CRF and CRIM

Closed tower

Hybrid closed circuit cooler

JACIR
Cooling for life

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La FRENCH FAB

General description and benefits CRF-CRIM

JACIR

With more than 60 years' experience, our company:

∞ Has invested in detailed research and development in order to propose technical solutions in accordance with environmental protection through unequalled realizations and patents.

∞ Is today the European leader thanks to its technology beyond market requirements.

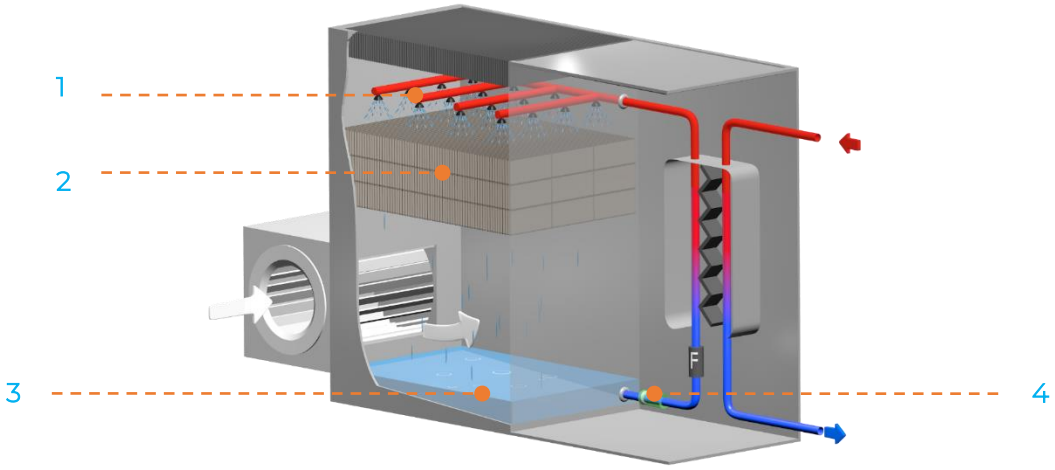
Strong points of CRF-CRIM series

∞ PLATE HEAT EXCHANGER	Made of stainless steel, the plates are removable to ease cleaning and reassembling
∞ PLATE HEAT EXCHANGER	Glycol free Plate Heat Exchanger: no freezing risk during winter as it stands out of the air flow.
∞ WATER PROOF	Thanks to our assembling technology, we guaranty no leak equipment
∞ SILENCE	Very silent cooling towers in standard version with very low sound levels up to NR 30 at 10m.
∞ EXCHANGE SURFACE	Made by Jacir in high density polyethylene. Thanks to its easy cleaning, it secures long lasting performances
∞ ANTICORROSION PROTECTION	Made of galvanised steel in standard, casing of the cooling tower can be in stainless steel 304L or 316L in option and assembled without any weld.
∞ EASY MAINTENANCE	Larges access hatches (540 x 390mm) fan outside the tower and at man height, exchange surface cleanable by elastic warping and high-pressure water spray, sloped basin for complete drain.
∞ ELECTRIC POWER	Minimal consumption.
∞ EVOLUTIVE TOWER	Possibility to increase the evacuated power by adding plates to the heat exchanger. The sound level can be lowered with attenuation, without necessarily increasing the absorbed power.
∞ ONE PIECE CONSTRUCTION	Easy handling and transport.

Principle of a closed cooling tower: CRF-CRIM

A cooling tower is a heat exchanger, cooling the water by direct contact with air. This process involves two simultaneous physical phenomena: convection and evaporation. The convection allows the transfer of sensitive heat. The evaporation, the main one, allows the transfer of latent heat and so makes it possible to reach lower water temperature than the ambient air temperature.

Operating principle of a wet cooling tower:



The fluid to be cooled flows through the primary circuit of a stainless-steel plate heat exchanger. The water from the secondary circuit, flows from the heat exchanger to the top of the cooling tower. This water is distributed on the exchange surface (2) through the nozzles (1).

The air is forced by the fan from the bottom to the top of the cooling tower. During the pass, it has been warmed up and saturated in water through the exchange surface.

Because of the superficial tension created by the exchange surface, the water equally flows down along the whole height of the so extended exchange surface.

Cooled by the forced air, the water falls by gravity to the inclined basin (3) located on the bottom of the tower.

This water is recycled on the plate heat exchanger by the circulating pump (4).

Advantages of the cooling tower versus dry air fins coolers:

Antifreeze and glycol savings:

- As the exchanger is not in the air flow, it does not require any glycol in the water, and is freezing resistant.

Energy savings:

- The condensers of the chillers will be lower cooled by a cooling tower i.e., a better efficiency of the system.
- It takes 7 to 10 times more air in a dry cooler, i.e., more fans and more electrical motors. So, the electrical consumption is approximately 40 % higher than in the wet cooling tower. The maintenance is therefore higher. Beyond its cost, this electrical over consumption requires the contribution of the Environment.
- For a same evacuated power, a cooling tower is 30 to 50 % cheaper than a dry cooler.
- A 1 % increase of the ambient air has a direct and proportional impact on the performance of a dry cooler. In the case of a cooling tower, the fluctuation of the performance is only related to wet bulb changes.

Sound attenuation:

Jacir supplies cooling towers much more silent than dry coolers.

I- AIR-WATER EXCHANGE: TOWER CIRCUIT

Tower casing:

The casing is made of self-supporting rigid panels, with double or 4 times folding on the four sides of each panel (Jacir design) which fit with sound attenuation on the casing. Therefore, we can offer cooling towers with sound level lower than NR 30 at 10m.

The towers are assembled by water proof rivets: powerful and regular torque. There is no weld for the assembly, and the sealing between the panels is secured by a gasket specially designed for this application.

Delivery in one-piece units, up to 5 units, with same height (2.5 m).

As standard, the panels are in 2mm galvanised steel, ZENDZIMIR 275 g/m2 (the protection of galvanised sheets is secured by the zinc oxidation on the surface).

As an option, 304L or 316L stainless steel for a reinforced resistance to corrosion.

Inclined basin: easy and complete drain:

- Capacity of 700 litres per module for the CRF towers, and 800l for the GCRF. (example: GCRF 5 modules: the basin contains 4400l).
- The assembly is made without any welds on all the parts in contact with water: reliability and totally smooth to avoid nest for bacteria proliferation.

On the utilities side, of the basin are located:

- Over flow,
- Drain hole,
- Water makeup with float valve or electro valves as option,
- Water outlet through strainer in stainless steel and in PEHD, removable and with a large nozzle to avoid any cavitation, and a pre filter,
- Options: water heater 230 or 400V, with separated waterproof thermostat.

For the connection of the heater, use the proper contactors.

Water distribution:

The water distribution is secured by PVC pipes with high efficiency PP nozzles. These nozzles split the water on the exchange surface in a cone shaped flow. They can easily be unscrewed for service and have a very strong mechanical resistance.

An internal turbulator provides and equal water distribution, and allows a very wide water flow fluctuation.

Exchange surface:

The *exchange surface*, or *packing*, is made by Jacir, in high density polyethylene, heat welded. This material is imputrescible, long lasting, and high temperature resistant. It can be cleaned by elastic warping and water spray. The advantages are as follows:

- high efficiency: 240 or 280 m2/m3,
- Increased efficiency (wettability) due to the "mesh" effect,
- Mechanical softness
- Easy maintenance
- High resistance to chemicals
- High temperature resistance: up to 75°C for standard
- Low pressure drop thanks to vertical channels, so low electrical consumption and low noise.

Drift eliminators:

Their purpose is to reduce the drift out the cooling tower. Highly efficient, they are UV resistant and can be removed from the top of the cooling tower. Then there is a direct access to the water nozzles and to the exchange surface.

Access for maintenance:

Large door(s) are provided to access to the basin (540 X 390mm) and to access to the water nozzles (740 X 390mm) ; these doors are mandatory if options for sound attenuators, for plume suppression coil, or for outlet cones are selected. This access can be used for easy disassembly of drift eliminators, water nozzles, exchange surface and water distribution. A 260x110mm trap hatch allows the rapid and complete removal of sludge and other material accumulated at the bottom of the basin.

Fans:

The centrifugal fans are designed and made by JACIR. The impeller is double inlet action type. The removable polyester inlet cones make it possible to easily disassemble the impeller. Their shape improves the fan efficiency.

The shaft bearings are self-aligned, factory greased, and to be regularly re-greased. Each shaft line is supported by two bearings, and two fans per shaft maximum.

One fan per module and only one motor for two fans maximum. In the case where the motor would drive three fans, the coupling is secured by a flexible part between the shaft with 2 fans and the shaft with the third fan.

The casing of the fan is used as motor support. This design allows the ideal belt tension. The coupling is made by trapezoidal pulleys and belts. The belt tension is secured by the adjustment of the motor support.
As an alternative, the casing and the impeller can be in stainless steel. The impeller is coated by a baked epoxy painting.

As an option the impeller can be made of X Steel stainless steel.

Connections:

As standard, flanges are made of galvanised steel whatever diameter and tower casing material. Overflow is made of PP.

Standard motor:

- 3 phases asynchrony
- 1500 rpm
- 230/ 400 V up to 5.5 kW motors
- 400/ 690 V above 5.5 kW
- 50 Hz
- IP 55
- Direct wiring on connection glands.

II- WATER-WATER HEAT TRANSFER: USER CIRCUIT

Room included in the cooling tower:

Made in galvanised steel in standard, it includes an access door 2100mm x 600mm with lockers activated by key. The panels can be disassembled, as all components are designed for easy access and maintenance.

Plate heat exchanger:

It is in-door protected in the exchanger room. The pipe connection is made with flanges outside the exchanger room. There are only two flanges: 1 for inlet, 1 for outlet. They can be located either on the length or on the width side of the cooling tower. It does not require anti-freeze protection: in case of electrical stop, the tower circuit automatically drains by gravity down to the basin, so that the customer circuit can freeze without damaging the plates and the gaskets.
Connection piece for chemical cleaning of the exchanger and blow down They are located on the exchanger piping.

Exchanger pump:

It is protection against freeze by a patented thermostatic valve: so there is no need for electrical tracing.

Pressure manometers:

Located before and after the pump and before the water distribution header.

Filters:

At the basin outlet, a 5mm strainer is installed. In addition, a centrifugal filter chosen in the same material as the piping (galvanized or stainless steel in option) is located at the plate exchanger inlet. It has the following characteristics:

- 100% of the tower volume is continuously filtrated every 1.2 minutes: high efficiency,
- automatic cleaning made during the blow down of the water circuit (Jacir patent).

The evaporative circuit remains clean and therefore decreases the risk of Legionella proliferation.

Electrical heater and lightening as options.

Plume suppression coil (option CRIM)

In standard, the header coil is in carbon steel, primer and epoxy coated. Two air valves secure the freezing matters.
The tubes are assembled in a triangular pitch, in copper. In option, they can be in stainless steel. The fins are in copper.

A monitored valve to adjust the water spray on the infill is associated to the plume coil.

As soon as ambient conditions are met, this system makes it possible to operate significant water savings by cooling the water in the dry mode, rather than spraying and evaporating it.

Sound attenuation (OPTION)

IB sound attenuation:

Sound attenuators at the air inlet: insulation of the fan(s) casing with strong self-supporting panels, double folded inwards, on the 4 sides of the panels.

Large doors for complete front access for maintenance. They are supplied with lockers activated by key. Sound attenuators at the air outlet: cone to reduce the acoustic surface.

ICV complete sound attenuation:

Housing of the fan(s) casing with self-supporting stiff panels, double folded outwards on the 4 sides. The internal side is coated with absorbent material; it includes sound baffles; those have a galvanised frame, high density rock wool, and are installed on sliding rails for easy disassembly. At the air inlet, the rock wool is protected by a fibre glass film. At the air outlet, the baffles are protected by a stainless-steel mesh.

ICVK complete sound attenuation with double casing:

The whole ICV tower is fitted with a second tower casing including high density rock wool : ICV-K.

Special NR 30 soundproofing:

It consists in an improvement of the ICVK solution, to reach NR 30 at 10 metres

OPTIONS

- Plate heat exchanger in stainless steel 316 or 316 TI.
- Plume suppression device: see CRIM series documentation.
- Panels in SS 304L or 316L.
- Electrical heater with thermostat.
- 2 speed motor (Dahlander 1500/ 750 rpm, or double wiring, or PAM 1500/ 1000 rpm).
- Stand-by motor, ready for connection.
- Frequency controller for motor control: energy savings.
- Make up by electrical water level switch (with electro valve en inlet filter).
- Automatic deconcentration by induction device; see Dai documentation.
- Polyester baked coating for all parts not in contact with water.
- All accessories in stainless steel (fan casing, impeller, coil support, flanges, pipes...).
- Outlet cone (for outlet air speed acceleration).
- Air inlet filter (fan adaptation + filter).
- Air pressure available for connection on casing.
- Electrical control panel,
- Equipment totally unassembled for site erection only,
- Site erection by skilled workers and supervisors,
- Vibration plots.
- A fan bearing lubrication line (made in Rilsan) is extended on the fan stack.

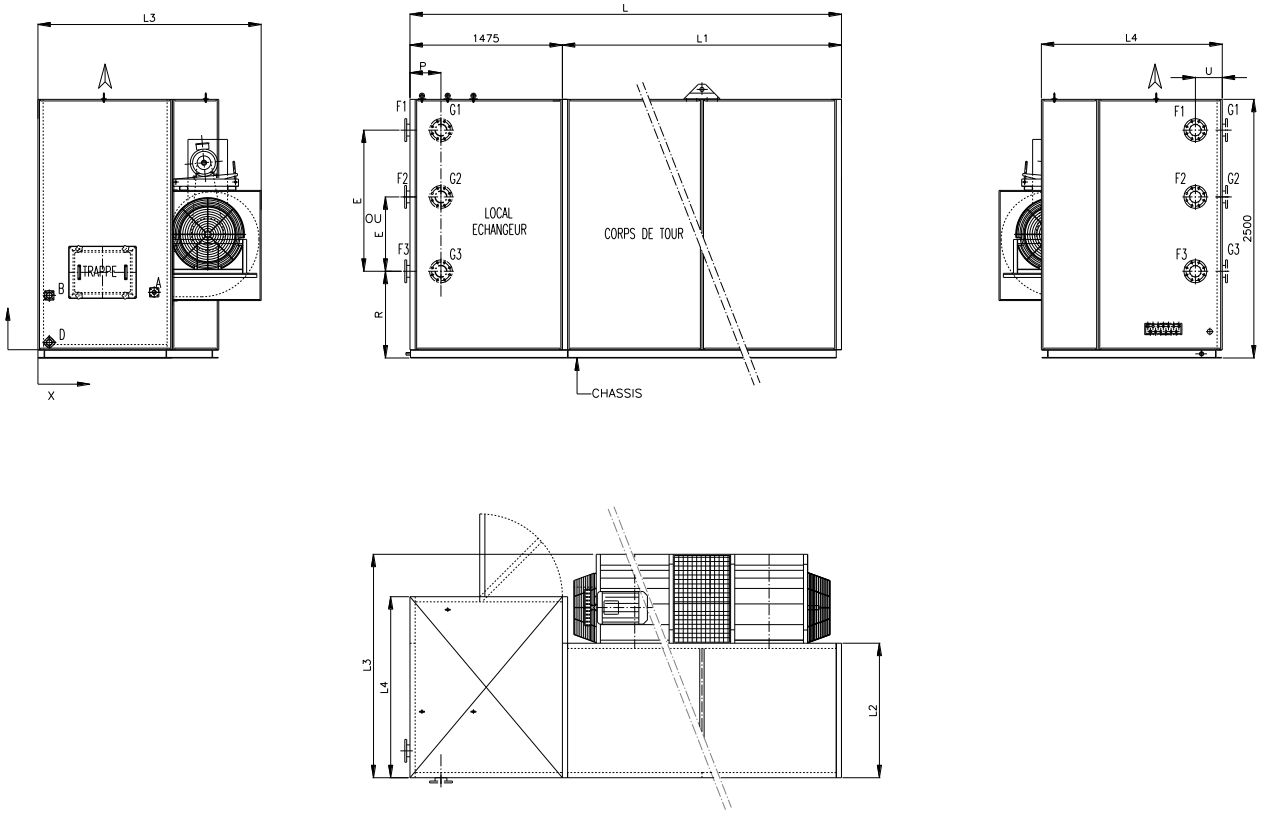
Technical characteristics CRF

CRF series	CLOSED TOWER WITHOUT SOUND ATTENUATION											
	Heat power ref. (1) [kW]	Fans qty type NDKL 560	Outlet air Average flow rate [m³/h]	Heat power [kW]	MFU power [kW]	Sound level (2) at 20 m [dBA]	Empty weight Small exch. room PH [kg]	Empty weight Large exch. room GH [kg]	Full weight Small exch. room PH [kg]	Full weight Large exch. room GH [kg]	Overall dimensions Small exch. room PH [mm]	Overall dimensions Large exch. room GH [mm]
CRF 1 HZ (15 to 47 m3/h)												
22	150	1	14 600	3	2,2	42	2150		3033		H = 2500	
30	175		16 400		3	44					L = 2875	
55	210		19 000		5,5	46					l = 2160	
GCRF 1 HZ (20 to 59 m3/h)												
55	220	1	23 600	3	5,5	47	2235		3307		H = 2500	
											L = 2875	
75	250		25 000		7,5	49					l = 2460	
CRF 2 HZ (30 to 94 m3/h)												
40	240	2	29 600	3	4	45	2597		4235		H = 2500	
75	285		33 200		7,5	47					L = 4175	
90	335		38 300		9	49					l = 2160	
GCRF 2 HZ (40 to 117 m3/h)												
110	435	2	47 200	3	11	50	2717		4733		H = 2500	
											L = 4175	
150	505		50 000		15	52					l = 2460	
CRF 3 HZ (45 to 140 m3/h)												
75	445	3	44 500	3	7,5	47	3152	3812	5545	6311	H = 2500	H = 2500
110	536		49 900		11	49					L = 5475	L = 5475
150	645		53 900		15	51					l = 2160	l = 2400
GCRF 3 HZ (58 to 175 m3/h)												
150	700	3	70 800	6	15	52	3268	3914	6227	6978	H = 2500	H = 2500
											L = 5475	L = 5475
150/75	770		75 000		15 + 7,5	54					l = 2460	l = 2460
CRF 4 HZ (60 to 190 m3/h)												
40 D	600	4	59 200	6	2 x 4	48		4193		7446		H = 2500
75 D	710		66 300		2 x 7,5	50						L = 6775
90 D	830		76 600		2 x 9	52						l = 2400
GCRF 4 HZ (78 to 235 m3/h)												
110 D	945	4	94 400	6	2 x 11	53		4396		8404		H = 2500
												L = 6775
150 D	1015		100 000		2 x 15	55						l = 2460
CRF 5 HZ (75 to 235 m3/h)												
75/40	745	5	74 000	6	7,5 + 4	49		4660		8668		H = 2500
110/75	890		83 000		11 + 7,5	51						L = 8075
150/90	1040		92 200		15 + 9	53						l = 2400
GCRF 5 HZ (100 to 295 m3/h)												
150/110	1155	5	118 000	6	15 + 11	54		4919		9871		H = 2500
												L = 8075
150/220	1290		125 000		15 + 22	56						l = 2460

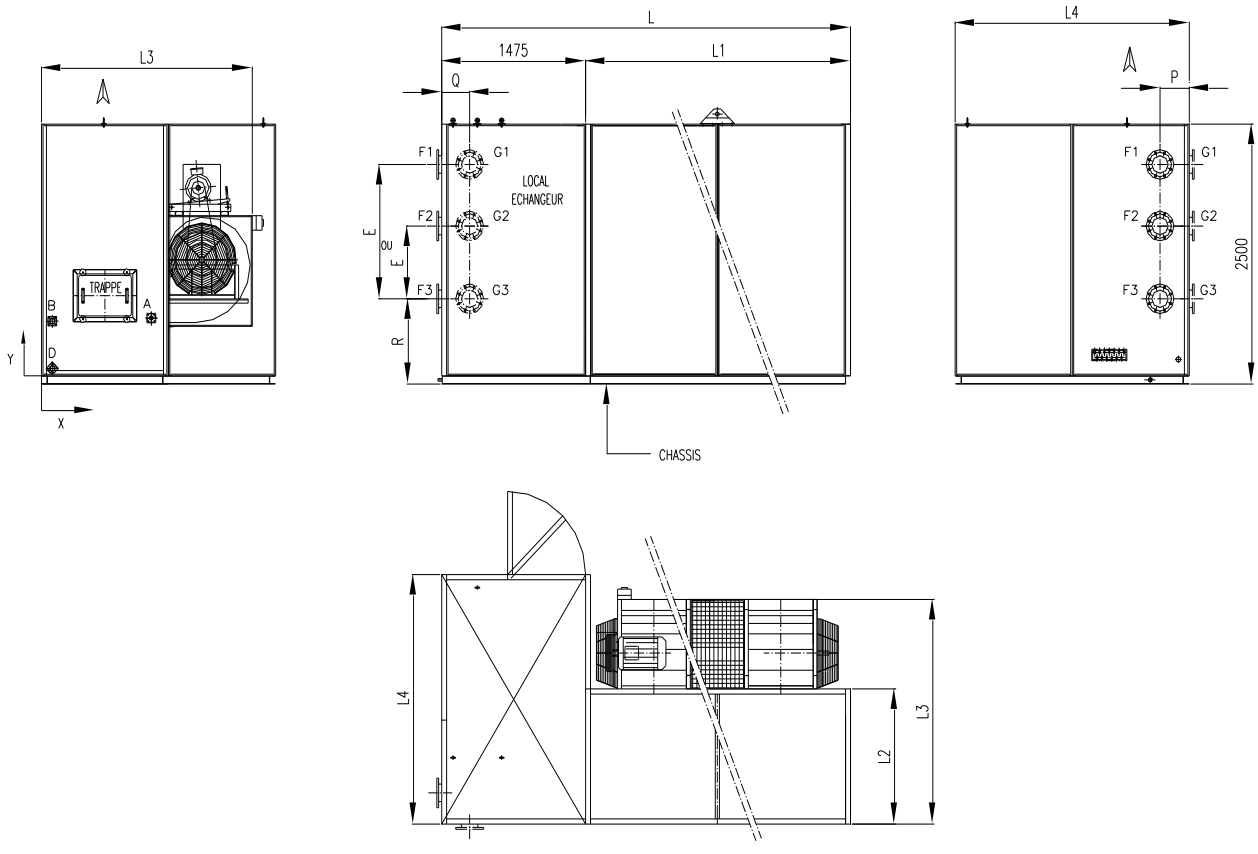
(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 4 directions at 1.5m high.
Note: for higher power, towers can be added side by side. (see KSF series)

Drawings and dimensions CRF

CRF small exchanger room PH – without sound attenuation



CRF large exchanger room GH – without sound attenuation



CRF series

Dimensions in mm

			CRF	GCRF	CRF	GCRF	CRF	GCRF	CRF	GCRF	CRF	GCRF
			1 HZ		2 HZ		3 HZ		4 HZ		5 HZ	
L = L1 + 1475			2875		4175		5475		6775		8075	
L 1			1400		2700		4000		5300		6600	
L 2			1300	1600	1300	1600	1300	1600	1300	1600	1300	1600
L 3 (without flanges)			2160	2460	2160	2460	PH 2160 / GH 2400	2460	2400	2460	2400	2460
L 4			1750						2400			
A	Solenoid valve and filters	Ø	3/4		1’		1’	1’1/4	1’1/4		1’1/4	
		DN	20		25		25	32	32			
	Floating valve (male)	Ø	3/4		1’	1’ 1/4	1’ 1/4		1’1/4		1’1/4	
		DN	20		25	32	32					
	Make up water	X	1125	1425	1125	1425	1125	1425	1125	1425	1125	1425
		Y	555									
B	overflow (female)	DN	50									
		X	110									
		Y	450									
C	Antifreeze resistance		Inside room									
D	Drain (female)	DN	50									
		X	110									
		Y	70									
E			719 or 1365						890 or 1292			
F	Water inlet	DN	100						150			
G	Water outlet	DN	100						150			
H	Thermostat (option): inside exch. room											
J	Safety lack of water (option):											
K	Low level (option): inside exch. room											
L	High level (option) : inside exch. room											
M			622,5						744,5			
Q			227						256			
R			778						806			

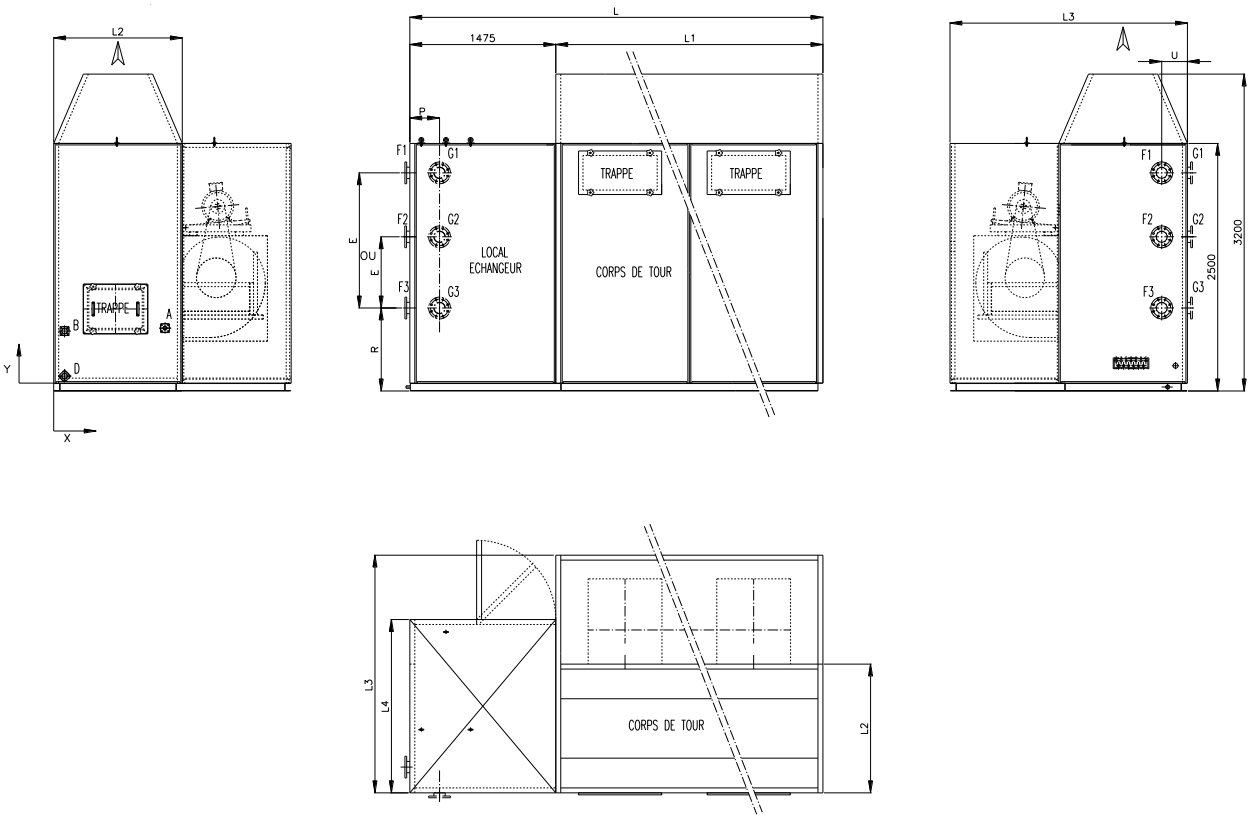
Technical characteristics CRF with IB sound attenuation

Type	CLOSED TOWER WITH IB SOUND ATTENUATION											
	Heat power ref. (1) [kW]	Fans qty type NDKL 560	Outlet air Average flow rate [m³/h]	Heat power [kW]	MFU power [kW]	Sound level (2) at 20 m [dBA]	Empty weight Small exch. room PH [kg]	Empty weight Large exch. room GH [kg]	Full weight Small exch. room PH [kg]	Full weight Large exch. room GH [kg]	Overall dimensions Small exch. room PH [mm]	Overall dimensions Large exch. room GH [mm]
CRF 1 HZ ..... IB (15 to 47 m3/h)												
22	150	1	14 600	3	2,2	39	2447		3330		H = 3200	
30	175		16 400		3	40					L = 2875	
55	210		19 000		5,5	42					I = 2400	
GCRF 1 HZ ..... IB (20 to 59 m3/h)												
55	220	1	23 600	3	5,5	42	2538		3610		H = 3200	
											L = 2875	
75	250		25 000		7,5	44					I = 2700	
CRF 2 HZ ..... IB (30 to 94 m3/h)												
40	220	1	23 600	3	5,5	42	2538		3610		H = 3200	
75											L = 2875	
90	250		25 000		7,5	44					I = 2700	
GCRF 2 HZ ..... IB (40 to 117 m3/h)												
110	220	1	23 600	3	5,5	42	2538		3610		H = 3200	
											L = 2875	
150	250		25 000		7,5	44					I = 2700	
CRF 3 HZ ..... IB (45 to 140 m3/h)												
75	445	3	44 500	3	7,5	42	3786	4451	6179	6949	H = 3200	H = 3200
110	536		49 900		11	44					L = 5475	L = 5475
150	645		53 900		15	46					I = 2400	I = 2400
GCRF 3 HZ ..... IB (58 to 175 m3/h)												
150	700	3	70 800	6	15	46	3909	4545	6868	7609	H = 3200	H = 3200
											L = 5475	L = 5475
150/75	770		75 000		15 + 7,5	48					I = 2700	I = 2700
CRF 4 HZ ..... IB (60 to 190 m3/h)												
40 D	600	4	59 200	6	2 x 4	43		4994		8247		H = 3200
75 D	710		66 300		2 x 7,5	45						L = 6775
90 D	830		76 600		2 x 9	47						I = 2400
GCRF 4 HZ ..... IB (78 to 235 m3/h)												
110 D	600 710	4	59 200 66 300	6	2 x 4 2 x 7,5	43 45		4994		8247		H = 3200 L = 6775
150 D	830		76 600		2 x 9	47						I = 2400
CRF 5 HZ ..... IB (75 to 235 m3/h)												
75/40	745	5	74 000	6	7,5 + 4	44		5639		9647		H = 3200
110/75	890		83 000		11 + 7,5	46						L = 8075
150/90	1040		92 200		15 + 9	48						I = 2400
GCRF 5 HZ ..... IB (100 to 295 m3/h)												
150/110	745 890	5	74 000 83 000	6	7,5 + 4 11 + 7,5	44 46		5639		9647		H = 3200 L = 8075
150/220	1040		92 200		15 + 9	48						I = 2400

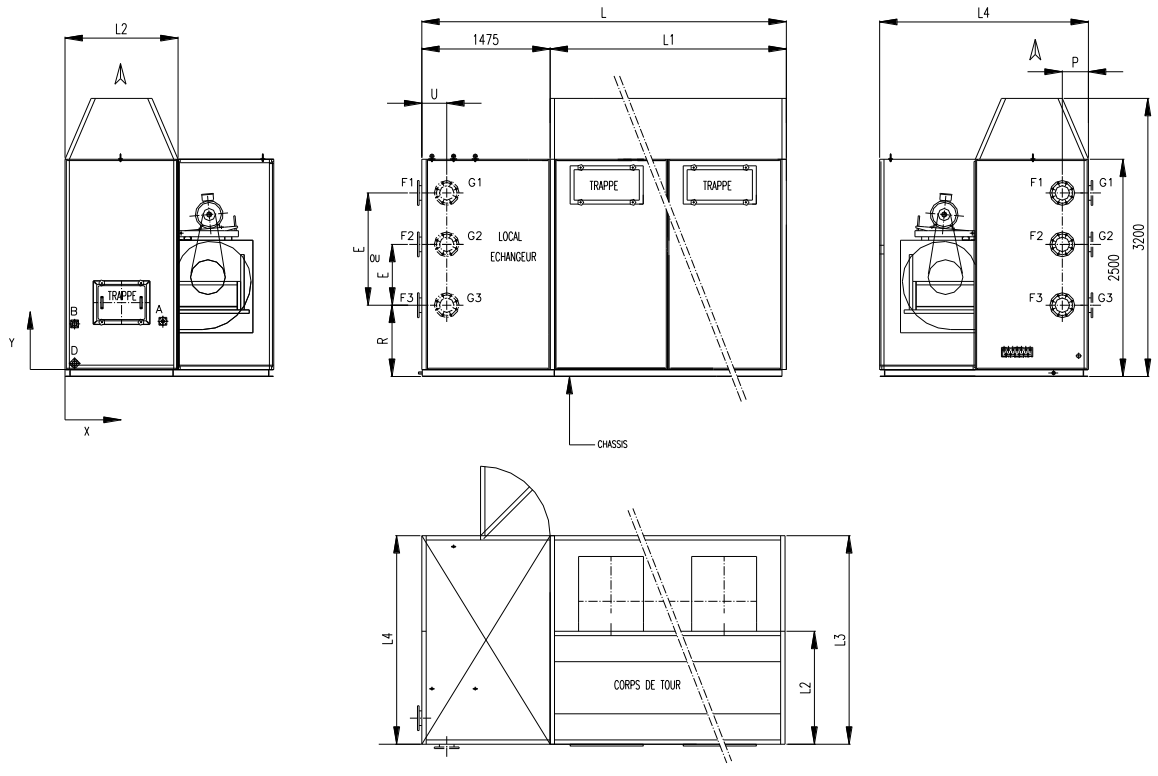
(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 4 directions at 1.5m high.
Note: for higher power, towers can be added side by side. (see KSF series)

Drawings and dimensions CRF with IB sound attenuation

CRF small exchanger room PH – IB sound attenuation



CRF large exchanger room GH –IB sound attenuation



CRF series			CRF	GCRF	CRF	GCRF	CRF	GCRF	CRF	GCRF	CRF	GCRF
Dimensions in mm			1 HZ		2 HZ		3 HZ		4 HZ		5 HZ	
L = L1 + 1475			2875		4175		5475		6775		8075	
L 1			1400		2700		4000		5300		6600	
L 2			1300	1600	1300	1600	1300	1600	1300	1600	1300	1600
L 3 (without flanges)			2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
L 4			1750						2400			
A	Solenoid valve and filters	Ø	3/4		1’		1’	1’1/4	1’1/4		1’1/4	
		DN	20		25		25	32	32			
	Floating valve (male)	Ø	3/4		1’	1’ 1/4	1’ 1/4		1’1/4		1’1/4	
		DN	20		25	32	32					
	Make up water	X	1125	1425	1125	1425	1125	1425	1125	1425	1125	1425
		Y	555									
B	overflow (female)	DN	50									
		X	110									
		Y	450									
C	Antifreeze resistance		Inside room									
D	Drain (female)	DN	50									
		X	110									
		Y	70									
E			719 ou 1365						890 ou 1292			
F	Water inlet	DN	100						150			
G	Water outlet	DN	100						150			
H	Thermostat (option): inside exch. room											
J	Safety lack of water (option):											
K	Low level (option): inside exch. room											
L	High level (option) : inside exch. room											
M			622,5						744,5			
Q			227						256			
R			778						806			

Technical characteristics CRF with ICV sound attenuation

Type	CLOSED TOWER WITH COMPLETE ICV SOUND ATTENUATION										
	Heat power ref. (1) [kW]	Fans qty type NDKL 560	Outlet air Average flow rate [m³/h]	Heat power [kW]	MFU power [kW]	Empty weight Small exch. room PH [kg]	Empty weight Large exch. room GH [kg]	Full weight Small exch. room PH [kg]	Full weight Large exch. room GH [kg]	Overall dimensions Small exch. room PH [mm]	Overall dimensions Large exch. room GH [mm]
CRF 1 HZ ..... ICV (15 to 47 m3/h)											
30	150	1	15 200	3	3	H = 4000	32	3249		4132	
40	175		17 500		4	L = 2875	34				
55	210		19 000		5,5	l = 2686	36				
CRF 2 HZ ..... ICV (130 to 94 m3/h)											
55	240	2	31 900	3	5,5	H = 4000	35	4145		5783	
90	285		35 500		9	L = 4175	37				
110	336		38 300		11	l = 2686	39				
CRF 3 HZ ..... ICV (45 to 140 m3/h)											
75	445	3	48 000	3	7,5	H = 4000	37	5084	5697	7477	8195
150	535		49 900		15	L = 5475	39				
185	615		53 900		18,5	l = 2686	41				
CRF 4 HZ ..... ICV (60 to 190 m3/h)											
55 D	595	4	63 800	6	2 x 5,5	H = 4000	38		6585		9838
90 D	710		70 900		2 x 9	L = 6775	40				
110 D	830		76 500		2 x 11	l = 2686	42				
CRF 5 HZ ..... ICV (75 to 235 m3/h)4											
75/55	745	5	79 800	6	7,5 + 5,5	H = 4000	39		7474		11 482
90/150	890		85 400		9 + 15	L = 8075	41				
110/185	1040		90 200		11 + 18,5	l = 2686	43				

(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 4 directions at 1.5m high.
Note: for higher power, towers can be added side by side. (see KSF series)

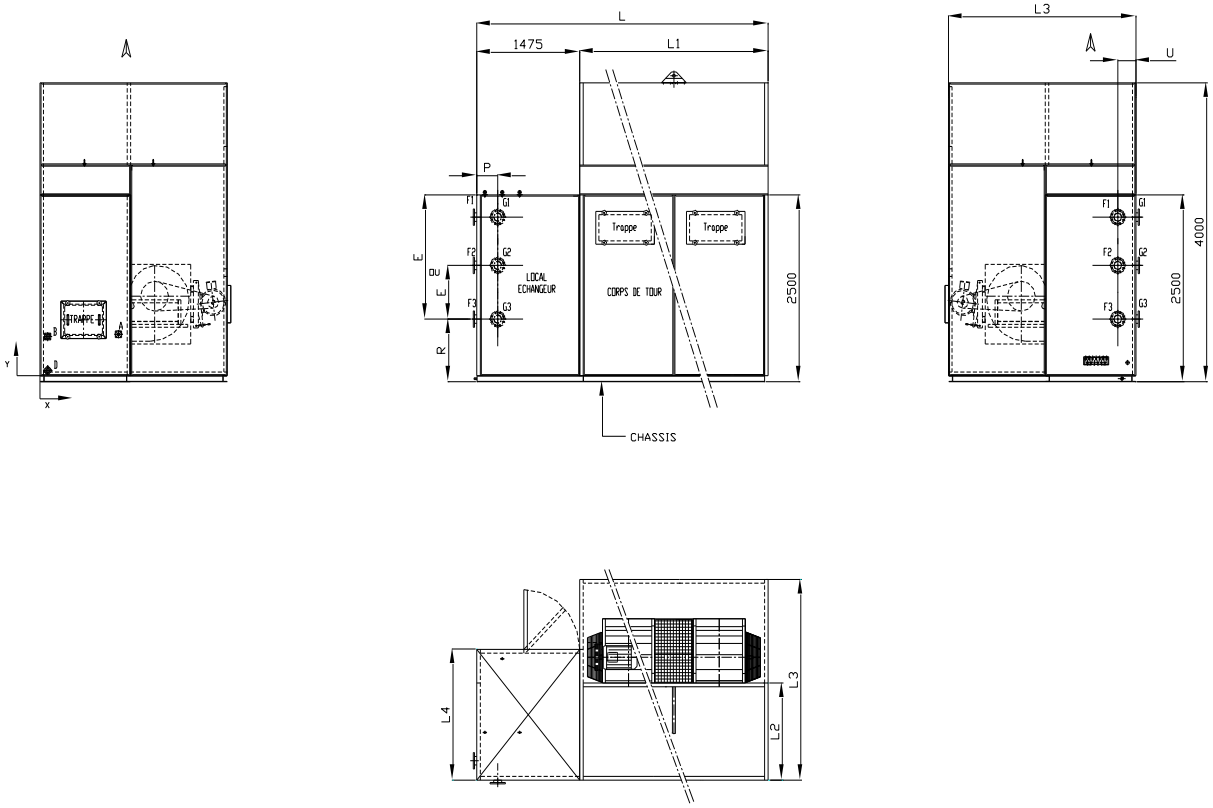
Technical characteristics CRF with ICVK and NR 30 sound attenuation

							COMPLETE SOUNDPROOFED ICVK					SOUNDPROOFED NR 30				
							TOWER CASING DOUBLING INCLUDED					SPECIAL- Sp SOUNDPROOFED				
Type	Heat power ref. (1) [kW]	Fans qty type NDKL 560	Outlet air Average flow rate [m³/h]	Heat power [kW]	MFU power [kW]	Overall dimensions [mm]	Sound level (2) at 20 m [dBA]	Empty weight Small exch. room PH [kg]	Empty weight Large exch. room GH [kg]	Full weight Small exch. room PH [kg]	Full weight Large exch. room GH [kg]	Sound level (2) at 20 m [dBA]	Empty weight Small exch. room PH [kg]	Empty weight Large exch. room GH [kg]	Full weight Small exch. room PH [kg]	Full weight Large exch. room GH [kg]
CRF 1 HZ (15 to 47 m3/h)							**ICVK**					**NR 30**				
30	150	1	15 200	3	3	H = 4000	NR 30	3653		4536		NR 30	3874		4757	
40	175		17 500		4	L = 2875	NR 30					NR 30				
55	210		19 000		5,5	I = 2686	31					NR 30				
CRF 2 HZ (30 to 94 m3/h)							**ICVK**					**NR 30**				
55	240	2	31 900	3	5,5	H = 4000	30	4672		6310		NR 30	4997		6635	
90	285		35 500		9	L = 4175	32					NR 30				
110	336		38 300		11	I = 2686	34					NR 30				
CRF 3 HZ (45 to 140 m3/h)							**ICVK**					**- Sp**				
75	445	3	48 000	3	7,5	H = 4000	32	5734	6238	8127	8736	NR 30	6164	6462	8557	8960
150	535		49 900		15	L = 5475	34					NR 30				
185	615		53 900		18.5	I = 2686	36					40				
CRF 4 HZ (60 to 190 m3/h)							**ICVK**					**- Sp**				
55 D	595	4	63 800	6	2 x 5,5	H = 4000	33		7212		10465	37		7471		10724
90 D	710		70 900		2 x 9	L = 6775	35					39				
110 D	830		76 500		2 x 11	I = 2686	37					41				
CRF 5 HZ (75 to 235 m3/h)							**ICVK**					**- Sp**				
75/55	745	5	79 800	6	7,5 + 5,5	H = 4000	34		8186		12194	38		8480		12488
90/150	890		85 400		9 + 15	L = 8075	36					40				
110/185	1040		92 200		11 +18.5	I = 2686	38					42				

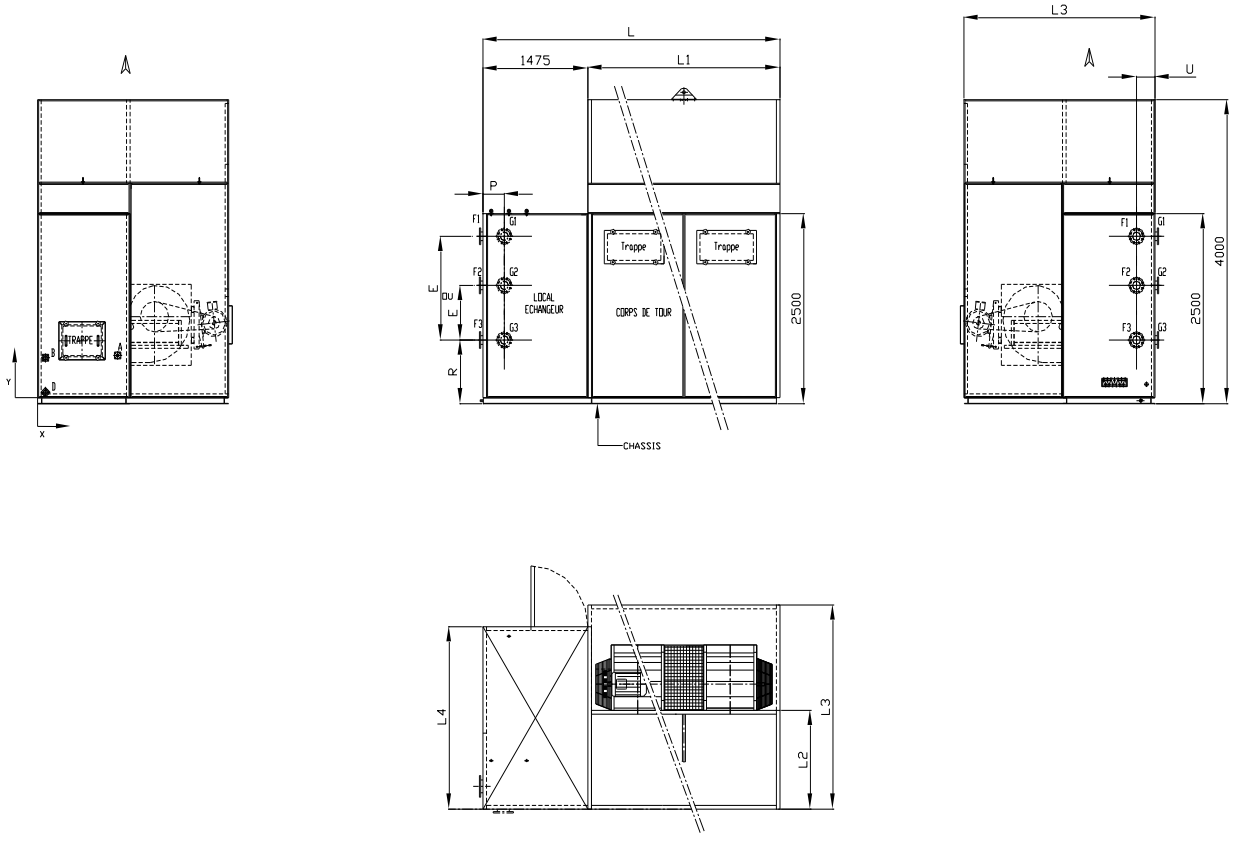
(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 4 directions at 1.5m high.
Note: for higher power, towers can be added side by side. (see KSF series)

Drawings and dimensions CRF ICV-ICVK-NR30 sound attenuation

CRF small exchanger room PH–ICV-K and NR30 sound attenuation



CRF large exchanger room GH –ICV-K and NR30 sound attenuation



Dimensions in mm	CRF series	CRF 1 HZ	CRF 2 HZ	CRF 3 HZ	CRF 4 HZ	CRF 5 HZ
L		2875	4175	5475	6775	8075
L 1		1400	2700	4000	5300	6600
L 2		1300				
L 3 (without flanges)		2686				
L 4		1750			2400	
A	Solenoid valve and filters Ø	3/4'	1'		1'1/4	
	Solenoid valve and filters DN	20	25		32	
	Floating valve (male) Ø	3/4'	1'		1' 1/4	
	Floating valve (male) DN	20	25		32	
	Make up water X	1125			1425	
	Make up water Y	555				
B	overflow (female) DN	50				
	overflow (female) X	110				
	overflow (female) Y	450				
C	Antifreeze resistance	Inside room				
D	Drain (female) DN	50				
	Drain (female) X	110				
	Drain (female) Y	70				
E		719 ou 1365			890 ou 1292	
F	Water inlet DN	100			150	
G	Water outlet DN	100			150	
H	Thermostat (option): inside exch. room					
J	Safety lack of water (option):					
K	Low level (option): inside exch. room					
L	High level (option) : inside exch. room					
M		622,5			744,5	
Q		227			256	
R		778			806	

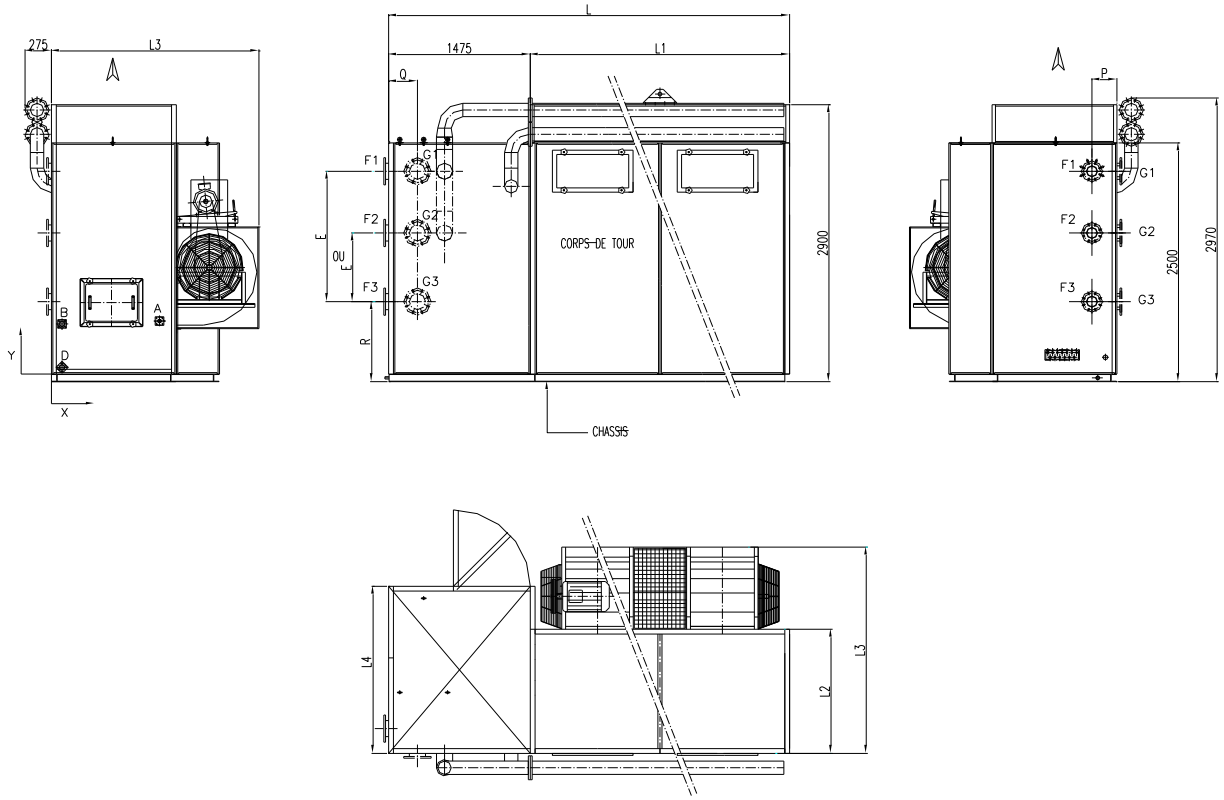
Technical characteristics CRIM

Type	CLOSED HYBRID TOWER WITHOUT SOUND ATTENUATION											
	Heat power ref. (1) [kW]	Fans qty type NDKL 560	Outlet air Average flow rate [m³/h]	Heat power [kW]	MFU power [kW]	Sound level (2) at 20 m [dBA]	Empty weight Small exch. room PH [kg]	Empty weight Large exch. room GH [kg]	Full weight Small exch. room PH [kg]	Full weight Large exch. room GH [kg]	Overall dimensions Small exch. room PH [mm]	Overall dimensions Large exch. room GH [mm]
CRIM 1 HZ (15 to 47 m3/h)												
22	150	1	14 600	3	2,2	42	2350		3303		H = 2900	
30	175		16 400		3	44					L = 2875	
55	210		19 000		5,5	46					l = 2160	
GCRIM 1 HZ (20 to 59 m3/h)												
55	220	1	23 600	3	5,5	47	2481		3632		H = 2900	
											L = 2875	
75	250		25 000		7,5	49					l = 2460	
CRIM 2 HZ (30 to 94 m3/h)												
40	240	2	29 600	3	4	45	2987		4745		H = 2900	
75	285		33 200		7,5	47					L = 4175	
90	335		38 300		9	49					l = 2160	
GCRIM 2 HZ (40 to 117 m3/h)												
110	435	2	47 200	3	11	50	3192		5358		H = 2900	
											L = 4175	
150	505		50 000		15	52					l = 2460	
CRIM 3 HZ (45 to 140 m3/h)												
75	445	3	44 500	3	7,5	47	3722	4382	6295	7061	H = 2900	H = 2900
110	536		49 900		11	49					L = 5475	L = 5475
150	645		53 900		15	51					l = 2160	l = 2400
GCRIM 3 HZ (58 to 175 m3/h)												
150	700	3	70 800	6	15	52	3972	4618	7157	7908	H = 2900	H = 2900
											L = 5475	L = 5475
150/75	770		75 000		15 + 7,5	54					l = 2460	l = 2460
CRIM 4 HZ (60 to 190 m3/h)												
40 D	600	4	59 200	6	2 x 4	48		4953		8446		H = 2900
75 D	710		66 300		2 x 7,5	50						L = 6775
90 D	830		76 600		2 x 9	52						l = 2400
GCRIM 4 HZ (78 to 235 m3/h)												
110 D	945	4	94 400	6	2 x 11	53		5331		9639		H = 2900
												L = 6775
150 D	1015		100 000		2 x 15	55						l = 2460
CRIM 5 HZ (75 to 235 m3/h)												
75/40	745	5	74 000	6	7,5 + 4	49		5605		9913		H = 2900
110/75	890		83 000		11 + 7,5	51						L = 8075
150/90	1040		92 200		15 + 9	53						l = 2400
GCRIM 5 HZ (100 to 295 m3/h)												
150/110	1155	5	118 000	6	15 + 11	54		6079		11401		H = 2900
												L = 8075
150/220	1290		125 000		15 + 22	56						l = 2460

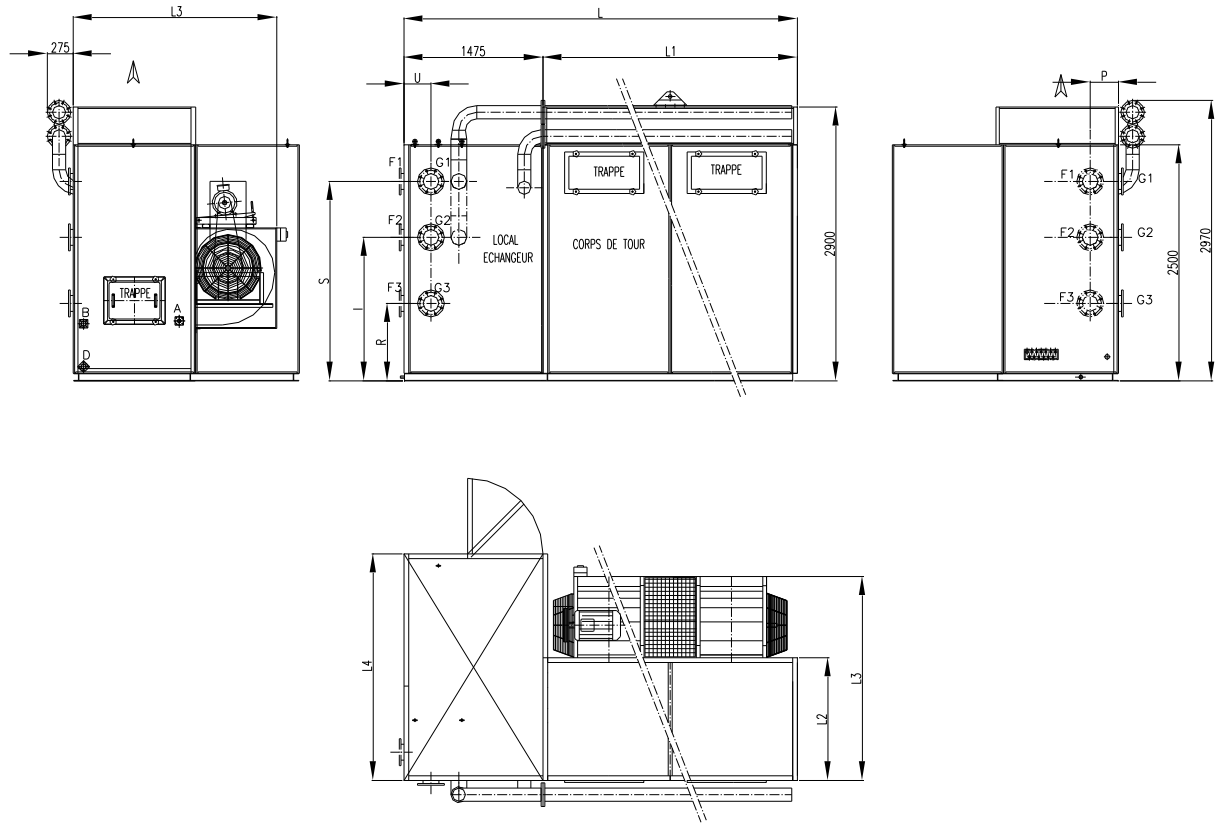
(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 5 directions.
Note: for higher power, towers can be added side by side. (see KSFIM series)

Drawings and dimensions CRIM

CRIM small exchanger room PH – without sound attenuation



CRIM large exchanger room GH – without sound attenuation



CRIM series

Dimensions in mm

			CRIM	GCRIM	CRIM	GCRIM	CRIM	GCRIM	CRIM	GCRIM	CRIM	GCRIM
			1 HZ		2 HZ		3 HZ		4 HZ		5 HZ	
L = L1 + 1475			2875		4175		5475		6775		8075	
L 1			1400		2700		4000		5300		6600	
L 2			1300	1600	1300	1600	1300	1600	1300	1600	1300	1600
L 3 (hors brides)			2160	2460	2160	2460	PH 2160 / GH 2400	2460	2400	2460	2400	2460
L 4			1750						2400			
A	Solenoid valve and filters	Ø	3/4		1’		1’	1’1/4	1’1/4		1’1/4	
		DN	20		25		25	32	32			
	Floating valve (male)	Ø	3/4		1’	1’ 1/4	1’ 1/4		1’1/4		1’1/4	
		DN	20		25	32	32					
	Make up water	X	1125	1425	1125	1425	1125	1425	1125	1425	1125	1425
		Y	555									
B	overflow (female)	DN	50									
		X	110									
		Y	450									
C	Antifreeze resistance		Inside room									
D	Drain (female)	DN	50									
		X	110									
		Y	70									
E			719 or 1365						890 or 1292			
F	Water inlet	DN	100						150			
G	Water outlet	DN	100						150			
H	Thermostat (option): inside exch. room											
J	Safety lack of water (option):											
K	Low level (option): inside exch. room											
L	High level (option) : inside exch. room											
M			622,5						744,5			
Q			227						256			
R			778						806			

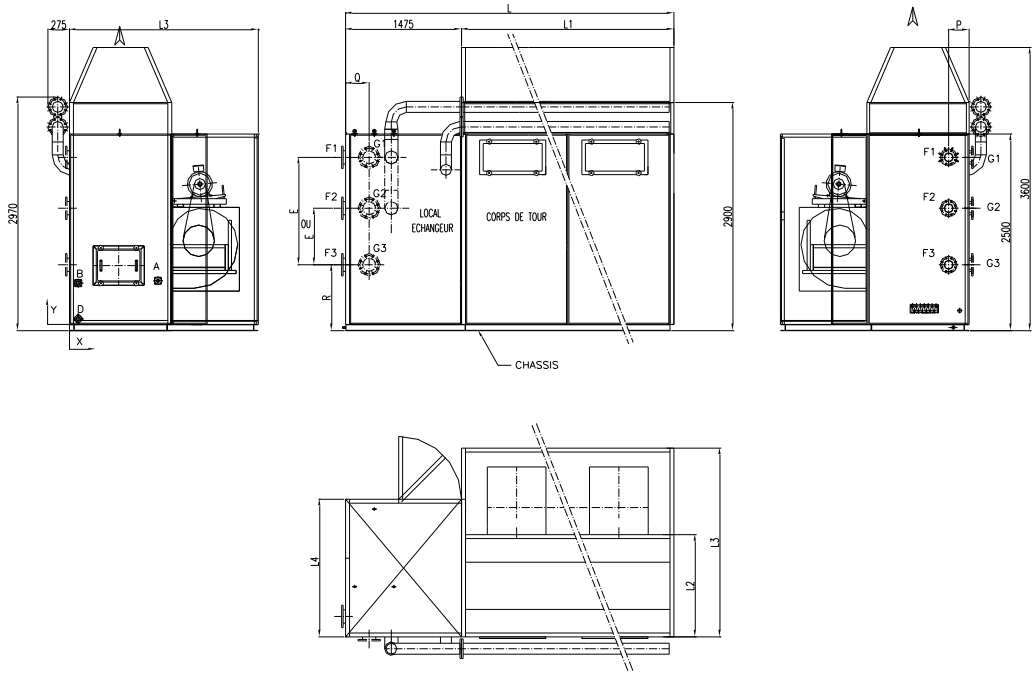
Technical characteristics CRIM with IB sound attenuation

Type	CLOSED TOWER WITH IB SOUND ATTENUATION											
	Heat power ref. (1) [kW]	Fans qty type NDKL 560	Outlet air Average flow rate [m^3/h]	Heat power [kW]	MFU power [kW]	Sound level (2) at 20 m [dBA]	Empty weight Small exch. room PH [kg]	Empty weight Large exch. room GH [kg]	Full weight Small exch. room PH [kg]	Full weight Large exch. room GH [kg]	Overall dimensions Small exch. room PH [mm]	Overall dimensions Large exch. room GH [mm]
CRIM 1 HZ ..... IB (15 to 47 m3/h)												
22	150	1	14 600	3	2,2	39	2647		3600		H = 3600	
30	175		16 400		3	40					L = 2875	
55	210		19 000		5,5	42					l = 2400	
GCRIM 1 HZ ..... IB (20 to 59 m3/h)												
55	220	1	23 600	3	5,5	42	2784		3935		H = 3600	
											L = 2875	
75	250		25 000		7,5	44					l = 2700	
CRIM 2 HZ ..... IB (30 to 94 m3/h)												
40	240	2	29 600	3	4	40	3444		5202		H = 3600	
75	285		33 200		7,5	42					L = 4175	
90	335		38 300		9	44					l = 2400	
GCRIM 2 HZ ..... IB (40 to 117 m3/h)												
110	435	2	47 200	3	11	44	3656		5822		H = 3600	
											L = 4175	
150	505		50 000		15	46					l = 2700	
CRIM 3 HZ ..... IB (45 to 140 m3/h)												
75	445	3	44 500	3	7,5	42	4356	5021	6929	7699	H = 3600	H = 3600
110	536		49 900		11	44					L = 5475	L = 5475
150	645		53 900		15	46					l = 2400	l = 2400
GCRIM 3 HZ ..... IB (58 to 175 m3/h)												
150	700	3	70 800	6	15	46	4613	5249	7798	8539	H = 3600	H = 3600
											L = 5475	L = 5475
150/75	770		75 000		15 + 7,5	48					l = 2700	l = 2700
CRIM 4 HZ ..... IB (60 to 190 m3/h)												
40 D	600	4	59 200	6	2 x 4	43		5754		9247		H = 3600
75 D	710		66 300		2 x 7,5	45						L = 6775
90 D	830		76 600		2 x 9	47						l = 2400
GCRIM 4 HZ ..... IB (78 to 235 m3/h)												
110 D	945	4	94 400	6	2 x 11	47		6124		10432		H = 3600
												L = 6775
150 D	1015		100 000		2 x 15	49						l = 2700
CRIM 5 HZ ..... IB (75 to 235 m3/h)												
75/40	745	5	74 000	6	7,5 + 4	44		6584		10892		H = 3600
110/75	890		83 000		11 + 7,5	46						L = 8075
150/90	1040		92 200		15 + 9	48						l = 2400
GCRIM 5 HZ ..... IB (100 to 295 m3/h)												
150/110	1155	5	118 000	6	15 + 11	48		7046		12368		H = 3600
												L = 8075
150/220	1290		125 000		15 + 22	50						l = 2700

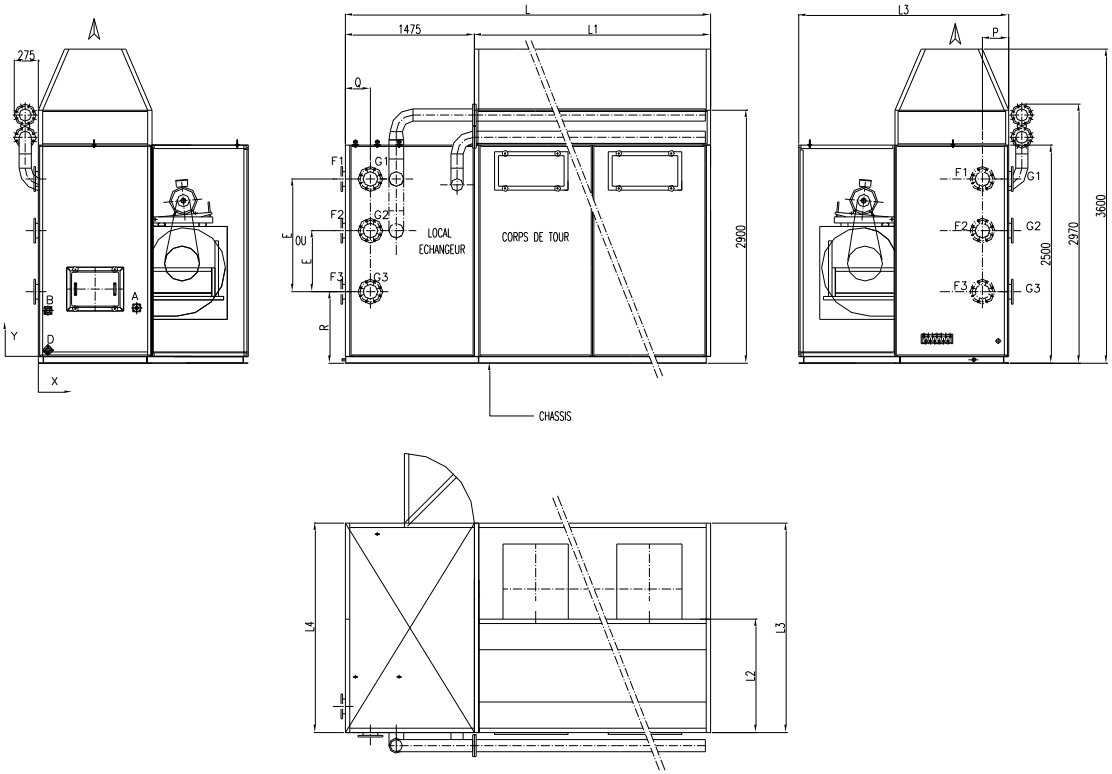
(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 5 directions.
Note: for higher power, towers can be added side by side. (see KSFIM series)

Drawings and dimensions CRIM with IB sound attenuation

CRIM small exchanger room PH – with IB sound attenuation



CRIM small exchanger room GH – with IB sound attenuation



CRIM series			CRIM	GCRIM	CRIM	GCRIM	CRIM	GCRIM	CRIM	GCRIM	CRIM	GCRIM
Dimensions in mm			1 HZ		2 HZ		3 HZ		4 HZ		5 HZ	
L = L1 + 1475			2875		4175		5475		6775		8075	
L 1			1400		2700		4000		5300		6600	
L 2			1300	1600	1300	1600	1300	1600	1300	1600	1300	1600
L 3 (without flanges)			2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
L 4			1750						2400			
A	Solenoid valve and filters	Ø	3/4		1’		1’	1’1/4	1’1/4		1’1/4	
		DN	20		25		25	32	32			
	Floating valve (male)	Ø	3/4		1’	1’ 1/4	1’ 1/4		1’1/4		1’1/4	
		DN	20		25	32	32					
	Make up water	X	1125	1425	1125	1425	1125	1425	1125	1425	1125	1425
		Y	555									
B	overflow (female)	DN	50									
		X	110									
		Y	450									
C	Antifreeze resistance		Inside room									
D	Drain (female)	DN	50									
		X	110									
		Y	70									
E			719 or 1365						890 or 1292			
F	Water inlet	DN	100						150			
G	Water outlet	DN	100						150			
H	Thermostat (option): inside exch. room											
J	Safety lack of water (option):											
K	Low level (option): inside exch. room											
L	High level (option) : inside exch. room											
M			622,5						744,5			
Q			227						256			
R			778						806			

Technical characteristics CRIM with ICV sound attenuation

Type	CLOSED TOWER WITH COMPLETE ICV SOUND ATTENUATION										
	Puissance de ref. (1) [kW]	Nombre de ventilateurs de type NDKL 560	Débit d'air moyen en sortie de tour [m³/h]	Puissance de RAG [kW]	Puissance moteur ventilateur [kW]	Dimension hors tout [mm]	Niveau sonore à 20m (2) [dBA]	Poids à vide Petit local PH [kg]	Poids à vide Grand local GH [kg]	Poids en eau Petit local PH [kg]	Poids en eau Grand local GH [kg]
CRIM 1 HZ ..... ICV (15 to 47 m3/h)											
30	150	1	15 200	3	3	H = 4000	32	3449		4402	
40	175		17 500		4	L = 2875	34				
55	210		19 000		5,5	l = 2686	36				
CRIM 2 HZ ..... ICV (130 to 94 m3/h)											
55	240	2	31 900	3	5,5	H = 4000	35	4535		6293	
90	285		35 500		9	L = 4175	37				
110	336		38 300		11	l = 2686	39				
CRIM 3 HZ ..... ICV (45 to 140 m3/h)											
75	445	3	48 000	3	7,5	H = 4000	37	5654	6267	8227	8945
150	535		49 900		15	L = 5475	39				
185	615		53 900		18.5	l = 2686	41				
CRIM 4 HZ ..... ICV (60 to 190 m3/h)											
55 D	595	4	63 800	6	2 x 5,5	H = 4000	38		7345		10838
90 D	710		70 900		2 x 9	L = 6775	40				
110 D	830		76 500		2 x 11	l = 2686	42				
CRIM 5 HZ ..... ICV (75 to 235 m3/h)4											
75/55	745	5	79 800	6	7,5 + 5,5	H = 4000	39		8419		12727
90/150	890		85 400		9 + 15	L = 8075	41				
110/185	1040		92 200		11 +18.5	l = 2686	43				

(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 5 directions.
Note: for higher power, towers can be added side by side. (see KSFIM series)

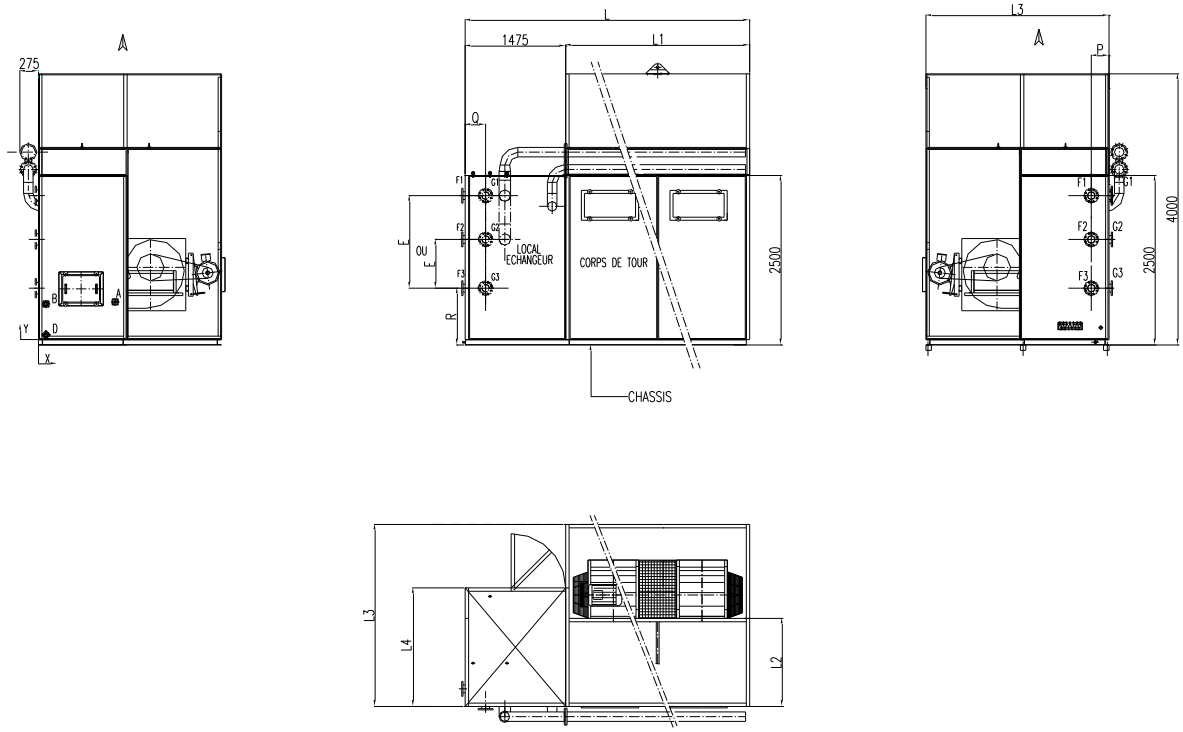
Technical characteristics CRIM with ICVK and NR 30 sound attenuation

							INSONORISATION COMPLETE ICVK					INSONORISATION NR 30				
							DOUBLAGE CORPS DE TOUR INCLUS					INSONORISATION SPECIALE-Sp				
Type	Puissance de ref. (1) [kW]	Nombre de ventilateurs de type NDKL 560	Débit d'air moyen en sortie de tour [m3/h]	Puissance de RAG [kW]	Puissance moteur ventilateur [kW]	Dimension hors tout [mm]	Niveau sonore à 20m (2) [dBA]	Poids à vide Petit local PH [kg]	Poids à vide Grand local GH [kg]	Poids en eau Petit local PH [kg]	Poids en eau Grand local GH [kg]	Niveau sonore à 20m (2) [dBA]	Poids à vide Petit local PH [kg]	Poids à vide Grand local GH [kg]	Poids en eau Petit local PH [kg]	Poids en eau Grand local GH [kg]
CRF 1 HZ (15 to 47 m3/h)							**ICVK**					**NR 30**				
30	150	1	15 200	3	3	H = 4000	NR 30	3853		4806		NR 30	4074		5027	
40	175		17 500		4	L = 2875	NR 30					NR 30				
55	210		19 000		5,5	l = 2686	31					NR 30				
CRF 2 HZ (30 to 94 m3/h)							**ICVK**					**NR 30**				
55	240	2	31 900	3	5,5	H = 4000	30	5062		6820		NR 30	5387		7145	
90	285		35 500		9	L = 4175	32					NR 30				
110	336		38 300		11	l = 2686	34					NR 30				
CRF 3 HZ (45 to 140 m3/h)							**ICVK**					**- Sp**				
75	445	3	48 000	3	7,5	H = 4000	32	6304	6808	8877	9486	NR 30	6734	7032	9307	9710
150	535		49 900		15	L = 5475	34					NR 30				
185	615		53 900		18.5	l = 2686	36					40				
CRF 4 HZ (60 to 190 m3/h)							**ICVK**					**- Sp**				
55 D	595	4	63 800	6	2 x 5,5	H = 4000	33		7972		11465	37		8231		11724
90 D	710		70 900		2 x 9	L = 6775	35					39				
110 D	830		76 500		2 x 11	l = 2686	37					41				
CRF 5 HZ (75 to 235 m3/h)							**ICVK**					**- Sp**				
75/55	745	5	79 800	6	7,5 + 5,5	H = 4000	34		9131		13439	38		9425		13733
90/150	890		85 400		9 + 15	L = 8075	36					40				
110/185	1040		92 200		11 +18.5	l = 2686	38					42				

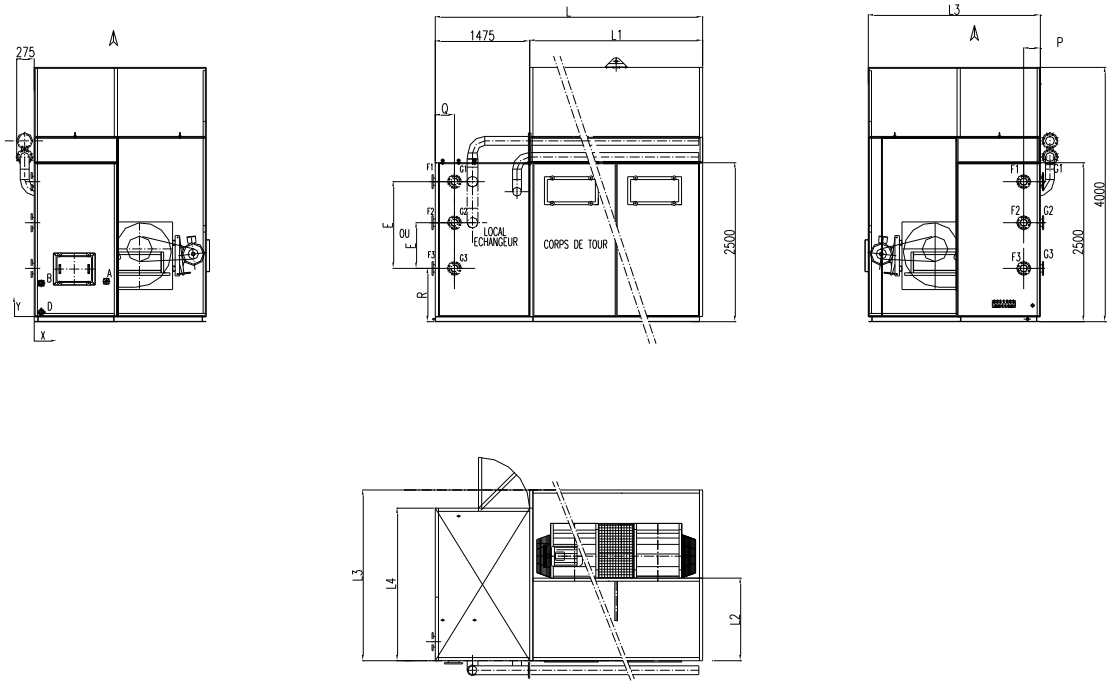
(1): Reference power is based on thermal data 32 / 27 / 21°C.
(2): sound level: average pressure level (Lp) in free field in 5 directions.
Note: for higher power, towers can be added side by side. (see KSFIM series)

Drawings and dimensions CRIM with ICV – ICVK - NR30 sound attenuation

CRIM small room PH –ICV-K or NR30 sound attenuation



CRIM large rool GH – ICV-K or NR30 sound attenuation



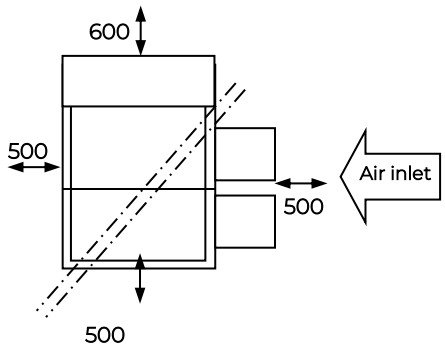
Dimensions in mm	CRIM series		CRIM 1 HZ	CRIM 2 HZ	CRIM 3 HZ	CRIM 4 HZ	CRIM 5 HZ
L			2875	4175	5475	6775	8075
L 1			1400	2700	4000	5300	6600
L 2			1300				
L 3 (hors brides)			2686				
L 4			1750			2400	
A	Solenoid valve and filters	Ø	3/4'	1'		1'1/4	
		DN	20	25		32	
	Floating valve (male)	Ø	3/4'	1'	1' 1/4		
		DN	20	25	32		
	Make up water	X	1125			1425	
		Y	555				
B	overflow (female)	DN	50				
		X	110				
		Y	450				
C	Antifreeze resistance		Inside room				
D	Drain (female)	DN	50				
		X	110				
		Y	70				
E			719 or 1365			890 or 1292	
F	Water inlet	DN	100			150	
G	Water outlet	DN	100			150	
H	Thermostat (option): inside exch. room						
J	Safety lack of water (option):						
K	Low level (option): inside exch. room						
L	High level (option) : inside exch. room						
M			622,5			744,5	
Q			227			256	
R			778			806	

Choice of location CRF-CRIM

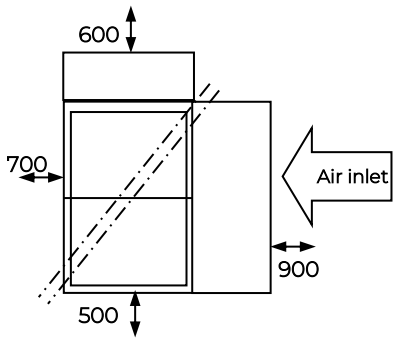
The cooling tower should not be located beside walls on the 4 sides, equal of higher than the tower itself. In addition, the walls should have openings.
The outlet air, hot and saturated with water can be recycled to the air inlet, and therefore the performance of the cooling tower would be decreased.
In any case, please consider minimum distance between the tower and the walls on the 4 sides in order to secure the designed air flow to the fan, and to ease installation and maintenance.
Would these rules not be considered; the cooling tower performance would be affected.

Minimum distance in mm for standard cooling towers: top views

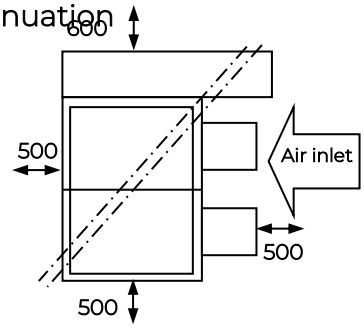
Tower without sound attenuation and small room attenuation & small room



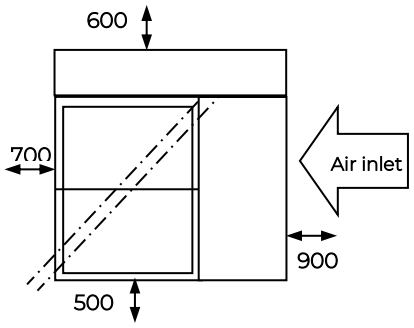
Tower with IB or ICVK sound



Tower without sound attenuation and large room attenuation



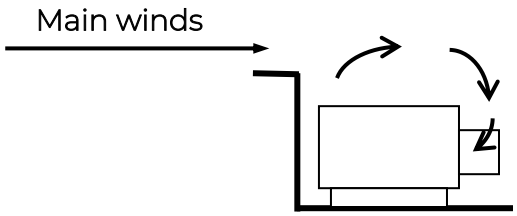
Tower with IB or ICVK sound



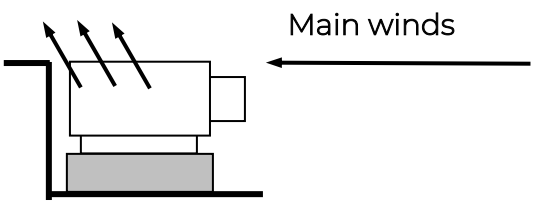
Do not hesitate to contact us for advice

Examples of implantation :

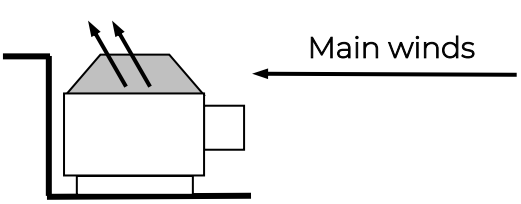
NO



YES



Install a support to up the air outlet



Intall an exhaust cone to up the air outlet

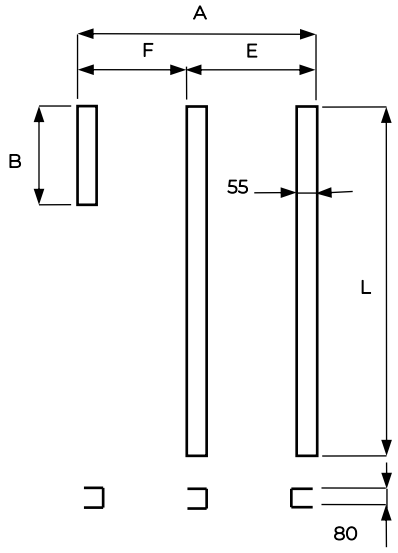
Support CRF-CRIM

Our closed loop cooling towers are delivered on a steel frame. Make sure the ground where the towers will be installed can stand the weight of the unit, and that the supports are properly aligned. Vibration plots can be provided as an option.

Arrangement of cooling tower support (steel or concrete beams)

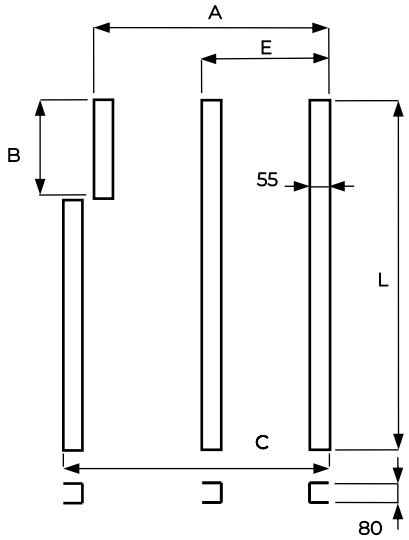
CRF series without sound attenuation

	Number of supports	Length L [mm]	Width A [mm]	Space between supports under basin E [mm]	B [mm]	F [mm]
CRF 1HZ	3	2870	1750	1300	1470	450
GCRF 1HZ				1600		150
CRF 2HZ		4170		1300		450
GCRF 2HZ				1600		150
CRF 3HZ		5470		1300		450
GCRF 3HZ				1600		150
CRF 4HZ		6770	2400	1300		1100
GCRF 4HZ				1600		800
CRF 5HZ		8070		1300		1100
GCRF 5HZ				1600		800



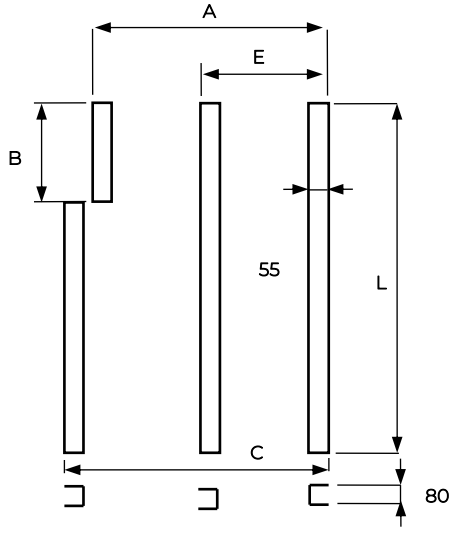
CRF Serie with IB sound attenuation

	Number of supports	Length L [mm]	Width A [mm]	Space between supports under basin E [mm]	B [mm]	F [mm]
CRF 1HZ	4	2870	1750	1300	1470	2400
GCRF 1HZ				1600		2700
CRF 2HZ		4170		1300		2400
GCRF 2HZ				1600		2700
CRF 3HZ		547		1300		2400
GCRF 3HZ				1600		2700
CRF 4HZ		6770	2400	1300		2400
GCRF 4HZ				1600		2700
CRF 5HZ		8070		1300		2400
GCRF 5HZ				1600		2700



CRF Series with ICV – ICVK and NR 30sound attenuation

	Number of supports	Length L [mm]	Width A [mm]	Space between supports under basin E [mm]	B [mm]	F [mm]
CRF 1HZ	4	2870	1750	1300	1470	2700
CRF 2HZ		4170				
CRF 3HZ		5470				
CRF 4HZ		6670	2400			
CRF 5HZ		8070				



WATER EVAPORATION

The water consumption by evaporation is approximately 1.7 kg/h for 1000 kcal/h evacuated.

DECONCENTRATION

Because of the evaporation and of the recycling of water, the salts and solids concentrate in the remaining water. To avoid the concentration, it is necessary to drain.
Without draining, the concentration rate could reach 10, 100 or even 1000 after time.
For the pre-sizing of installations, consider twice the value of the evaporation : rate = 2. This rate can be improved with the proper water treatment and with the use of stainless steel tower very resistant to aggressive chemical cleaning. Then the rate could be 3 to 5, so drain and so water savings.

According to the situation, 3 solutions can be chosen:

1- Continuous drain:
Connection piece at the pump outlet, just before the cooling tower, preferably at the same level as the water distribution system, so that the drain in made only when the pump is in operation.
The pump flow rate can be calculated with the following formula: [100 S / (M - S)] % of the flow rate with:
S : salt content in the make up water.
M : maximum admissible salt content in the re-circulating water.

Example :
S = salt content in the make up water : TH 20°
M = maximum allowed salt content : TH 40 °.
100X 20/ (40-20) = 100 % of the make up flow rate.
So the continuous drain should be equal to the evaporated water flow rate (rate = 2). Therefore, the actual water make up is twice the evaporation flow rate.

2- Uncontinuous drain:
According to the water make up, the installation is drained through electro valve, set by the impulsion meter.

3- Automatic deconcentration by induction (JACIR made)
Maintenance free. An electro valve is monitored by conductivity meter. The valve opens until the water reaches the right concentration rate.

WATER TREATMENT

In order to secure the right operation of a closed cooling circuit, the good water quality is essential.
If the solid content is high, it is recommended to foresee a filtration for 5 to 10 % of the recirculated water flow.
If the salt content, or aggressive chemical content are high, there must be a water treatment of the make up water, to reach soft and neutral water for safe cooling.
In some cases algae, fungus, shells can grow. Please procure regularly chemicals to prevent the growth of these bodies.

The water treatment should be carried out by a specialist.
LEGIONELLA PREVENTION (see separate document).

Technical prescription CRF

Evaporative cooling tower, closed loop, high efficiency, modular, with forced centrifugal fans Jacir made CRF type....., designed for a glycol free operation during freezing period.

The system should be with a double exchange: a direct exchange air/ water, counter flow type, and an exchange water/ water, counter flow type.

The cooling tower is designed and delivered by the supplier, totally assembled on frame, exchanger, pump and technical accessories gathered in a same technical area with access door.

Thermal data

The power to be evacuated is .....kW, inlet temperature: ...°C, down to ... °C, with a wet bulb at the air inlet :.....°C.

Acoustic data

The sound pressure level should not be higher than .....dB(A) at .....meters, in all 4 directions in free line. Therefore, the cooling tower should include the following component:

1 –IB attenuation: Sound attenuators at the air inlet and at the air outlet,

2 –ICV / ICVK type or special type:
sound baffles at air inlet and air outlet, and eventually coupled with fan casing insulation with high density rock wool, up to NR30 at 10m.

Casing and inclined basin

Made of self-supporting steel panels, with double fold on the 4 sides. The side panels are designed to be insulated later on, to reduce the sound pressure. They are assembled by high torque waterproof stainless-steel rivets.

The basin is fitted with an access door, a floating valve easy to set, a drain, an overflow and anti-cavitation strainer in stainless steel and PEHD. There are no welds on the parts in contact with the water. A special elastomer joint secures a perfect tightness.

Fans

The low-pressure centrifugal fan (s) with double inlets and front wards blades are located outside the basin, out of the air flow, at man height; so, the access is very easy for the maintenance and the disassembly.

The impeller (s) is (are) baked epoxy painted. The volute is made of X-STEEL stainless steel. As an option, the impeller can be made of stainless steel. Each fan will be coupled to its own motor.
The impeller is coupled on large diameter shaft; two turbines maximum are coupled on a same shaft. In the case of 3 fans for the same motor, the coupling of the third fan to the shaft of the first 2 fans is flexible. Bearings are self-aligned.

Motor(s) and coupling

The motor(s) are closed and ventilated casing type, with a power of .....kW, ...rpm, IP 55 protected, class F. The coupling is secured by several trapezoidal belts, 150 % of the nominal power sized.

Water distribution

The nozzles are made of Polypropylene. They can be removed easily, and include and internal turbulator for an optimised distribution, and can stand very large flow rate fluctuation.

Access for maintenance

If sound attenuators, plume suppression coil, or outlet duct are installed, a large access door (740 X 390mm) is provided, to visit and access easily to drift eliminators, nozzles, water distribution pipes and exchange surface. Another access door is located on the basin: 540 X 390mm.

Tower casing

There is no weld on parts in contact with water. An elastomer joint secures the tightness. The tower is made of:

- 2mm thick galvanised steel panels folded twice on the 4 sides, Zendzimir 275 gr/ m2, plus ZINCALU painting as finish, after the assembly or,
- Stainless steel 304L or 316L folded 4 times the 4 sides, for a longer lasting, a better resistance to aggressive chemical and mechanical cleaning,
- and higher Galvanised steel + EPOXY baked painting on all parts not in contact with the water.

AIR-WATER DIRECT EXCHANGE: USER CIRCUIT

The exchange surface is made of high-density polyethylene welded wire, with a surface of 280 m2/ m3. It can easily be removed and is resistant to temperature up to 75 °C in standard. It is built in vertical channels with low pressure drop. These parts remain flexible, uncracked, and can stand strong high-pressure spray for cleaning. (100 bars); they can be twisted for cleaning.
The exchange surface is located in the self-supporting galvanised structure, with double fold and the 4 sides 20/10thmm thick. The water nozzles in polypropylene include a turbulator for optimized water distribution and can easily be removed, as well as the PP drift eliminators.
The utilities panels include: overflow, drain, water make up.

WATER – WATER EXCHANGE: USER CIRCUIT

A plate heat exchanger made of stainless steel is provided; it is necessarily protected by a self-supporting galvanised structure in standard 15/10th minimum, including a door: 2100mm X 600mm and removable panels. The design is all maintenance oriented.
The pipe connection is made with flanges outside the exchanger room. There are only 2 flanges: 1 for the inlet, 1 for the outlet. They can be located either on the length or on the width side of the cooling tower.

Filters and connections

A stainless-steel strainer and a centrifugal filter with automatic cleaning secure the proper water filtration before the inlet to the plate heat exchanger (if DAi option chosen). The water circulation in the system is secured by monobloc pump. This pump is protected against freezing by a thermostatic valve. All the connection pipes are hot dip galvanised or in option in stainless steel. As option, a low-level switch avoids the start of the pump and protect the water heaters if any.

Pressure manometers are located before and after the pump, and before the water distribution header. They secure a constant control of the system. A deconcentration pipe with setting valve is provided; electro valve optional. Ideally located accesses in the pipe are provided for easy chemical cleaning, with disassembly. As standard, flanges are made of galvanised steel whatever diameter and tower casing material. Overflow is made of PP.

Automatic Inductive Deconcentration (DAI)

Installed as an option (see separate documentation).

Technical prescription CRIM

Evaporative cooling tower, closed loop, high efficiency, modular, with forced centrifugal fans Jacir made, CRIM ....., designed for a glycol free operation during freezing period.

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Thermal data

The power to be evacuated is .....kW, inlet temperature: ...°C, down to ... °C, with a wet bulb at the air inlet :.....°C.

Acoustic data

The sound pressure level should not be higher than .....dB(A) at .....meters, in all 4 directions in free line. Therefore, the cooling tower should include the following component:

1 –IB attenuation: Sound attenuators at the air inlet and at the air outlet, and a discharge cone lined with acoustic foam,

2 –ICV / ICVK type or special type:
sound baffles at air inlet and air outlet, and eventually coupled with fan casing insulation with high density rock wool, up to NR30 at 10m

Plume suppression coil

In standard, the header coil is in carbon steel, primer and epoxy coated. Two air valves secure the freezing matters. The tubes are assembled in a triangular pitch, in copper. The fins are in aluminium epoxy coated.

A monitored valve to adjust the water spray on the infill is associated to the plume coil. This modulating by-pass valve has a nodular cast iron body and a stainless-steel pavilion, elastomer seal.

Casing and inclined basin

Made of self-supporting steel panels, with double fold on the 4 sides. The side panels are designed to be insulated later on, to reduce the sound pressure. They are assembled by high torque waterproof stainless-steel rivets.

The basin is fitted with an access door, a floating valve easy to set, a drain, an overflow and anti-cavitation strainer in stainless steel and PEHD. There are no welds on the parts in contact with the water. A special elastomer joint secures a perfect tightness.

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The exchange surface is located in the self-supporting galvanised structure, with double fold and the 4 sides 20/10thmm thick. The water nozzles in polypropylene include a turbulator for optimized water distribution and can easily be removed, as well as the PP drift eliminators.
The utilities panels include: overflow, drain, water make up.

WATER – WATER EXCHANGE: USER CIRCUIT

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Pressure manometers are located before and after the pump, and before the water distribution header. They secure a constant control of the system. A deconcentration pipe with setting valve is provided; electro valve optional.
Ideally located accesses in the pipe are provided for easy chemical cleaning, with disassembly.

As standard, flanges are made of galvanised steel whatever diameter and tower casing material. Overflow is made of PP.

Automatic Inductive Deconcentration (DAI)

Installed as an option (see separate documentation).