaG, natural draft, Indoor temperature 0℃)						
	25m/m Coil length				32m/m Coil length		
	8m/m Pitch	9.5m/m Pitch	11.1m/m Pitch	12.7m/m Pitch	9.5m/m Pitch	11.1m/m Pitch	12.7m/m Pitch
20A	—	0.599	0.529	0.479	0.808	0.712	0.638
25A	—	0.659	0.588	0.535	0.879	0.778	0.699
32A	—	0.728	0.651	0.593	0.957	0.849	0.765
40A	0.907	0.792	0.710	0.650	1.041	0.914	0.837
50A	1.073	0.945	0.849	0.779	1.209	1.072	0.973
65A	1.230	1.083	0.981	0.901	1.362	1.217	1.116
80A	1.385	1.224	1.110	1.023	1.535	1.363	1.247
100A	1.695	1.507	1.363	1.267	1.853	1.655	1.516

Unit Heater H Type

Unit heater H type

Unit heater provides comfortable heating in a building especially with a large floor area and high ceiling such as factory, storage and market etc.
Also, it' s easy to adjust the direction (up/down) of sending air for proper circulation according to the condition of the facility.
This heater can be put on the ceiling or wall and space-saving will be achieved since there are rings for hanging.

■Standard specifications

1. Element	Plate fin tube (SGP ϕ17.3×t2.3) t0.3 aluminum fin
2. Casing	t2.3 SPHC
3. Coating	Munsell symbol N-6.5 (silver gray)

■Table 1

※Following performance shows a case when used steam pressure is 0.034MPaG and air temperature at inlet is 25℃.
※Determine the heat discharge under the different use condition by multiplying compensating rate in the item below.

Model	Hz	Heat discharge kw	Air volume m³/min	Air temperature at outlet ℃	Concentrated volume kg/hr	Electrical motor (60/50Hz) Dimension	Electrical pressure	Pole number	Output	Generated noise A horn	Weight kg
No.252N	60 50	16.2 15.9	37 36	47.0 47.3	26.0 25.6	三相	200V	4極	100W	62 59	46
No.253N	60 50	21.1 20.5	33.5 32	56.7 57.3	33.9 33.0					62 59	55
No.302N	60 50	25.0 23.6	58 53	46.7 57.6	40.1 38.0				200W	70 66	62
No.303N	60 50	32.0 30.4	51 47	46.3 57.6	51.5 48.9					70 66	73
No.352N	60 50	33.4 32.4	79 75	46.3 46.8	53.8 52.0			6極	400W	64 64	86
No.353N	60 50	43.5 41.4	71 66.5	55.9 56.4	70.0 66.6					64 64	98

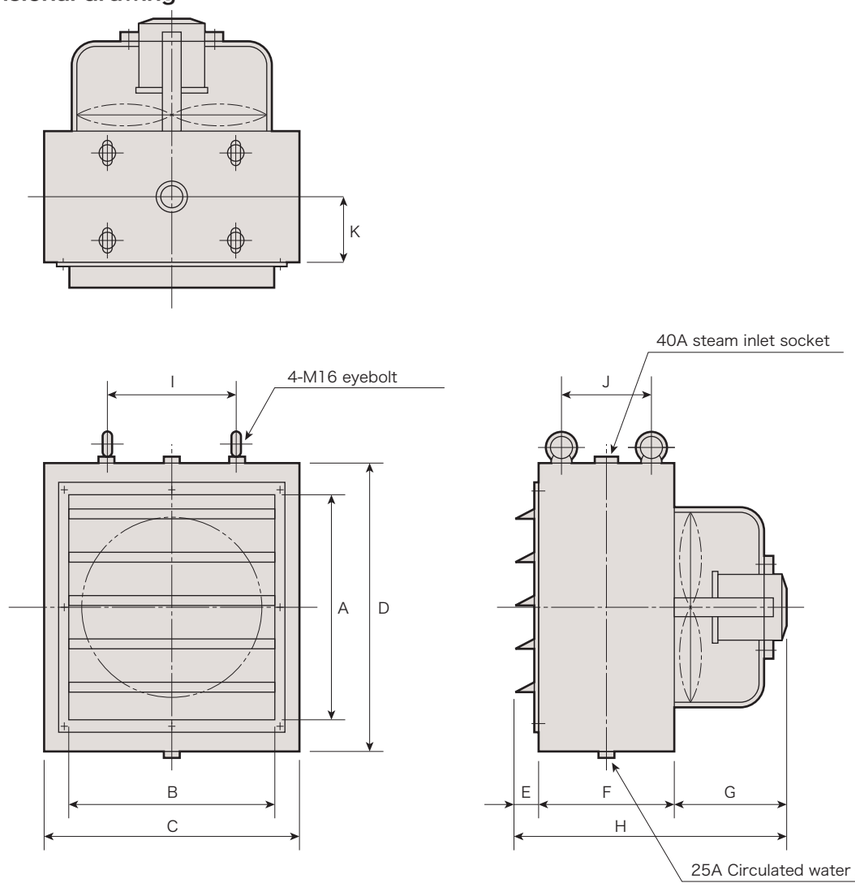
Calculation of heat discharge: kwx860=kcal/h

■Table 2

(mm)

Model	A	B	C	D	E	F	G	H	I	J	K	Tapping Inlet	Tapping Outlet	Diameter of fan
No.252N No.253N	410	410	500	550	50	300	237	587	280	200	150	40A	25A	350ϕ
No.302N No.303N	510	510	570	650	50	300	247	597	300	200	150			400ϕ
No.352N No.353N	560	560	680	700	60	320	347	727	400	220	160			500ϕ

■Dimensional drawing



■Compensating rate for heat discharge (Table 3)

Use a coefficient to correct the heat discharge (kw) according to the used steam pressure and air temperature at inlet

Steam pressure MPaG	Steam temperature ℃	Concentrated heat KJ/kg	Temperature at inlet ℃ 0	5	10	15	20	25	30	35	40
0.034	108.0	2240	1.364	1.288	1.214	1.138	1.072	1.000	0.931	0.866	0.801
0.098	119.6	2203	1.510	1.433	1.358	1.280	1.213	1.139	1.069	1.004	0.938
0.147	126.7	2183	1.600	1.522	1.446	1.367	1.300	1.225	1.154	1.088	1.021
0.196	132.8	2165	1.678	1.598	1.521	1.441	1.374	1.298	1.227	1.160	1.093
0.245	138.1	2148	1.745	1.664	1.587	1.506	1.439	1.362	1.290	1.223	1.156
0.294	142.9	2135	1.805	1.724	1.646	1.565	1.497	1.420	1.348	1.280	1.212
0.343	147.2	2123	1.859	1.778	1.700	1.618	1.549	1.472	1.399	1.331	1.263
0.392	151.1	2111	1.908	1.827	1.748	1.665	1.597	1.519	1.445	1.377	1.309
0.490	158.0	2088	1.996	1.913	1.833	1.750	1.681	1.602	1.528	1.459	1.390

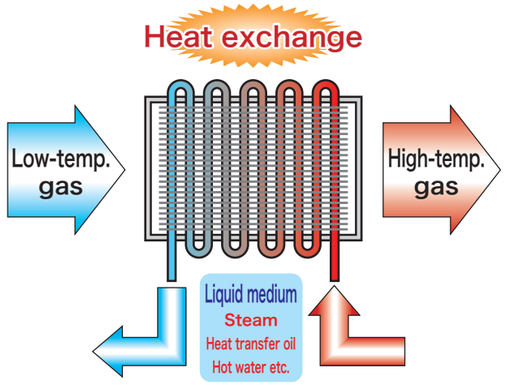
Calculation of pressure: MPax10.2=kg/cm²

Fin-Tube Heat Exchanger Mechanism

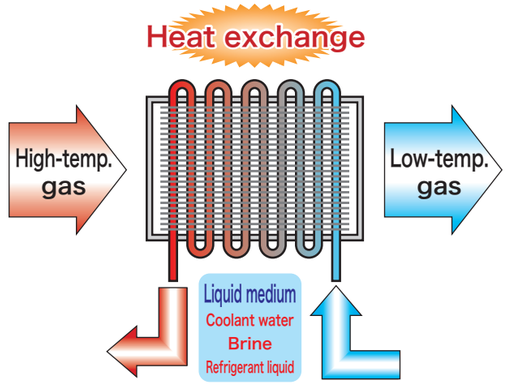
Fine-tube heat exchanger is a dedicated equipment to transfer heat from/to gas using liquid medium.

Heat is exchanged in the structure designed to flow liquid in the tube and pass gas through the outer surface of the tube and the inserted fin (heat sink).

Heater Mechanism



Cooler Mechanism



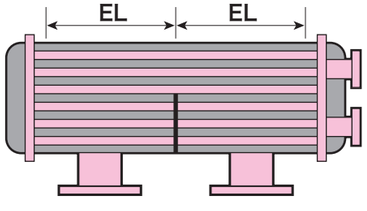
Fin-Tube Heat Exchanger Advantages

Fin-Tube Heat Exchanger is more often used for liquid x gas process than tubular exchanger because of its smaller footprint and larger heat transfer area. See below for the comparison.

(Assuming that a steam heater is used, and the same tube size, effective length, the number of levels and the ventilation velocity are used.)

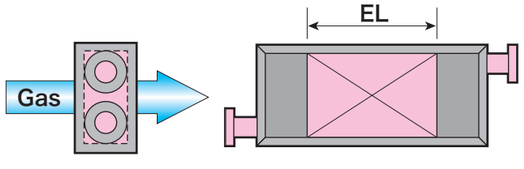
Typical Tubular Exchange

- As gas often comes in through multiple paths, relatively large pressure tends to be lost
- Heat is transferred only on the outer surface of the tube.



IHC Fin-Tube Heat Exchange

- As gas comes in through one path, pressure loss is small.
- Heat is transferred at the front and back sides of the fin as well as the outer surface of the tube



'IHC Fin-Tube Heat Exchanger' is the merit that it is greatest to be "satisfied in the smallest establishment space" in comparison with 'Typical Tubular Exchanger'.

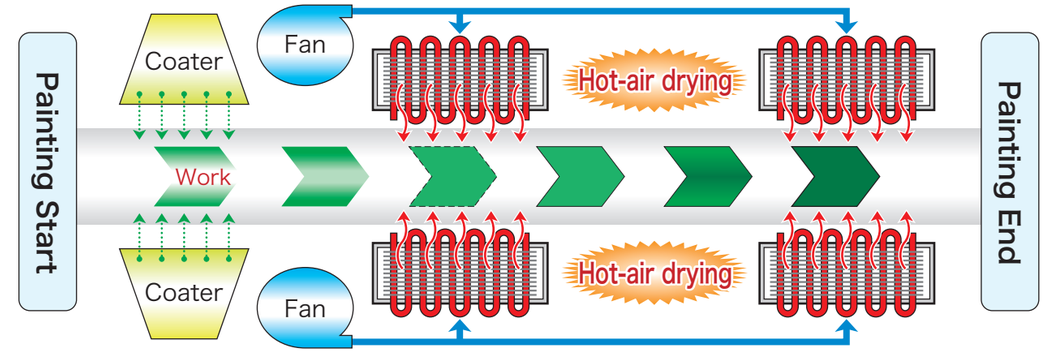
Fin-Tube Heat Exchanger Use Applications

Use examples of Fin-Tube Heat Exchanger as heater and cooler are shown below.

Dry Process at Painting Line

As Heater Example

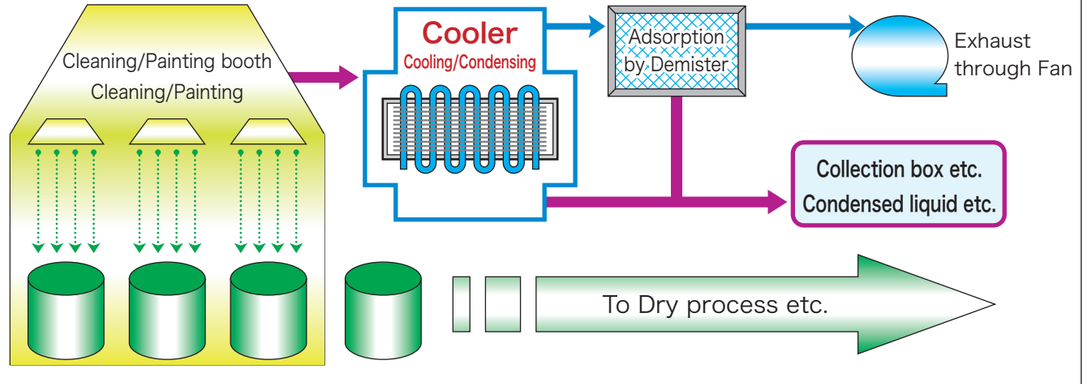
Improve productivity by shortening dry time by blowing hot air to the painted products at the painting line - the finish process of the manufacturing.



Solvent Cleaning / Painting Line

As Cooler Example

Exhausting solvent directly to the air could produce pollution, but with Cooler, solvent can be condensed and collected.



Since the condensed liquid splashes to the exhaust side due to the wind pressure of the fan, it needs to attach a demister or eliminator to adsorb the condensed liquid.

Fin-Tube Heat Exchanger Specifications

When the intended use of Fin-Tube Heat Exchanger is decided, specifications including the main 8 items below are determined to meet each user' s needs.

1 Fluid

Gas and liquid is carefully chosen through consultation with customer.

◆Gas → Air, N2, Mixed gas, Carrier gas
◆Liquid → (Heater) Steam, Heat transfer oil, Hot water etc.
(Cooler) Water, Brine, Other water solutions etc.

2 Flow Rate

To determine how much gas is heat-exchanged, it should be specified in units like Kg/h(min), Kg-DA/h(min), m3/h(min) at what temperature (deg.C). When the flow rate is shown in m3, as the gas volume varies by temperature, specific gas volume must be determined; otherwise thermal calculation would lack precision and required performance of the Exchanger may not be attained. Liquid volume should be directed by the user when they specifies the supply amount of utility.

3 Humidity

Thermal calculation differs depending on humidity of the gas at the entry of the heat exchanger. Specific conditions should be determined including whether related or absolute humidity is used.

4 Temperature

It needs to determine at what temperature is gas heated to or cooled down, and on the liquid side, at what temperature is the utility supplied or returned. The most critical value is the difference in temperature between gas at the outlet side and liquid. See below.

Heat Exchanger Name	Steam Heater	Hot Water Heater	Heat Transfer Oil Heater	Cooler
Min. Required Temp. Difference	15℃	5℃	5℃	5℃
Preferable Flow Direction	N/A	Countercurrent		
Note on Temp.	Heat insulation work	Heat insulation work	Heat insulation work	Anti-freezing

5 Operating Pressure

The size of the heat exchanger is determined based on user's direction on the blower pressure and pressure loss at the heat exchanger.

6 Design Pressure Temp.

Fin-Tube heat exchanger is classified as pressure vessel, but if it falls under the category of the first-category pressure vessel, we might not be able to design the exchanger depending on capacity. We will follow customer' s direction on design pressure or temperature.

7 Blower System

Pressures and some characteristics differ depending on actual blower. See the following list of fan, specification static pressure, recommended fin-tube and casing structure to suit each characteristic.

※Roots Blower is often selected when fine particles are conveyed for a long distance and the lifting height difference is large. You may get such useful information that is not included in specification.

	Sirocco Fan Axial Fan Pressure Fan	Turbo Fan	Turbo Fan	Roots Blower	Compressor High-pressure Gas
Spec. Static Pressure Fan Characteristics	W/o pulsation	W/o pulsation	W/o pulsation	W/ pulsation	W/o pulsation
Recommended Fin-Tube	Plate fin	Plate fin MN fin High-frequency fin	Plate fin MN fin High-frequency fin	Plate fin (P10-N only) MN fin High-frequency fin	Plate fin (P10-N only) MN fin High-frequency fin
Casing Structure	Bending	Bending	Frame flange	Line cooler Tank-type	Line cooler Tank-type

8 Material

Material selection is an important part in determining Fin-Tube Heat Exchanger specification. Heat conduction largely varies by material. Choose the best material referring to the table below.

※Heat conductivity of common materials

Material Name	Iron	Stainless steel	Aluminum	Copper	Water	Alcohol	Universal gas	Hydrogen
Heat Conductivity W/m・K	47～52	17	205～235	350～400	0.6～0.7	0.16～0.19	0.02～0.03	0.19

Refer to the following list of the combination of materials for Fin-Tube Heat Exchanger.

Fin-Tube Name	Plate fin	Plate fin	Plate fin	MN-fin	High-frequency weldedfin
Fin-Tube Material	C1220T	SGP STPG370 STB340	SUS304TP SUS304TB SUS316LTP SUS316LTB	STB340 SUS304TB	SUS304TP SUS316LTP
Tube Size	ϕ15.88	ϕ15.9 10A 20A	ϕ15.9 10A 20A	ϕ15.88 ϕ25.4	10A 20A
Fin Material	C1220 AL	SS (Pentite) AL	AL SUS304 SUS316L	AL	SUS304 SUS316L

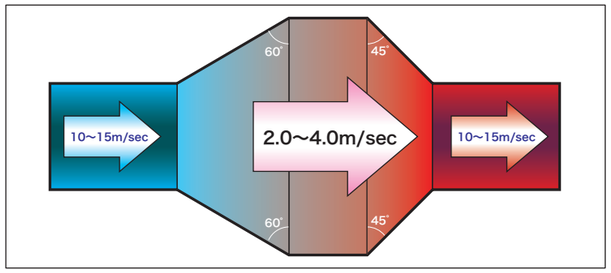
Fin-Tube made of low heat conductivity material needs large heat transfer area!

Ambient Environment of Fin-Tube Heat Exchanger

Use care with the settings of ambient environment, especially with the following four items.

① Duct Piping

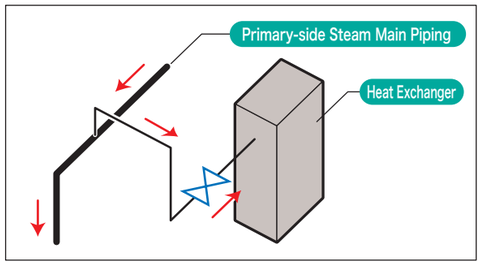
To maximize the performance of Fin-Tube Heat Exchanger, the gas on the primary side should be blown to the entire surface of the Fin-Tube uniformly. Ordinary ducts are designed for the wind velocity of 10-15m/sec. As wind velocity best suited for our standard Fin-Tube Heat Exchanger is 2.0-4.0m/sec., it needs to put chute hopper between the duct and Heat Exchanger. The gas flows efficiently when the chute hopper is placed at an angle of 60deg.



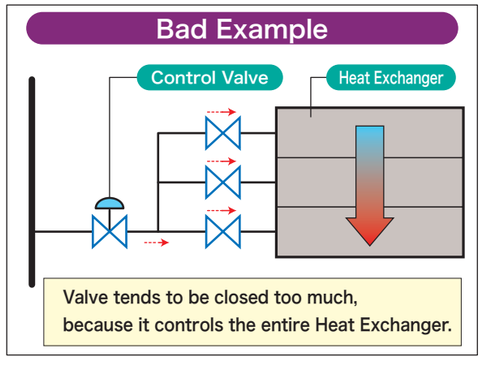
② Primary-side Steam Piping and Equipment Settings

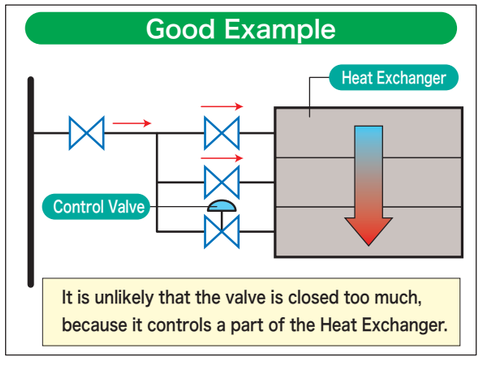
When steam is used as heat medium, please be aware of the following points...

①To prevent dry steam and foreign objects from entering, steam should be supplied to the Heat Exchanger from the main piping as shown in the drawing. Don' t supply directly from the end of the main piping. (It will lead to water hammer and pitting corrosion.)



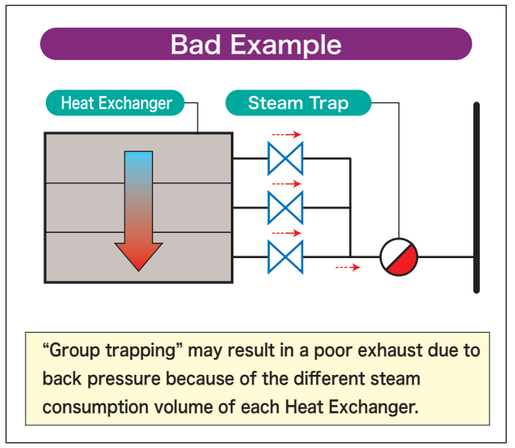
②A control valve is used for temperature control by controlling steam. However, control valve might cause a trouble when it is used to control the entire Heat Exchanger.

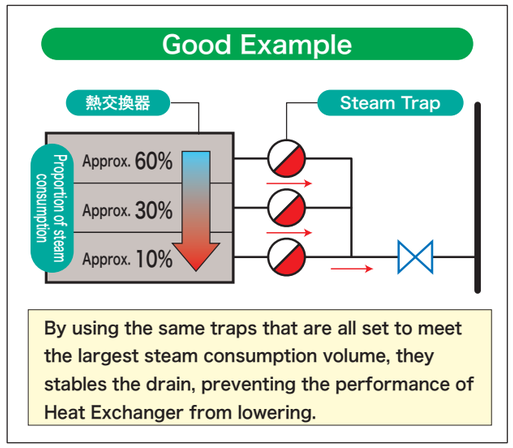




③ Secondary-side Drain Piping and Equipment Settings

The steam used in the Heat Exchanger should be drained. If the drain remains inside Heat Exchanger, it may lower the performance and cause troubles due to corrosion. it is recommended that you make a structure not to keep drain inside Heat Exchanger.





④ Compliance

As Fin-Tube Heat Exchanger is classified as pressure vessel, it must comply with related labor laws. Use due care in selecting specifications.

First class pressure vessels

Vessels for heat exchange by utilizing a medium on the heating side at temperature where the liquid medium on the heat receiving side exceeds its boiling point

※However, it does not violate the law when a medium on the heat receiving side is open to the air, not the circuit is closed on the secondary circuit.

Second class pressure vessels

Vessels whose design pressure is 0.2MPaG or higher and capacity on the gas medium side is 40L or more.

※However, even when multiple Exchangers are connected using header and flange, some Labor Standards Inspection Office may regard them as one vessel. In that case, you may separate vessels from each other by setting valves between them.

The items with *mark are determined/confirmed by customers.
Submission of Specifications

Submission of Specifications

※Please check conditions including wind volume, temperature, pressure and materials.

Model Selection

Submission of Quotation

※Please check performance calculation sheet, dimensional outline drawing and descriptions.

Placing Order

Submission of Delivery Specification

※Please check descriptions in the delivery specification including delivery time.

Manufacturing, Inspection

※Inspection in the presence of customer at IHC factory

Delivery

Access

【 By JR 】

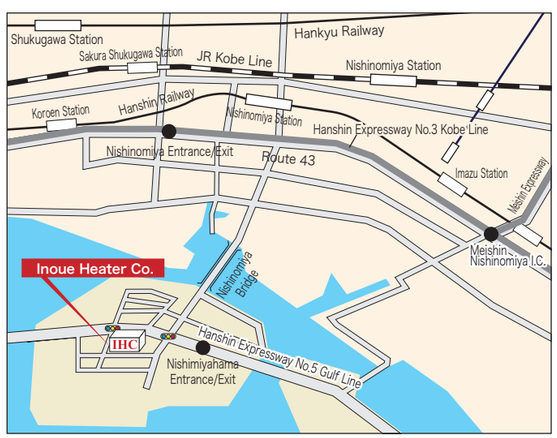
JR Osaka Station → Nishinomiya Station (12min. by rapid train)
JR Sannomiya Station → Nishinomiya Station (15min. by rapid train)
From Nishinomiya Station:
Take a Hanshin bus at Bus Stop No.3 bound for Marina Park and get off at Nishinomiyahama Junior High School (15min.)

【 By Hanshin Railway 】

Umeda Station → Nishinomiya Station (14min. by express)
Sannomiya Station → Nishonomiya Station (15min. by express)
From Nishinomiya Station:
Take a Hanshin bus at Bus Stop No.6 bound for Nishinomiya and get off at Nishinomiyahama Junior High School (10min.)

【 By Automobile 】

Go straight from the Nishinomiyahama Exit of Hanshin Expressway No.5 Gulf Line and you will see IHC on your left at the second signal



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※Japanese only

エアーヒーター、クーラーのお見積引き合いに際し条件をお知らせください。（不明な箇所は、メーカー一任として、提出いたします。）
下記のコピーにご記入後、弊社までファクス送信ください。 【 ファクス番号 ： 0798-37-0870 】

御　社　名	
ご　住　所	〒
ご 担 当 者 名	様
ご 連 絡 先 電 話	（　　）　　—

1	見 積 内 容	□ヒーター □クーラー □その他	
2	使　用　先	□食品・医薬品 □化学・工業 □製紙 □環境 □繊維 □その他（　　）	
3	設 置 場 所	□屋外 □屋内（□機内 □機外）	
4	仕 様 条 件	シェル（ケース）側	チューブ側
5	流　体	□空　気	□蒸　気
		□その他	□熱媒体油
		（種類　　）	□冷却水
			□ブライン
			（種類　　）
			□その他
6	流　量	m^3/min(Hr)at　　℃	(Kg/Hr)
		(Kg/Hr)	
7	湿　度	□R/H（相対）＝　　%（at 入口） □x'（絶対）＝　　kg/kg'	
		（クーラーの場合は湿度条件が必要です）	
8	温　度	入口　　℃	入口　　℃
		出口　　℃	出口　　℃
9	運 転 圧 力	□kPa □mmAq	□MPa □MPaG □kg/cm^2G
10	設 計 圧 力	□kPa □mmAq	□MPa □MPaG □kg/cm^2G
11	送風システム	□シロッコ □ターボ □ルーツ □コンプレッサー □その他	
12	材　質	□指定無し □指定あり ①SS ②SUS*** ③AL ④CU ⑤その他	
		チューブ（　　） フィン（　　） ケーシング（　　）	
13	付　属　品	□無し □有り □ホッパー □架台 □フィルター	
		□その他（　　）	
14	指 定 寸 法	□無し □指定あり（H）　　×（L）　　×（W）	
15	取り合い寸法	□指定あり シェル側 入口　　A 出口　　A	
		□無し チューブ側 入口　　A 出口　　A	
16	脱 脂 処 理	□不要 □要（□蒸気燃焼 □溶剤洗浄 □その他　　）	
17	塗　装	□耐熱シルバー	
		□御指定色（　　） □仕様書による	
18	立 会 検 査	□無し □有り	
19	納 入 場 所	□貴社工場（　　工場） □御指定場所（　　）	
20	梱　包	□無し □有り □国内 □輸出	
21	備　考		

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