

HEAT EXCHANGER COILS
AIR-AIR HEAT RECUPERATOR



ENGLISH VERSION



The History of “COMINTER”

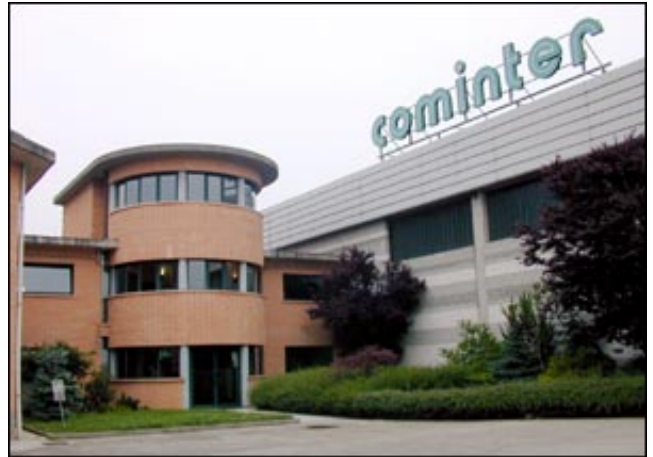


Cominter established in 1980, near Bergamo in Italy, as the manufacturer of customized finned pack heat exchanger coils to meet the requirement of HVAC market, both commercial and industrial.

Cominter operates on their own 8000mq property, which includes 800mq of offices and 3000mq of production area.

The purpose of Cominter is to realize customized products according to the needs of the customers, with production decisions in relation to the application sector or reference. To grant the reliability of the heat exchanger design, Cominter got **AHRI Standard 410** certification (Air-conditioning, heating and refrigeration institute).

Respect the quality of the own products, Cominter works from several years following **ISO 9001/UNI EN ISO 9001/2008** Quality system, certificated from Italian SGS institute.



The standard high quality of their own equipments as:

- The straightening, the calibration and the cut of the tubes,
- The shearing of the fins in different geometries,
- The rolling expansion of the tubes, the brazing of the bends (realized using special machines which ensure the cleaning in the inner of the tubes)
- The final check by a leak test examination makes Cominter a very high qualified partner.

CERTIFICATIONS



SGS ITALIA S.p.A. - Systems & Services Certification
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CONSTRUCTION FEATURES



Finned pack



This consists in copper tubes and aluminium fins, pre-painted aluminium, copper and tin-plated copper. The fins model is of continuous type and they have a collar of the desired height which allows regular and constant spacing between one fin and the following. The tubes are mechanically expanded to get a perfect contact between the fins allowing efficient heat transfer. The fins have a corrugated surface which allows to give more rigidity to the fin itself and to create turbulence in the air which increases the heat exchange coefficient, this type of surface also prevents that the dust accumulates inside the pack, and allows the possible dispersion of condensation.

Frame



The frame is made of hot galvanized sheet steel of adequate thickness, or, on request, of copper, aluminium, brass or stainless steel and it's constructed so that the finned pack and the small angles are efficiently protected. The holes for the passage of the tubes into the plates are of the drawn type with collar to allow free sliding of the tubes due to the effect thermal expansion, eliminating any risk of nicks on the tubes.

Headers and Connections



The water coil headers are provided in steel or copper with threaded BSP connections, while the headers of the steam coils are with treaded or flanged steel connections. The headers for the refrigerant coils such as the condensing and evaporating coils are made of copper with connection suitable for brazing. However refrigerant coils are supplied with pre-charge .

CONSTRUCTION CHARACTERISTICS

Condensate drain pan

The drain pan can be realized on the lower side of the coils, but even in intermediate positions than the height.

The materials which can be used are galvanized steel, inox steel, aluminium or copper drain pan on what kind of material is used for the realization of the coil frame.

Drop eliminator

They are indicated to avoid the drag of the condensate when the air velocity is very high, according to the use conditions, they can be provided in different material like; aluminium PTFE and inox steel.

Surface treatments

Sometimes due to particular conditions some exchange surface protection treatments can be necessary.

The use of particular material as well as specific treatments can ameliorate the life of the exchanger. Some type of treatments are: Tinning – Bath galvanized – Cathodolysis – Heresite – Fin guard silver – Blygold.

Quality inspections

Cominter coils undergo quality control checks regularly to ensure that the product meets exactly to the client's requirement.

Following controls, such as but not limited to are carried out during the manufacturing process:

- Fin block assembly is checked for the dimensions and square.
- Mechanical bonding of tubes and fins.
- Leak test of coil under pressure at 30 bar in water bath.
- Cleaning and drying of tubes internally in case of the refrigerant coils.

All these procedures follow the ISO 9001 Quality System.



COIL DENOMINATION



COMINTER coil are identified with the following codes:

Ex. PT60 04R 10T 1000A 2,5P 10NC CU.AL 01

- PT60 Coil type (Geometry)
- AC Hot water
- AF Cold water
- AS Superheated water
- V Stream
- ED Evaporation
- C Condensation
- ED/C Evaporation / condensation
- R Number of rows
- T Number of tubes
- A Finned length (mm)
- P Fin spacing (mm)
- NC Number of circuits
- 01 Connection side



For the complete definition of the coil it's necessary to specify the materials with which tubes and fins of the coil shall be built.

CONNECTIONS SIDE

TIPO BATTERIA TYPE DE BATTERIE		AC·AF·AS	ED	C	V
INSTALLAZIONE VERTICALE VERTICALE INSTALLATION	01				
	02				
	03				
	04				
INSTALLAZIONE ORIZZONTALE HORIZONTAL INSTALLATION	05				
	06				
	07				
	08				



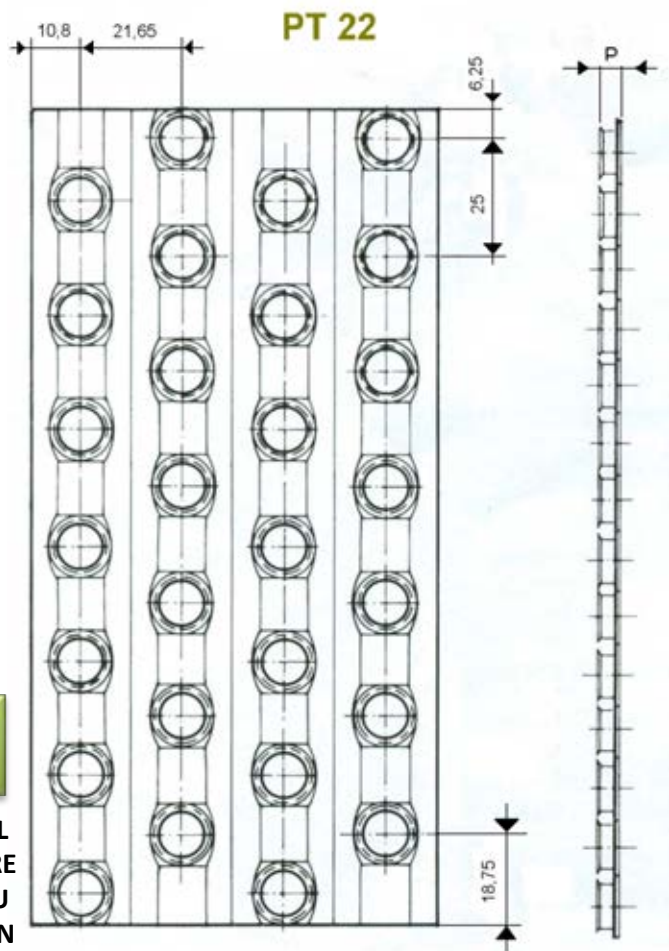


GEOMETRY PT22-10

Tube spacing x row spacing 25x21.65 mm.
 Rated tube diameter 3/8 (9.52mm)
 Fin surface corrugated
 Number of rows 1 – 18
 Fin spacing (P) 1.8 – 5 mm.

Certified Geometry **AHRI Standard 410**,
 Certificate reference n. **3589641**

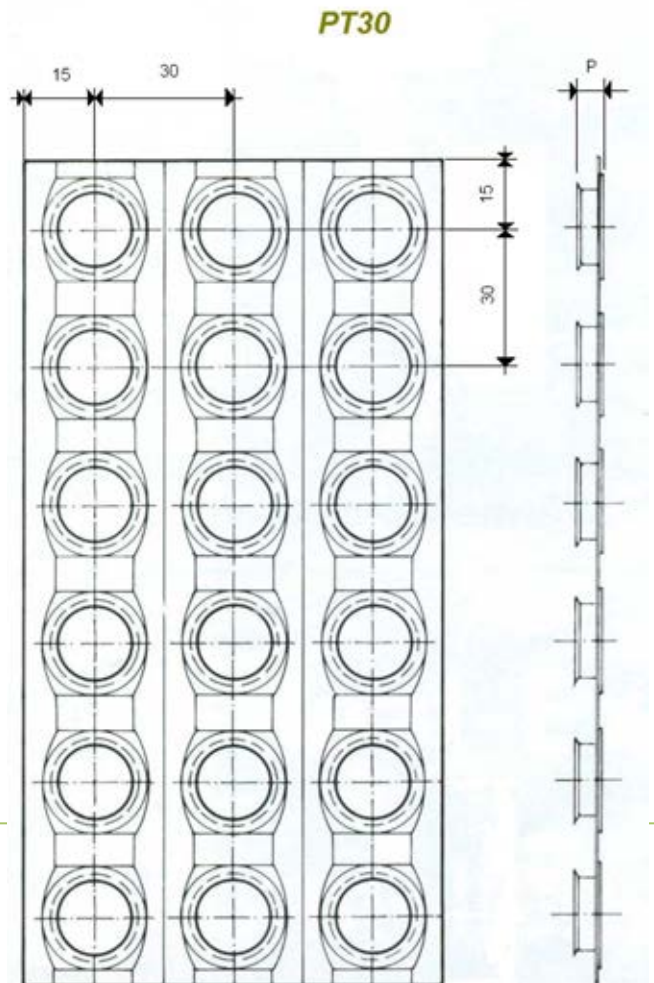
MATERIALS		
TUBES	FINS	CODE
Copper	Aluminium	CU.AL
Copper	Prepainted aluminium	CU.ALUPRE
Copper	Copper	CU.CU
Tinned copper	Tinned copper	CUSN-CUSN



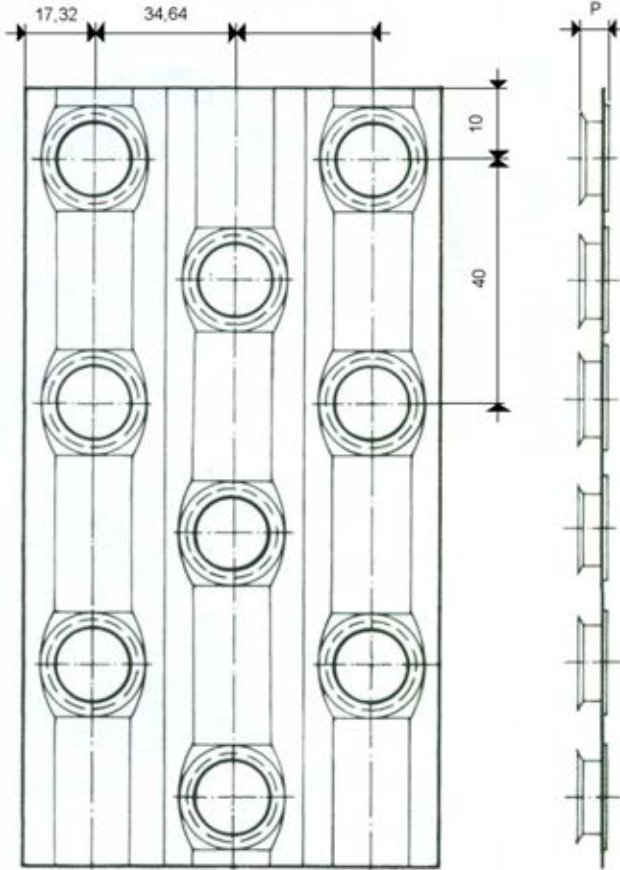
GEOMETRY PT30-16

Tube spacing x row spacing 30x30 mm.
 Rated tube diameter 5/8 (15.88mm)
 Fin surface corrugated
 Number of rows 1 – 16
 Fin spacing (P) 1.8 – 6 mm.

MATERIALS		
TUBES	FINS	CODE
Copper	Aluminium	CU.AL
Copper	Prepainted aluminium	CU.ALUPRE
Copper	Copper	CU.CU
Cupronichel	Copper	CUNI.CU
Tinned copper	Tinned copper	CUSN-CUSN



PT40



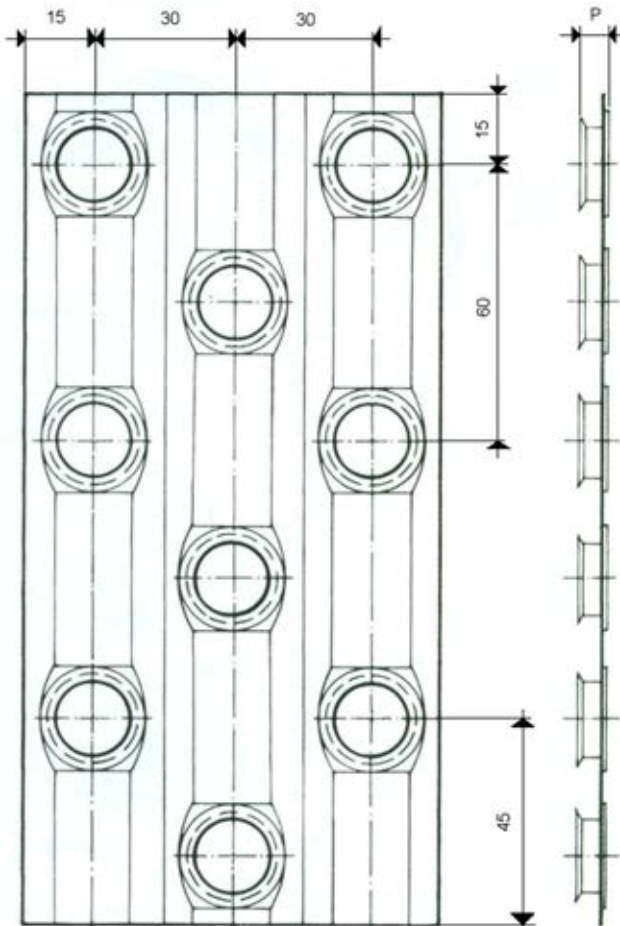
GEOMETRY PT40-16

Tube spacing x row spacing	40x34.64 mm.
Rated tube diameter	5/8 (15.88mm)
Fin surface	corrugated
Number of rows	1 – 16
Fin spacing (P)	1.8 – 6 mm.

Certified Geometry **AHRI Standard 410**,
Certificate reference n. **3589029**

MATERIALS		
TUBES	FINS	CODE
Copper	Aluminium	CU.AL
Copper	Prepainted aluminium	CU.ALUPRE
Copper	Copper	CU.CU
Cupronichel	Copper	CUNI.CU
Tinned copper	Tinned copper	CUSN-CUSN
Inox 304	Aluminium	AISI 304.AL
Inox 316	Aluminium	AISI 316.AL

PT 60

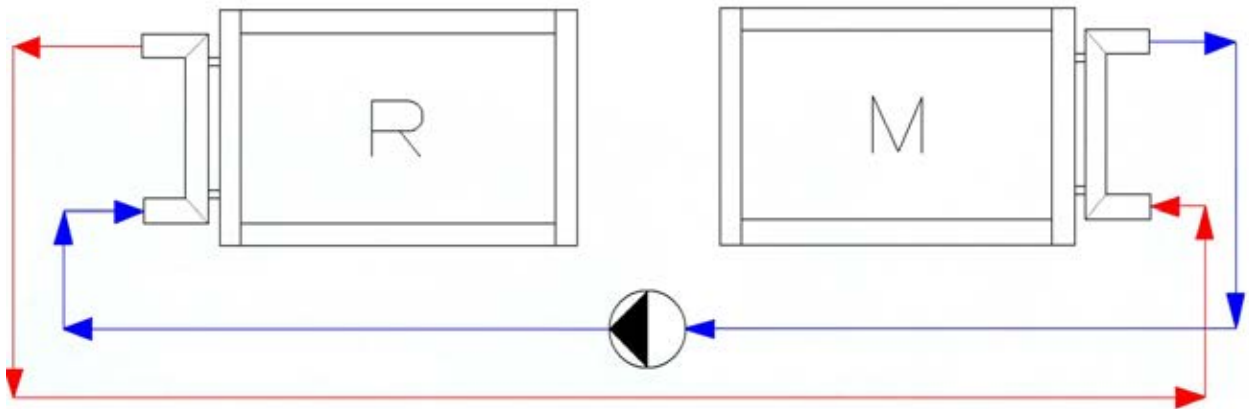


GEOMETRY PT60-16

Tube spacing x row spacing	60x30 mm.
Rated tube diameter	5/8 (15.88mm)
Fin surface	corrugated
Number of rows	1 – 16
Fin spacing (P)	1.8 – 6 mm.

MATERIALS		
TUBES	FINS	CODE
Copper	Aluminium	CU.AL
Copper	Prepainted aluminium	CU.ALUPRE
Copper	Copper	CU.CU
Cupronichel	Copper	CUNI.CU
Tinned copper	Tinned copper	CUSN-CUSN
Inox 304	Aluminium	AISI 304.AL
Inox 316	Aluminium	AISI 316.AL

RUN AROUND COIL (RAR) SYSTEM



Operation

A typical run around coils system comprises of two or more multi-row finned tube coils connected each other by a pumped pipe work circuit.

The pipe work is charged with an heat exchange fluid, normally water, which picks up heat from the exhaust air coil and gives up heat to the supply air coil before returning again. Thus heat from the exhaust air steam is transferred through the pipe work coil to the circulating fluid, and then from the fluid through the pipe work coil to the supply air steam.

The complete physical separation of air flows eliminate cross contamination, thus make this type of recuperator particularly suitable for special applications, such as Hospitals, Laboratories.

Advantages

- Amount energy Recovery can be varied by varying the speed of the recirculation pump
- RAR system makes possible the energy recovery from the steams, separated one from the other.
- Zero cross contamination between the air flows.

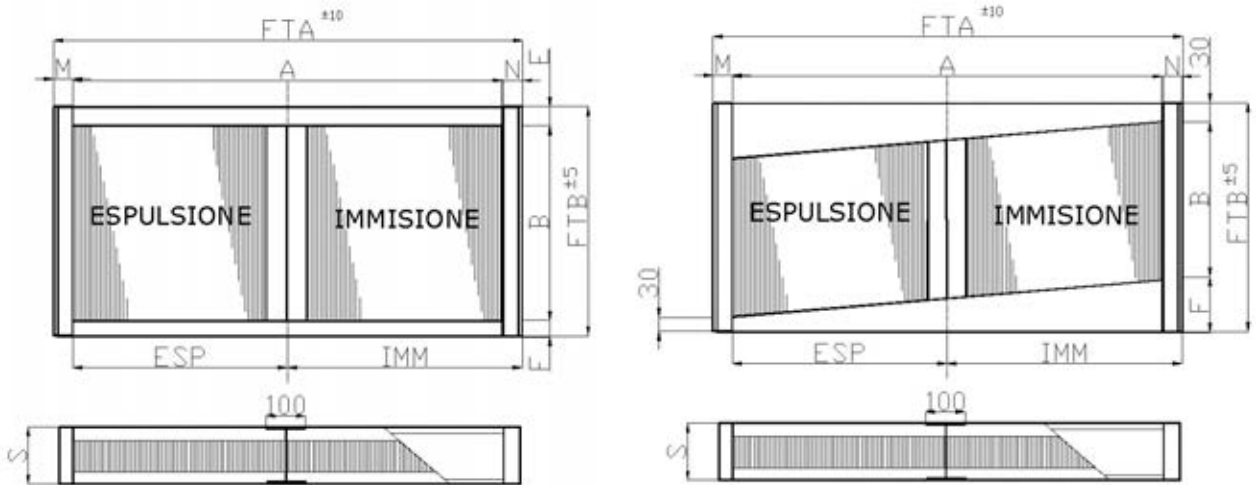
Disadvantages

- The presence of an intermediate fluid limits the energy recovery of around 50%.
- Normally RAR system can recover only sensible energy, resulting in a change in dry bulb temperature of the medium (air in this case), but with no change in moisture content.

Some Applications

- Hospital
- Industrial application
- Room operation
- Laboratories

HEAT PIPE DUOTERM RCD



Operation

In external appearance the “DUOTERM RCD” heat recuperator seems an usual exchange coil with finned pack but subdivided into 2 sections by an intermediate baffle. Hot exhaust air goes through one of the two sections dispersing its heat. Inside the tubes the dispersed heat is conveyed by a two-phase fluid to the other section and is transferred to the fresh air. Up to 80% of the heat can be recovered, which would be otherwise lost, giving a proportionate saving of fuel.

Advantages of the “DUOTERM RCD”

- Can be updated to existing plants
- Resistance to high differential pressure between the two air flows
- The recuperator is static and is not submitted to wear
- Lackage of contamination between the two air flows.

Maintenance

Restricted to periodic cleaning only

Temperatures

From 10°C to 250°C

HEAT PIPE DUOTERM RCD

Construction

The standard construction is made of copper/aluminium with a galvanized sheet framework, but other suitable materials can be used for specific usages.

Price and amortization

“DUOTERM RCD” recuperators are amortized in a short period of time thanks to their modest price and simple installation. In few months in case of industrial installation functioning all the year.

Applications

In all cases where polluted or wet air is given out into the atmosphere and replaced with fresh air (provided that between the two air flows there is a difference of temperature).

Some typical application

(Civil – Industrial – Agricultural)

- Covered swimming pools
- Hospitals
- Supermarkets
- Cinema and theatres
- Hotels
- Greenhouses
- Pigsties
- Pharmaceutical and chemical industries
- Treatment of metals
- Food and confectionery manufacturing industries

HEAT PIPE DUOTERM RCD

DESIGNATION OF THE DUOTERM RCD

The Cominter DUOTERM RCD recuperators can be provided in two different types designated as:

DUOTERM RCD-B 10/9 60° pos. 1 sist. 2

DUOTERM RCD-F 15/7 160° sist. 3

DUOTERM RCD	Heat Recuperator
B	Recuperator with possibility of tilting
F	Fix recuperator with predetermined inclination
Pos. 1 a 3	Functioning position
Sist. 1 a 3	Installation system

Position of the partition septum

In the standard position the partition septum is central. In the case that 'M' report is major or minor than 1 and that the pressure drops between the 2 air flows result too unbalanced, it's possible to move the septum.

Treatment of wet air

When expelled air is humid, quite certainly there is a formation of condense. It is necessary to foreseen special collecting tanks and discharged; there is a considerable increase of performance.

Models

RCD Recuperators are built in 2 models which are useful for any kind of application or basing on the available sizes.

The **model B**; as shown here below, can be mounted in all positions, but inclined from the installer, included a tilting unit of our construction which is particularly adapted for the summer recovery in the condition field.

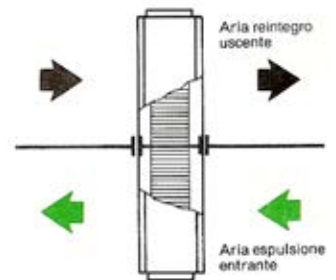
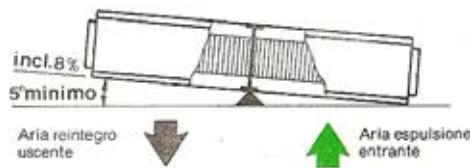
Model B

Operation positions

VERTICAL INSTALLATION WITH PAIRED HORIZONTAL AIR FLOWS.

HORIZONTAL INSTALLATION WITH PAIRED VERTICAL AIR FLOWS.

VERTICAL INSTALLATION WITH OVERLAPPED HORIZONTAL AIR FLOWS.

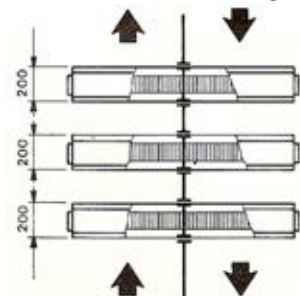
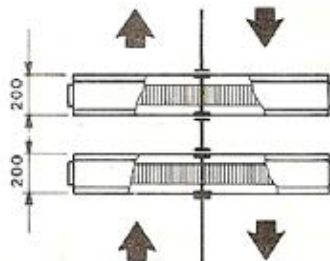
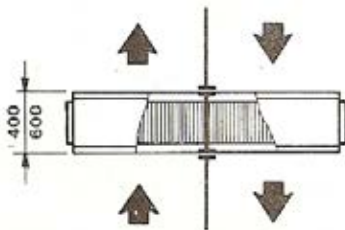


Construction accomodations

SINGLE BLOCK INSTALLATION.

INSTALLATION WITH SUBDIVISION OF THE RECUPERATOR IN 2 SECTIONS OF SAME THICKNESS WITH INTERMEDIATE MAN STEP.

INSTALLATION WITH SUBDIVISION OF THE RECUPERATOR IN 3 SECTIONS OF SAME THICKNESS WITH INTERMEDIATE MAN STEP.



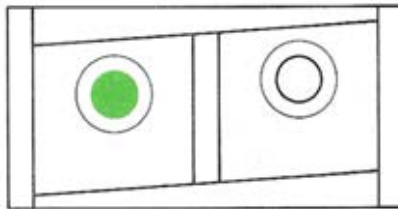


In **F model**, the inclination is ensured by the support frame.
 If mounted in drawer model, this model is very easy to be extracted for the periodic cleaning, it's so particularly adapted for the industrial applications.

Model F

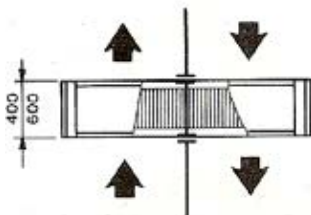
Operation positions

ONLY VERTICAL INSTALLATION WITH APPEARED HORIZONTAL AIR FLOWS IS POSSIBLE.

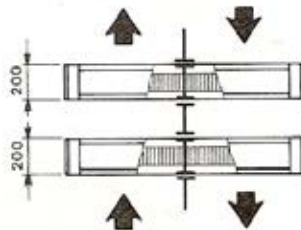


Construction accomodations

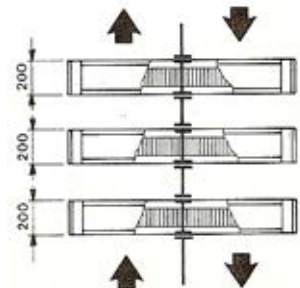
SINGLE BLOCK
INSTALLATION.



INSTALLATION WITH
SUBDIVISION OF THE
RECUPERATOR IN 2 SECTIONS
OF SAME THICKNESS WITH
INTERMEDIATE MAN STEP.

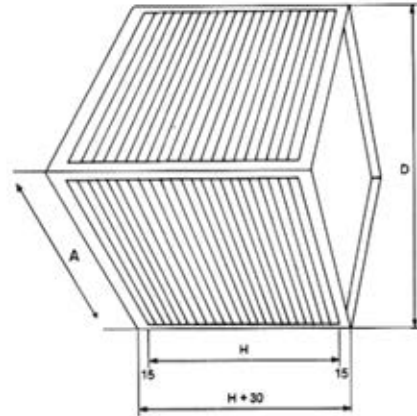


INSTALLATION WITH
SUBDIVISION OF THE
RECUPERATOR IN 3 SECTIONS
OF SAME THICKNESS WITH
INTERMEDIATE MAN STEP.



HEAT RECUPERATOR DUOTERM RCP

TIPO TYPE	A mm	D mm	H mm
02	204	289	VARIABILE SECONDO LA SELEZIONE
03	304	439	
04	404	572	
05	504	713	
06	604	856	
07	704	996	
08	804	1138	
09	904	1280	
10	1004	1420	
12	1204	1704	
14	1408	1993	
16	1608	2275	
18	1808	2558	
20	2008	2842	
24	2408	3406	



Operation

The “DUOTERM RCP” heat recuperator is made of an heat exchanger block manufactured in plane aluminium sheets interspaced with corrugated aluminium sheets and assembled in an aluminium frame.

The exhaust hot air and the supply cool air go through the exchanger with a crossed movement without interfering each other.

As final result heat is transmitted from the exhaust air to the supply air.

Construction

The plates can be made with different materials : aluminium, pre-painted aluminium, inox steel according to the final uses. The aluminium plates are used for recuperation problems in general while inox plates are used for the industrial applications : the choice depends on the corrosive nature of the exhaust air and on its temperature.

The tightness of the plates is guaranteed by a suitable sealing studied in order to resist to the exercise temperatures.

The tightness into the air channel is excellent, lower than 1% of leakage for a differential pressure of 1000pa, the recuperator resists to a static pressure higher than 4500pa without undergoing any changes in the technical characteristics.

High efficiency

The way in which is formulated the “DUOTERM RCP” recuperator allows the acquisition of an high exchange surface; the reduced space inside the undulated plates constitutes an additional mass of heat accumulation.

A total surface which can be changed till 350 times to the frontal surface itself, essential reason of the high efficiency of “DUOTERM RCP” recuperator.

HEAT RECUPERATOR DUOTERM RCP

Advantages

- Lower size and weight
- Facility of installation
- Possibility of dimensionment according to the available size
- Perfect separation between the two air flows
- The perfect tightness between the plates obstructs the formation of mildew, mold, bacterium, odour from the exhaust air to the supply air
- High efficiency, low cost, quick amortization

Some typical applications

(Civil – Industrial – Agricultural)

- Covered swimming pools
- Hospitals
- Supermarkets
- Cinemas and Theatres
- Hotels
- Meeting hall
- Dry furnaces
- Machines for woodworking, textile and paper manufacturing
- Pharmaceutical and chemical industries
- Steelworks and founderies
- Greenhouses
- Dryers ovens

Application temperatures

Aluminium plate	max. temp. 150°C
Prepainted aluminium plate	max. temp. 120°C
Inox plate	max. temp. 250°C

COMINTER REFERENCE



<i>Location</i>	<i>Project</i>
<i>Italy</i>	<i>Hospital of Bergamo</i>
<i>Italy</i>	<i>Malpensa 2000 Airport</i>
<i>Italy</i>	<i>Fortuna ship cruise</i>
<i>Italy</i>	<i>Magica ship cruise</i>
<i>Italy</i>	<i>Concordia ship cruise</i>
<i>Italy</i>	<i>Serena ship cruise</i>
<i>Italy</i>	<i>Favolosa ship cruise</i>
<i>Italy</i>	<i>Pacifica ship cruise</i>
<i>Arab Emirates</i>	<i>American University</i>
<i>Arab Emirates</i>	<i>Emirates Tower (3)</i>
<i>Arab Emirates</i>	<i>Marina Mall (5)</i>
<i>Arab Emirates</i>	<i>Abu Dhabi trade center</i>
<i>Arab Emirates</i>	<i>Manar Mall at Ras Al Khaima</i>
<i>Arab Emirates</i>	<i>Abu Dhabi Trade center (9)</i>
<i>Arab Emirates</i>	<i>Barwa Financial district (2)</i>
<i>Arab Emirates</i>	<i>Technical School</i>
<i>Arab Emirates</i>	<i>Knowledge village</i>
<i>Arab Emirates</i>	<i>Emirates Hangar</i>

<i>Location</i>	<i>Project</i>
<i>Arab Emirates</i>	<i>Mall of the Emirates</i>
<i>Arab Emirates</i>	<i>Flower center</i>
<i>Arab Emirates</i>	<i>Wafi Hotel & Mall (4)</i>
<i>Arab Emirates</i>	<i>Old Town commercial island</i>
<i>Arab Emirates</i>	<i>Al Mass Tower</i>
<i>Arab Emirates</i>	<i>Ferrari Experience (7)</i>
<i>Arab Emirates</i>	<i>Burj el Arab (1)</i>
<i>Arab Emirates</i>	<i>Commercial Bank of Dubai</i>
<i>Arab Emirates</i>	<i>Biggest indoor swimming pool (10)</i>
<i>Arab Emirates</i>	<i>Race course (8)</i>
<i>Qatar</i>	<i>Beach villas</i>
<i>Qatar</i>	<i>Defence HQ</i>
<i>Qatar</i>	<i>North camp 12 base</i>
<i>Qatar</i>	<i>Rumailah Hospital</i>
<i>Qatar</i>	<i>Qatar flour Mills (KDS)</i>
<i>Qatar</i>	<i>Al Wajbah complex</i>

COMINTER REFERENCE



<i>Location</i>	<i>Project</i>
<i>Qatar</i>	<i>QAFAC</i>
<i>Qatar</i>	<i>Junior school</i>
<i>Qatar</i>	<i>Aquatic complex</i>
<i>Qatar</i>	<i>British Bank</i>
<i>Qatar</i>	<i>Ministry of interior</i>
<i>Qatar</i>	<i>Al Bida Plaza</i>
<i>Qatar</i>	<i>Univeristy of Qatar</i>
<i>Qatar</i>	<i>Royal Plaza</i>
<i>Qatar</i>	<i>Elementary schools</i>
<i>Qatar</i>	<i>Al Hodaifi Tower</i>
<i>Qatar</i>	<i>Emadi center</i>
<i>Qatar</i>	<i>Khalifa Stadium</i>
<i>Qatar</i>	<i>Indoor stadium</i>
<i>Qatar</i>	<i>QP central office building</i>
<i>Qatar</i>	<i>Al Udeid</i>
<i>Qatar</i>	<i>The Villaggio</i>
<i>Qatar</i>	<i>Al Wusayl Shooting range</i>
<i>Qatar</i>	<i>Dolphin tower</i>

<i>Location</i>	<i>Project</i>
<i>Qatar</i>	<i>Cultural Village</i>
<i>Qatar</i>	<i>Hamad Hospital</i>
<i>Qatar</i>	<i>Science and Technologies park</i>
<i>Qatar</i>	<i>Al Bidda Tower</i>
<i>Qatar</i>	<i>Jaidah Hotel</i>
<i>Qatar</i>	<i>Akis Primary school</i>
<i>Qatar</i>	<i>Waqood Tower</i>
<i>Qatar</i>	<i>Barwa commercial Avenue</i>
<i>Qatar</i>	<i>SIDRA Medical research center</i>
<i>Qatar</i>	<i>Ministry of Foreign affairs</i>
<i>Qatar</i>	<i>Woman Univeristy</i>
<i>Qatar</i>	<i>Landmark</i>
<i>Qatar</i>	<i>Al Saad sports club</i>
<i>Qatar</i>	<i>Al Udeid</i>
<i>Qatar</i>	<i>Millennium hotel</i>
<i>Kuwait</i>	<i>Office building Tower (6)</i>
<i>Kuwait</i>	<i>Shopping mall</i>



COMINTER REFERENCE





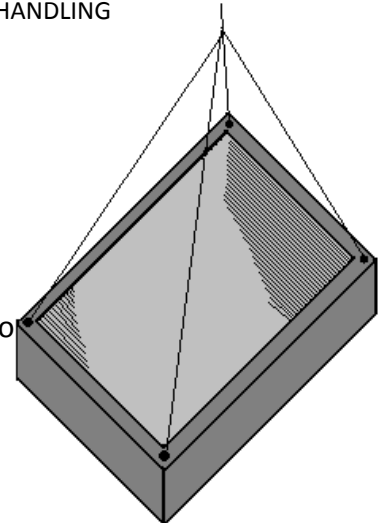
The heat exchanger coils are submitted to the obligations and to the exclusions of the directive 97/23 CE-PED and further directive which could be applied.

The test nominal pressures are determined following the above mentioned directive and the matched norme prEN 378-2.

The products we manufacture are made with high quality materials and undergo to checks and process and final tests following the procedures of our Quality system certificate (UNI EN ISO n. IT99/0204), although we believe that it is useful to supply our customers some suggestions for the **installation and maintenance of the heat exchanger coils**.

INSTALLATION

CORRECT MODE FOR
HANDLING



- The installation should be made following the art state and in accordance to the temperature and pressure data indicated in the apposite technical data sheets.
- To handle the product using only the apposite holes which are made along the frame of the heat exchangers and **do not use the nipples, headers or bends**.
- Use suitable instruments which support the weight of the coils to handle or to lift them.
- Put the heat exchangers in horizontal position for both vertical and horizontal installation or inclined to avoid formation of air pocket during the functioning or liquid reserve in case of emptiness.
- For inclined installation never exceed the 45°.
- Link in a correct way the entering to the exit headers following the agreed schema.
- Foresee the installation of rolling shutters on the alimentation and on the discharging to allow eventual maintenance and/or repair interventions.
- Do not remove protection plugs from the headers before making the connection to the net to avoid the entering of rain water, actually its presence could cause oxidization phenomenon or the tubes breaking in case of frozen.
- Foresee the presence of anti-vibrant joints to avoid any damages in case of rigid blocking of exhaust and supply headers.
- Close the threaded connection with keys and anti-keys.
- The start function operations of the heat exchanger coils should be done with gradual processes, so that the hot fluid must be introduced slowly.

- Carry out the filling of the heat exchanger coils through water and diathermic oil from the low side to eliminate completely the presence of air; pay attention because the presence of air can produce serious drawbacks as corrosion and lower heat exchange.
- Avoid that the heat exchanger coils work at higher temperatures or pressures than the ones of the project.

HANDLING

- Any operation of maintenance and/or reparation shall be executed at system off.
- Clear periodically the heat exchanger coils both on the fins that in the inner of the tubes to avoid the accumulation of extraneous substance which must be removed by an air jet or using special detergents.
- In case of installation at open air or shutdown of the system during winter season, the heat exchanger coil must be completely emptied of the fluid through the apposite dumps which are situated on the headers or on the net to avoid the risk that the same fluid iced (the eventual reserve of fluid can be eliminated by compressed air puffed in the inner of the tubes)

Caused to the high fragility of the heat exchanger in the case of cleaning it is suggested to avoid corrosive agents towards copper and aluminium and to use eventual pressure machines with the necessary care (ex. Pressure too high or too closed to the fins which could be damaged).



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