

# S

## Open Circuit Cooling Tower Quiet Centrifugal Fans

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# Open circuit cooling tower S

## 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.

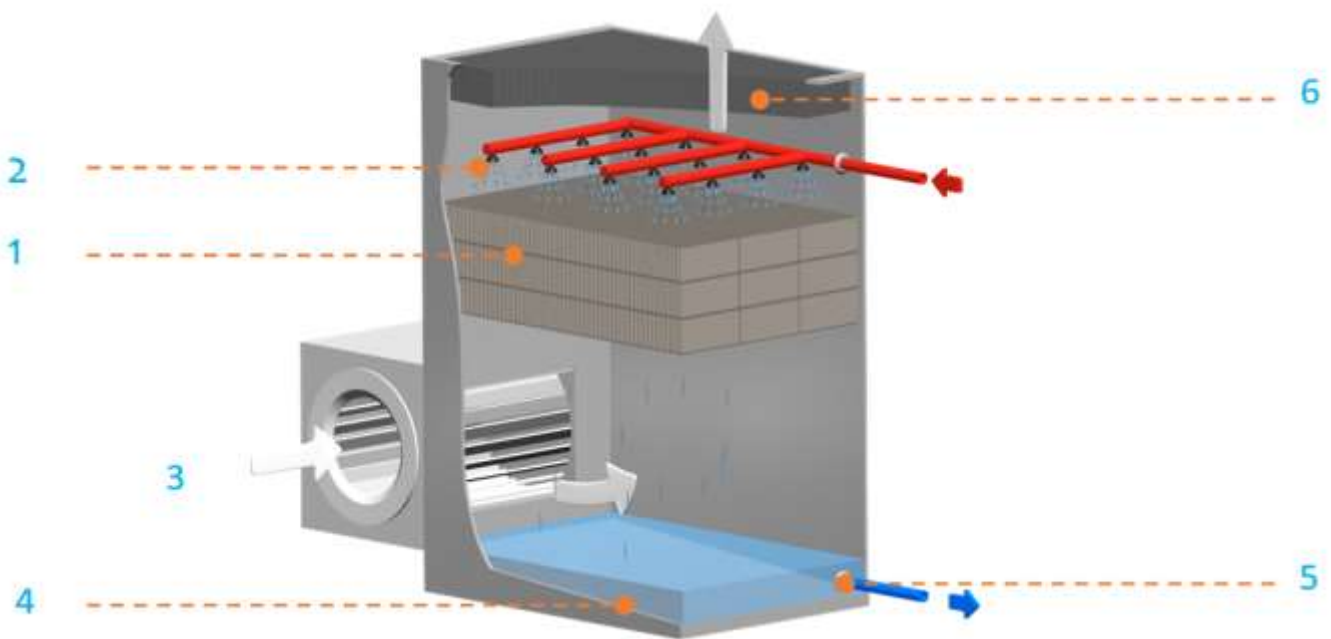
## STRONG BENEFITS OF THE S

- ∞ **SECURITY AND HYGIENE** Compliant with hygienic standards
- ∞ **WATER PROOF** Thanks to our assembling technology, we guaranty no leak equipment.
- ∞ **SILENCE** Very silent cooling towers in standard version, can be adapted according requirements.
- ∞ **EXCHANGE SURFACE** **EFFI-PACK:** Highly efficient and easy to maintain, excellent resistance to temperature (75°C continuous) the infill may support use till 95°C as an option.
- ∞ **ANTICORROSION COATING** Made of galvanized steel as a standard, the casing of the tower is assembled without any welding, also proposed in **X-STEEL** stainless steel (corrosion resistance superior to 316L).
- ∞ **EASY MAINTENANCE** Large access doors, fan outside the tower and at man chest, inclined and plane basin for a complete drain.
- ∞ **ELECTRICAL POWER** Fully optimized
- ∞ **EVOLUTIVE TOWER** Possible to increase the exchanged power by addition of plates, to lower the sound level without increasing the motor power.
- ∞ **MODULAR CONSTRUCTION** Easy handling and transport.

## Open circuit cooling tower principle S

A cooling tower is a heat exchanger, which enables water to be cooled through direct contact with air, the heat transfer from the water to the air is carried out partly by sensible heat transfer, but mainly by latent heat transfer (evaporation of part of the water into the air), which makes it possible to reach cooling temperatures lower than ambient temperatures.

### Operation



The hot water to be cooled is pumped to the top of the tower through pipes. This water is divided and distributed over the heat exchange surface (1) by low pressure water distribution nozzles (2).

Blown by the fan (3), the fresh air enters into the lower section of the unit and escapes through the upper section after being heated and saturated by passing through the wetted heat exchange surface.

As a result of surface tension, due to exchange surface, the water spreads in uniform way, falls down the whole height. The exchange surface is then increased.

The water, cooled thanks to forced ventilation, falls into the inclined basin (4) at the bottom of the tower. Then the water is sucked through the strainer (5). Drift eliminators (6) located at air outlet reduces drifts losses.

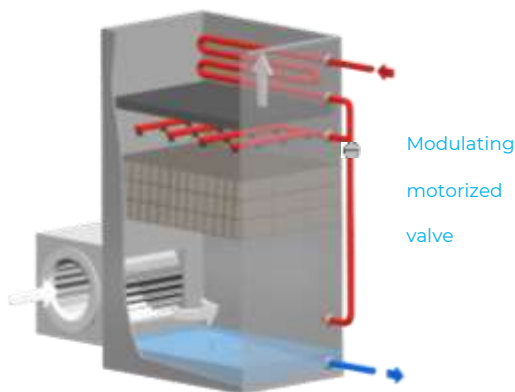
# Open Hybrid Cooling Tower principle and operation SIM

Standard S open circuit cooling tower ranges have originally been designed to receive the plume abatement coil option; these S ranges are then referred to as SIM open hybrid cooler range. Their efficiency is ensured by a finned tube coil combined with a valve for adjusting the water spray on the exchange surface (infill). This water flow regulation over the exchange surface is a market exclusivity (JACIR patent). Therefore, the combination of the air desaturation by air outlet warming up, and the reduction of the spray on the packing, ensures the complete plume suppression. Beyond the plume suppression itself, this system can provide significant water savings and is an ultimate obstacle to the drifts. This technology proposed by JACIR has been deeply researched in partnership with CETIAT for over 40 years, and has offered the opportunity to file innovating patents. Their design makes access and cleaning very easy and ensures performance durability.

## Operation :

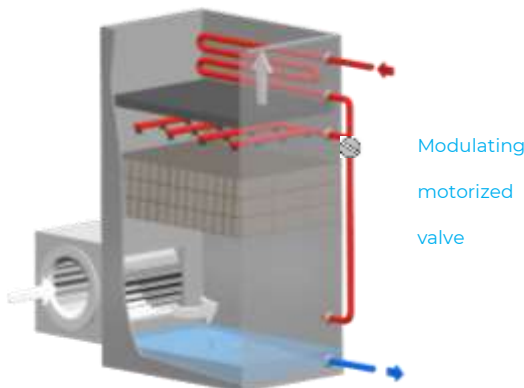
### Dry operation: WINTER

The by-pass valve is totally open, so the whole water flow leaves directly the tube coil to the basin: there is no water spray on the infill, no water evaporation, so no water consumption. The whole power can be dissipated through the plume suppression coil.



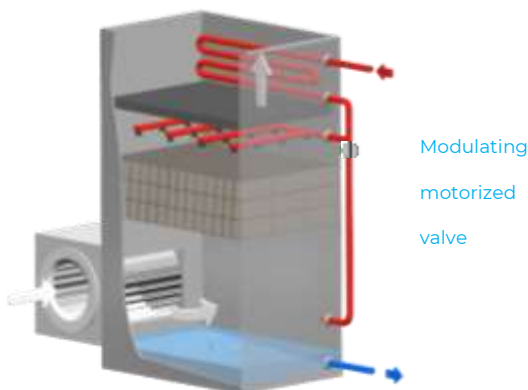
### Wet/dry operation: MID SEASON

When the dry cooling is not powerful enough part of the water flow goes to the spraying system thanks to the by-pass valve. A temperature probe (option) located in the water outlet send the information to the regulator monitoring the valve. So only the minimum water quantity is sprayed on the infill. This cooling mode lowers the water/air exchange and optimize the power evacuated in the dry coil.



### Wet operation: SUMMER

If necessary, the by-pass valve is totally closed: the water leaves the tube coil, and can be totally sprayed over the infill. This water is first cooled by sensitive heat, then by latent heat (evaporation on the exchange surface). In wet operation, 5 to 10% of the power is dissipated by the finned tube coil.



# Manufacturing details and options S

## Casing

Self-supporting rigid panels, with 2 or 4 folds on the four sides, **(JACIR design)** allowing sound attenuation casing addition if required. Thanks to this technology, we can offer cooling towers with an extremely low sound level.

Towers are assembled with waterproof stainless-steel rivets (uniform, high-capacity locking). There is no welding on assembled panels for the parts in contact with water; a high-covering seal ensures the close fit between the panels. Folds and cutting plan are all outside oriented.

As standard model, the panels are in galvanized steel 2mm thick ZENDZIMIR process 275gr/m<sup>2</sup> (galvanized plates are protected by the zinc oxidation on the surface).

**X-STEEL** stainless-steel is optional: corrosion resistance higher than 316L stainless-steel



## Basin

The sloped and plan basin allows a **complete and easy drain**. On the utilities panels of the basin are located:

- ∞ Overflow,
- ∞ Drain below the lower level of the basin and POWER FLOW access (260 x 110mm) enabling to quickly and completely evacuate all sludge and other accumulated parts in the bottom of the casing using simple water spray,
- ∞ Make up water by float valve or electro valve as an option,
- ∞ Water outlet through a removable strainer in stainless-steel (or PEHD) with a flange, oversized to eliminate cavitation, with a perforated steel plate,
- ∞ An access door to the basin (540 x 390mm),
- ∞ Option: electrical heater of 230V or 400V and waterproof thermostat with separate bulb.

For automatic resistance control, suitable contactors must be provided. Evaporative water circuit remains clean and decreases Legionella risks.



## Exchange surface: EFFI-PACK infill

Made of thermoformed and welded Polypropylene sheets, this heat exchange surface is resistant to chocks and offers a large available surface. Resistant up to 75°C, its excellent thermal efficiency favours energy saving.

The **EFFI-PACK** infill is made of PP and offers a maximal heat exchange surface:

- ∞ High-temperature resistance (75 °C continuous),
- ∞ High-efficiency extended surface,
- ∞ Easy maintenance,
- ∞ High resistance to chemical agents,
- ∞ Range of operation up to 95°C (option).



## Water distribution

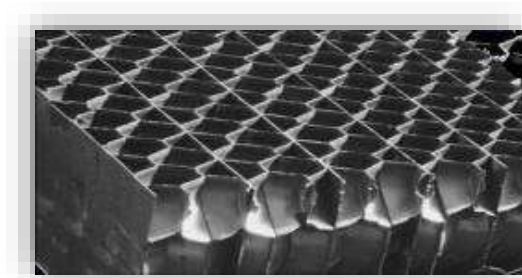
Water distribution is made of PVC pipes through highly efficient water distributors. The nozzles made of polypropylene distribute water in the shape of a full jet cone. Made of stainless-steel, these nozzles are bolted to the distribution pipes, for easy maintenance and strong mechanical resistance. An internal turbulator distributes the water so that a uniform water distribution reaches the exchange surface.



## Drift eliminators

Highly efficient, drift eliminators are made of PP sheets and prevent the water from being sprayed out of the tower: the drift is 0.01% maximum of the recirculating water flow. This value has been EUROVENT certified.

Ultraviolet resistant, they are easy to remove from the top in order to access to the distributors and to the exchange surface.



## Fans

The centrifugal fans are especially designed and manufactured by **JACIR**. The impeller is a double side air inlet type. The air inlet ducts are removable to access to the impeller, and are made of polyester. Their shape noticeably improves the performances of the fans.

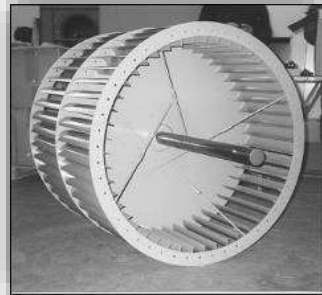
The bearings are self-aligning, lubricated in our factory and to be regularly lubricated thanks to a copper deposited line lubrication as a standard for a simple and quick maintenance without any removal. Each shaft is supported by 2 bearings

The volutes side-plates are used to fix the motor support. This design prevents the belts from producing a slapping effect.

Trapezoidal pulleys and V-belts transmission are used. Tension is applied to the belts by tipping the motor seat, for easy adjustment.

The impeller is protected from corrosion by a baked coating. The elliptical scroll is made of X-STEEL stainless-steel.

Optionally, the impeller can be made of stainless-steel



## Standard motors

- ∞ IE3 three-phase asynchronous motor, compatible with a frequency converter,
- ∞ 1500 rpm,
- ∞ 230/400 V up to 5.5 kW,
- ∞ 400/690 V above 5.5 kW,
- ∞ 50 Hz,
- ∞ IP 55 (outdoor operation possible),
- ∞ Class F / B,
- ∞ Direct connection to its terminal box,



## Accessibility

As a standard, the basin is equipped with access door(s) sized 390 x 540 mm, and one **POWER FLOW** access sized 260x110 mm: located under the bottom level of the basin, it allows a fast complete drain and an easy cleaning of sludge or other accumulated parts of the bottom casing using simple water jet.

One large door sized 1290 x 640 mm in the same material as the cooling tower casing is also provided: allowing quickly removing of the drift eliminators, the nozzles, the packing (infill) and the water distribution pipes.



## Plume suppression coil and modulating valve (Jacir patent) – SIM option

As a standard, the coil is made of carbon steel header coated with a primer paint. Two air vents secure the freezing risk.

The tubes are assembled in a triangular pitch, made of copper (stainless-steel option)  
The fins are in copper.

A monitored valve adjusting the water flow sprays over the infill, associated to the plume coil.

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





## Sound attenuations (options):

### IB standard sound attenuation

Additional casing of the air inlet fan(s), made of self-supporting rigid steel panels covering, double folding on the 4 internal sides of the panels. Internal lagging is made of absorbent sound material. Complete access door is provided for a total accessibility maintenance in front door with 4 lockers, activated by key.

At the air outlet, an exhaust cone reduces the acoustic emission surface.

### ICV complete sound attenuation

Additional casing of the air inlet fan(s), made of self-supporting rigid steel panels covering, double folding on the 4 internal sides of the panels. Internal lagging is made of absorbent sound material and contains sound acoustics baffles. These galvanized steel sound baffles, made of high-density rock wool panels, are easily removable.

At the air inlet, the rock wool is coated by a fibre glass layer.

At the air outlet, baffles receive a reinforced protection by a stainless-steel grid.

### ICVK complete sound attenuation with double casing

The entire casing of ICV cooling tower is fitted with a double casing: high density rock wool covered by an additional steel sheet - ICVK.

### Special sound attenuation

ICVK solution is adapted to reach required sound level, up to NR 30 at 10m.

## OPTIONS

- ∞ Plume suppression coil system and modulating valve (**SIM** series),
- ∞ **X-STEEL** stainless-steel casing (resistance to corrosion superior to 316L),
- ∞ Non-freezing heater with thermostat,
- ∞ Two-speed motor (separate wiring or PAM – 1500/1000rpm),
- ∞ Fans frequency drive,
- ∞ Water level control with electric valve and input filter,
- ∞ Automatic Inductive Blow down (DAi),
- ∞ All accessories made of stainless steel (fan casing, wheel, plume suppression coil, etc),
- ∞ Discharge cone (increase of air outlet speed with lower sound radiation and recycling),
- ∞ **EFFI-SILENT** basin sound abatement,
- ∞ Available air pressure for connection to the duct,
- ∞ Equipment delivered in parts, ready to assembled,
- ∞ Assembly on site by our experimented technicians.

# Technical characteristics S

## OPEN COOLING TOWER WITHOUT SOUND ATTENUATION

	Thermal power ref. average (1) [kW]	NDKL fans Qty	Total motor power [kW]	Sound level (2) at 20m [dB(A)]	Weight empty (without beams) [kg]	Operation weight (without beams) [kg]
S-1209-A-40	83	1	4	45	485	850
S-1812-A-90	165		9	47	695	1 435
S-2415-A-110	331		11	50	1 100	2 315
S-2415-A-150	503		15	52	1 100	2 315
S-2718-A-110	551		11	52	1 525	3 175
S-2718-A-150	639		15	53	1 525	3 175
S-2718-A-185	700		18.5	53	1 525	3 175
S-3021-A-150	744		15	53	1 750	3 880
S-3021-A-185	843		18.5	54	1 750	3 880
S-3021-A-220	896		22	54	1 750	3 880

(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.

## OPEN COOLING TOWER WITH SOUND ATTENUATION

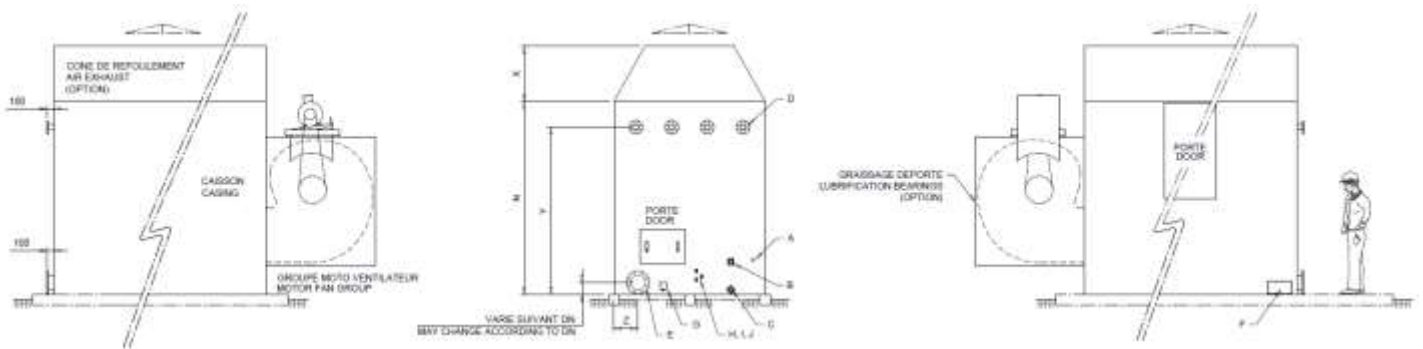
NDKL fans Qty	Total motor power [kW]	Thermal power ref. average (1) [kW]	Sound level (2) at 20m [dB(A)]	Weight empty (without beams) [kg]	Operation weight (without beams) [kg]	Thermal power ref. average (1) [kW]	Sound level (2) at 20m [dB(A)]	Weight empty (without beams) [kg]	Operation weight (without beams) [kg]
		IB	IB	IB	IB	ICV	ICV	ICV	ICV
S-1209-A-40	4	161	41	715	1 085	-	-	-	-
S-1812-A-90	9	322	44	1 045	1 780	-	-	-	-
S-2415-A-110	11	490	46	1 530	2 745	459	39	2 830	4 045
S-2415-A-150	15	537	46	1 530	2 745	503	39	2 830	4 045
S-2415-A-185	-	-	-	-	-	534	39	2 830	4 045
S-2718-A-110	11	622	47	2 030	3 680	582	41	3 515	5 165
S-2718-A-150	15	681	47	2 030	3 680	638	41	3 515	5 165
S-2718-A-185	18.5	725	47	2 030	3 680	678	41	3 515	5 165
S-2718-A-220	22	-	-	-	-	714	41	3 515	5 165
S-3021-A-150	15	820	48	2 330	4 460	767	42	4 005	6 135
S-3021-A-185	18.5	872	48	2 330	4 460	816	42	4 005	6 135
S-3021-A-220	22	918	48	2 330	4 460	859	42	4 005	6 135
S-3021-A-300	30	-	-	-	-	941	42	4 005	6 135

(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.

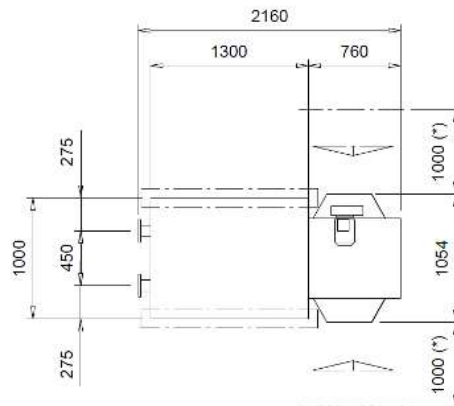
# Drawings and dimensions S without sound attenuation



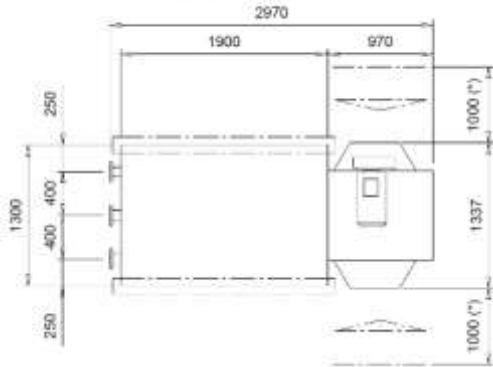
			S 1209 IB	S 1812 IB	S 2415 IB	S 2718 IB	S 3021 IB
	Height H with discharge cone (option)	mm	2 730	3 000	3 230	3 370	3 620
	Length L	mm	2 160	2 970	3 740	4 335	4 794
	Width I	mm	1 054	1 337	1 600	1 900	2 200
A	Float valve (male) Or electro valve (option)	DN	25	25	32	32	32
B	Over flow (female)	DN	20	20	25	25	40
C	Drain (female)	DN	50				
D	Hot water inlet	DN	80				
	Height connection pipe	Qty	2	3	3	4	4
		mm	2 040	2 140	2 195	2 365	2 440
E	Water outlet	DN	According to the water flow				
F	Drain basin Power Flow	mm	260 x 110				
G	Non-freezing heater with integrated thermostat (option)	kW	3	3	3	6	6
H	Low level (option)						
I	High level (option)						
J	Water level switch (option)						

# Drawings and dimensions S without sound attenuation

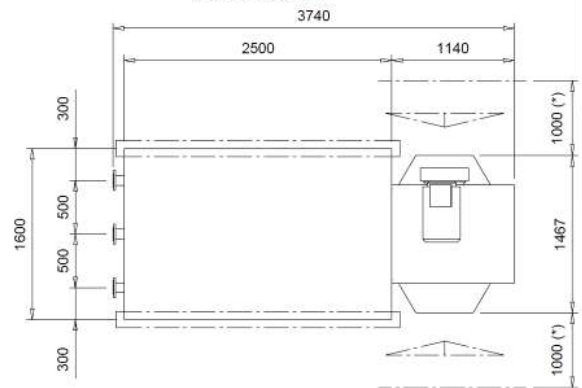
PLAN DE POSE S1209  
S1209 BASEMENT



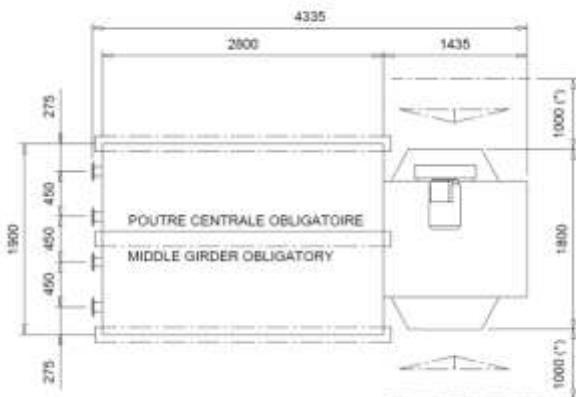
PLAN DE POSE S1812  
S1812 BASEMENT



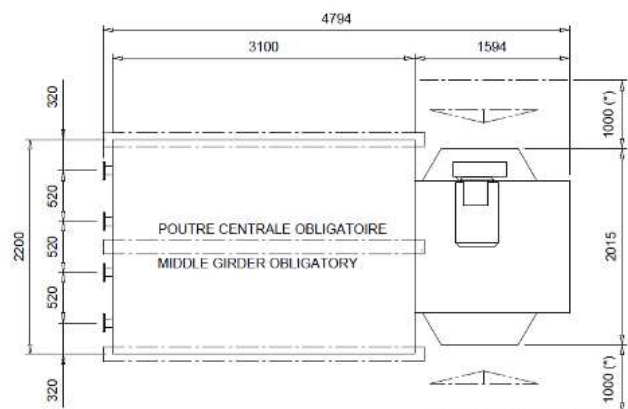
PLAN DE POSE S2415  
S2415 BASEMENT



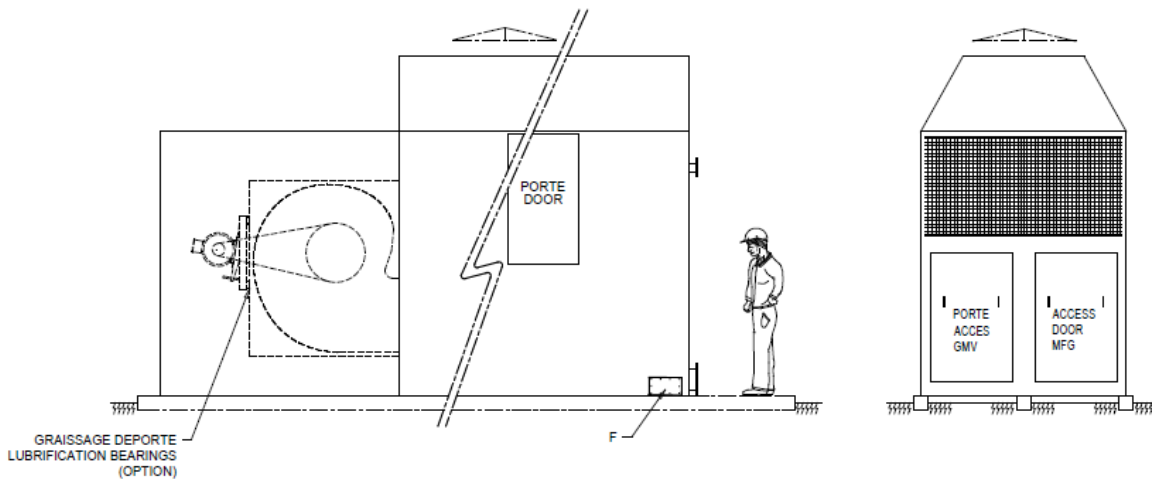
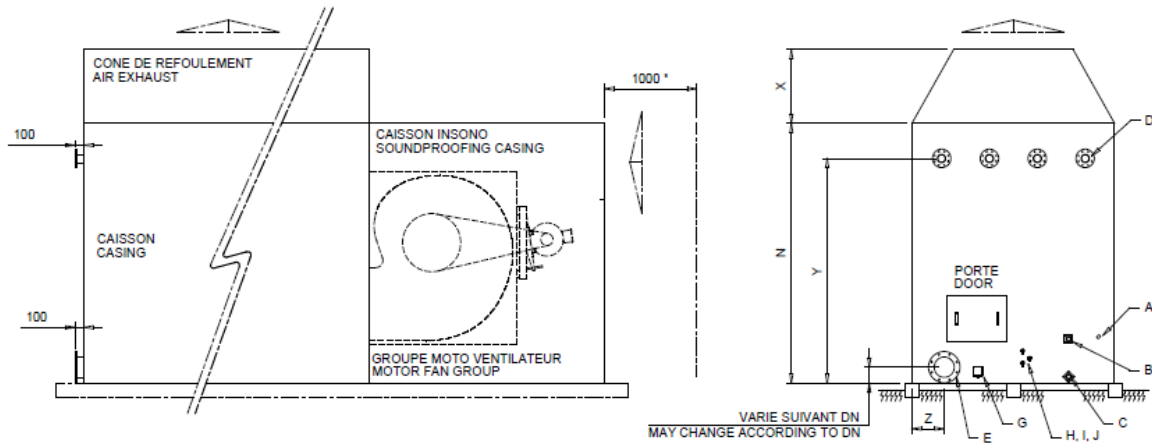
PLAN DE POSE S2718  
S2718 BASEMENT



PLAN DE POSE S3021  
S3021 BASEMENT



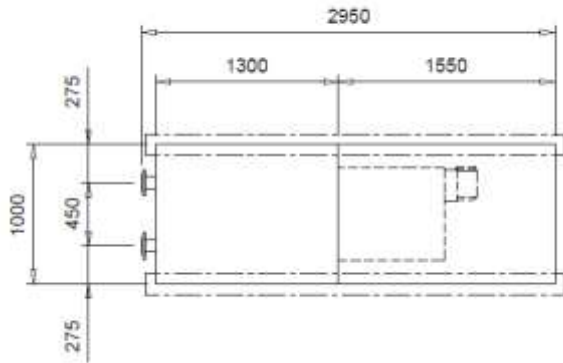
# Drawings and dimensions IB sound attenuation



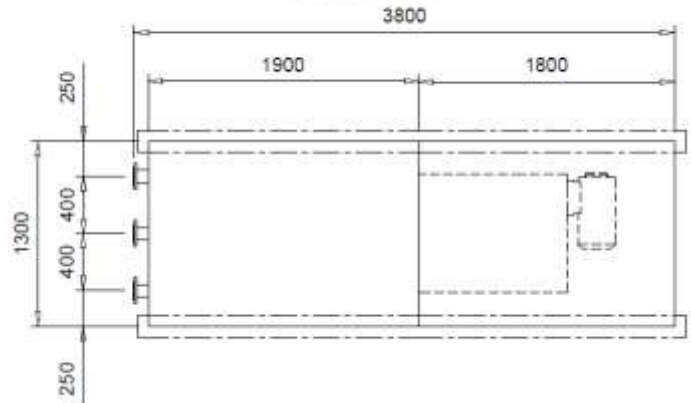
			S 1209 IB	S 1812 IB	S 2415 IB	S 2718 IB	S 3021 IB
	Height H with discharge cone (option)	mm	2 730	3 000	3 230	3 370	3 620
	Length L	mm	2 950	3 800	4 600	5 200	5 750
	Width l	mm	1 000	1 300	1 600	1 900	2 200
A	Float valve (male)	DN	25	25	32	32	32
	Or electro valve (option)	DN	20	20	25	25	40
B	Over flow (female)	DN	50				
C	Drain (female)	DN	50				
D	Hot water inlet	DN	80				
	Height connection pipe	Qty	2	3	3	4	4
		mm	2 040	2 140	2 195	2 365	2 440
E	Water outlet	DN	According to the water flow				
F	Drain basin Power Flow	mm	260 x 110				
G	Non-freezing heater with integrated thermostat (option)	kW	3	3	3	6	6
H	Low level (option)						
I	High level (option)						
J	Water level switch (option)						

# Drawings and dimensions IB sound attenuation

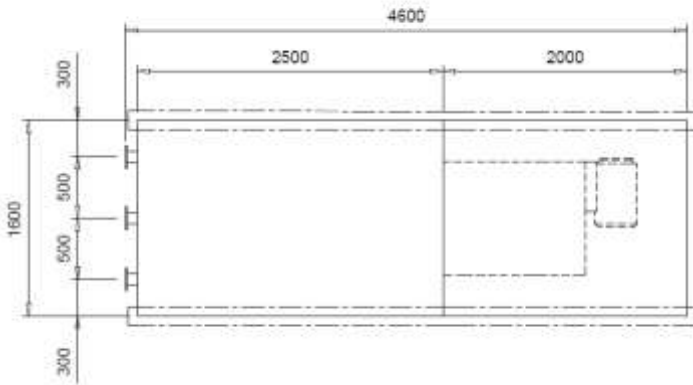
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S1209 BASEMENT



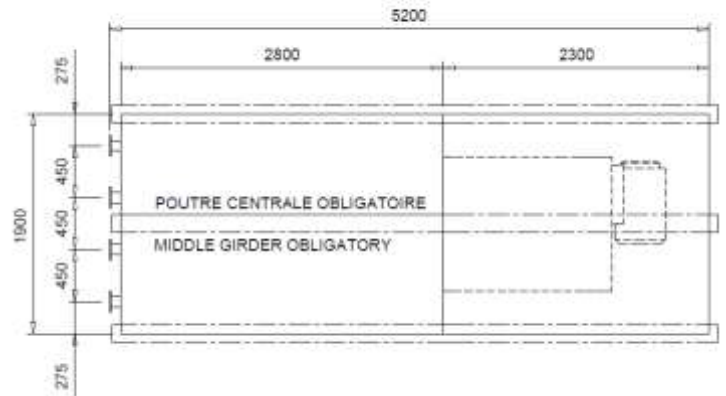
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S1812 BASEMENT



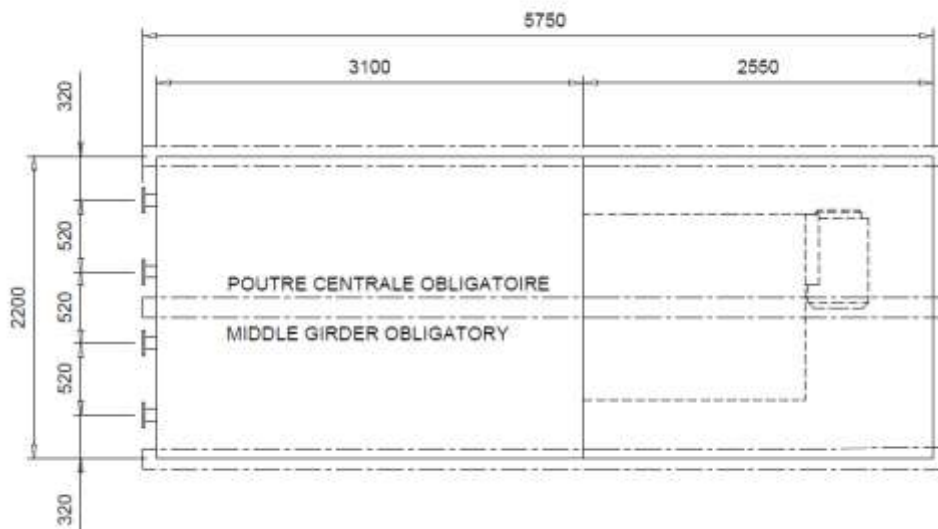
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S2415 BASEMENT



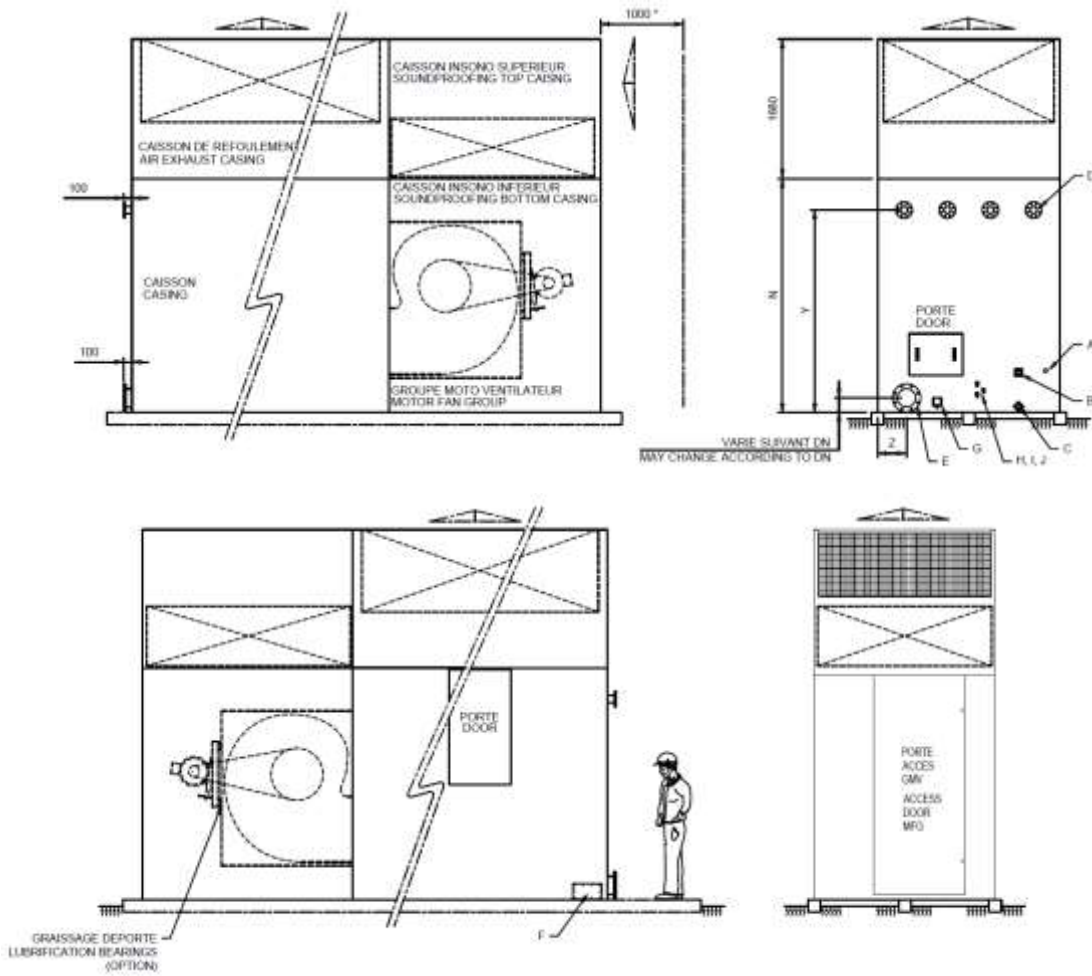
PLAN DE POSE S2718  
S2718 BASEMENT



PLAN DE POSE S3021  
S3021 BASEMENT



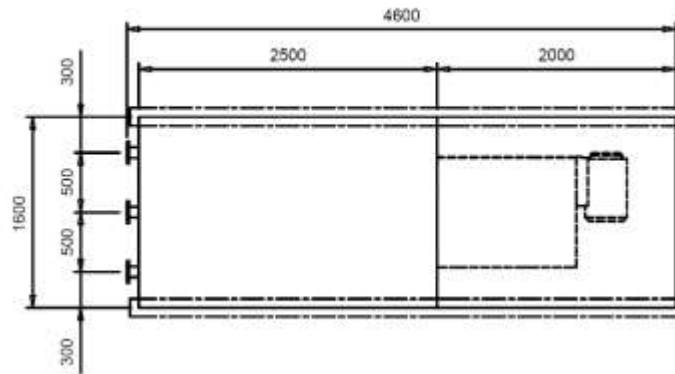
# Drawings and dimensions ICV sound attenuation



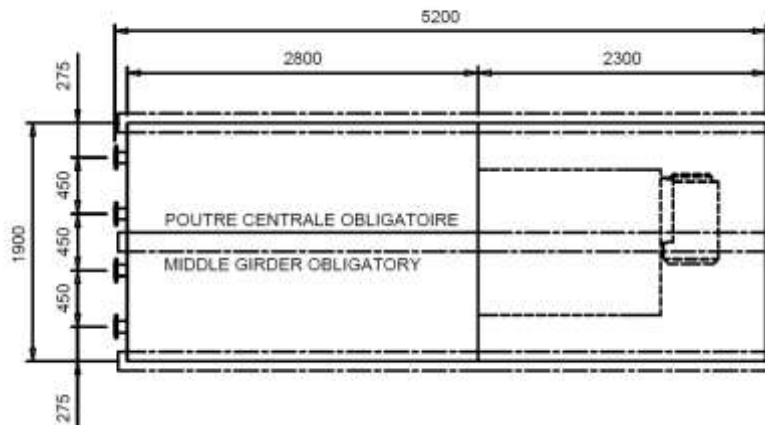
			S 2415 ICV	S 2718 ICV	S 3021 ICV
	Height H with discharge cone (option)	mm	4210	4350	4500
	Length L	mm	4600	5200	5750
	Width I	mm	1600	1900	2200
A	Float valve (male) Or electro valve (option)	DN	32	32	32
B	Over flow (female)	DN	50		
C	Drain (female)	DN	50		
D	Hot water inlet	DN	80		
	Qty		3	4	4
	Height connection pipe	mm	2195	2365	2440
E	Water outlet	DN	According to the water flow		
F	Drain basin Power Flow	mm	260 x 110		
G	Non-freezing heater with integrated thermostat (option)	kW	3	6	6
H	Low level (option)				
I	High level (option)				
J	Water level switch (option)				

# Drawings and dimensions ICV sound attenuation

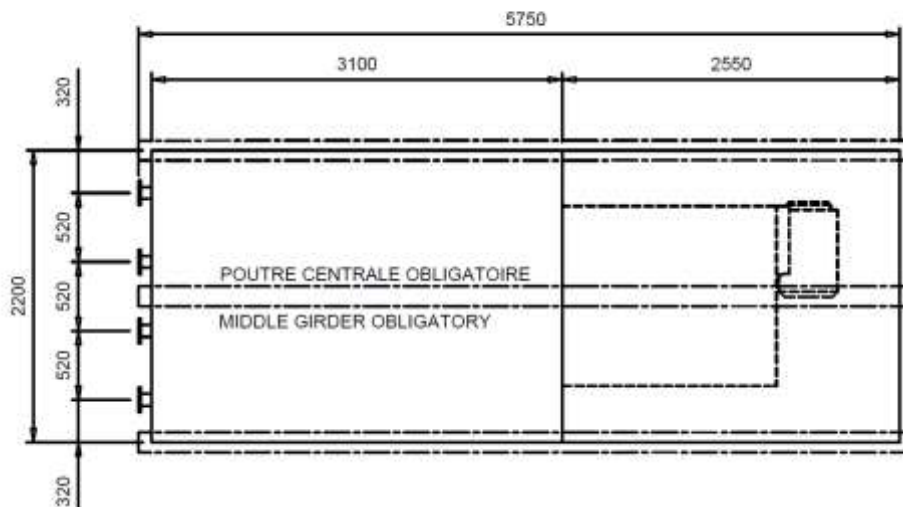
PLAN DE POSE S2415  
S2415 BASEMENT



PLAN DE POSE S2718  
S2718 BASEMENT



PLAN DE POSE S3021  
S3021 BASEMENT



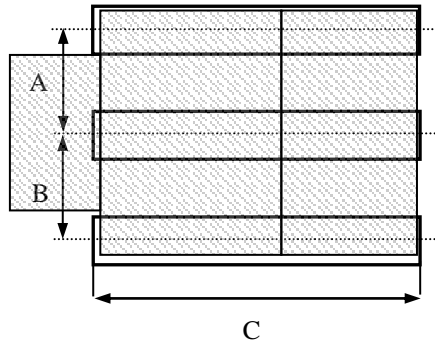


## Support S

S cooling tower ranges can stand on a concrete base or on steel frame beams (customer supply).

Check that the ground can stand the operating load, and that surface or supports are flat and horizontal.

### Quantity and position of concrete or metallic beams (customer supply) for cooling towers without sound attenuation



	Qty	Distance between beams under the basin A and B [mm]	Beams length under the basin C[mm]
S 1209	2	1000	1400
S 1812	2	1300	2000
S 2415	2	1600	2600
S 2718	3	1000	2900
S 3021	3	1100	3200

### Quantity and position of concrete or metallic beams (customer supply) for cooling towers with IB sound attenuation

	Qty	Distance between beams under the basin A and B [mm]	Beams length under the basin C[mm]
S 1209 IB	2	1000	3000
S 1812 IB	2	1300	3900
S 2415 IB ou ICV	2	1600	4700
S 2718 IB ou ICV	3	950	5300
S 3021 IB ou ICV	3	1100	5850

## On Site Layout S - SIM

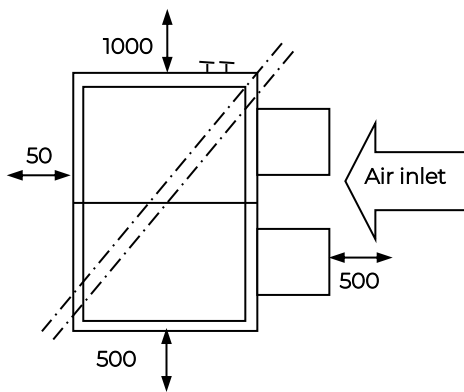
Walls, higher or equal to the tower must not surround on all sides a cooling tower, furthermore without any openings. This could create a risk of a « re-circulation »; the air discharged (hot and saturated) may be recycled into the unit and significantly reduces the thermal efficiency of the tower.

In any case, the free access on the four sides of the tower must be secured to ensure that the fans are supplied correctly with air and that there is proper access for installation and maintenance.

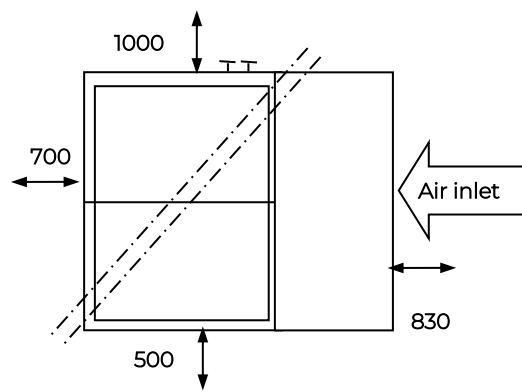
If these rules are not applied, it is inevitable that the cooling tower will not operate properly.

### Recommended minimum free access (mm) for standard cooling towers: Top view

Tower without sound attenuation



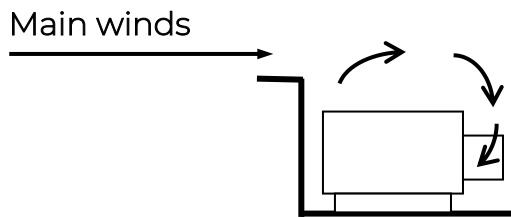
Tower with sound attenuation



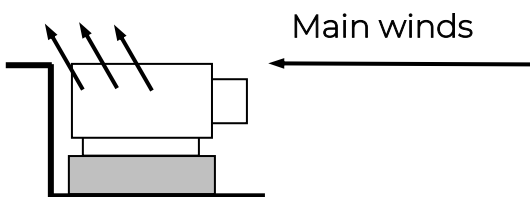
Do not hesitate to contact us for any advice

### Layout examples:

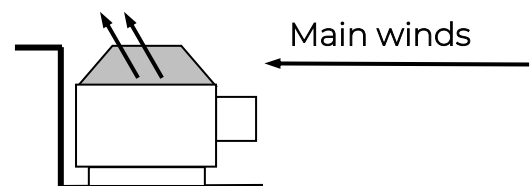
**NOT TO DO:**



**TO DO:**



Install a base in order to up the cooling tower



Install a cone in order to up the air outlet of the cooling tower

## Water treatment S - SIM

### WATER EVAPORATION

Consumption by evaporation is approximately 1.7kg/h per 1 000kcal/h.

### DECONCENTRATION

Due to the evaporation and to the water recycling, impurities or salts in the water are concentrated. To make sure that this concentration is not too high, drain must be carried out.

If not, concentration rates of 10, 100 or even 1,000 would occur over time.

In order to pre-determine the installation requirements, consider drain value twice the evaporation level. In operation, with an efficient water treatment, this figure may decrease, especially in the case of a stainless-steel cooling tower (concentration rate of 3 to 5 possible).

There are three possibilities to choose according to the case:

#### 1- Continuous blow down

Connection piece to be installed at the pump discharge just before the tower, if possible, at the level of the water distribution pipes so that the purge only takes place when the circulation pump is operating.

The blow down flow rate can be calculated using the formula:  $[100 S / (M - S)]$  % of the make-up water in which:

S: Salinity of the make-up water compensating for evaporation.

M: Maximum acceptable salinity level of water in circuits.

#### Example:

Salinity of make-up water = HT 20 ° F

Maximum acceptable salinity = HT 40 ° F

$100 \times 20 / (40 - 20) = 100$  % make-up water flow rate

Therefore, the continuous blow down must be equal to the evaporated make-up water flow rate (rate=2).

Consequently, the real water consumption is twice the theoretical evaporated water flow.

#### 2- Discontinuous blow down

The conductivity of the water in the circuit is controlled and the device is purged while not exceeding the TH value.

#### 3- JACIR Automated Inductive Blow down

Once water conductivity level has been reached, a motorised valve can be activated to drain the required quantity of water to maintain the right concentration level. See separate documentation.

### WATER TREATMENT

It is essential that good quality water is available to ensure that the closed-circuit cooling network operates correctly. If the water contains a significant amount of impurities, it is recommended that a filtration device to be installed in parallel for 5 to 10% of the recycled water flow.

If the water contains salts that form deposits, iron or corrosive chemical elements, a make-up water treatment system must be installed to obtain purer water, which is close to being chemically neutral, and which can supply the cooling devices without causing damage.

In some cases, algae, moss, fungus or permanent shells can tend to grow in cooling towers. There are products that can be added periodically to the water circuit to prevent these organisms from developing.

**Water treatment should be undertaken by a specialized Company.**

**PREVENTS THE RISK OF LEGIONNAIRES' DISEASE:** see separate documentation

# Prescription S

Evaporative cooling tower, high efficiency open circuit with forced centrifugal fans, S ..... JACIR type.

## Thermal characteristics

The dissipated power will be .....kW, with a temperature range from .....°C to .....°C, an ambient air temperature of.....°C, and a wet bulb temperature of .....°C.

## Sound level characteristics

The sound pressure level will not exceed ..... dB (A) at ..... metres in free field over 4 directions. To ensure this, the tower has one of the following types of soundproofing devices:

1 – **IB** option with sound attenuators without baffles at air inlet, and outlet cone coated with acoustics foam,

2 –**ICV / ICVK** or **special** sound attenuation with parallel baffles both at air inlet and outlet, equipped with 50mm thick high density rock wool double casing, covered by 1.2mm thick steel sheet. NR30 at 10m may be reached.

## Tower casing, sloped and plane bottom basin

The cooling tower casing will be made of self-supporting steel panels, twice or 4 times folded on the 4 sides. Side panels will be designed to receive if necessary, a double casing later on. Stainless steel rivets with uniform and high-capacity locking will be used for assembly. The cooling tower casing will be assembled without any bolting or welding for the parts in contact with water; a special designed high covering seal ensure waterproofing between the panels.

The basin will be equipped with a rectangular access door (390 x 540mm), with a floating valve that can easily be adjusted, a drain, an overflow and an anti-cavitation strainer.

The sloped bottom of the basin will allow a complete and easy drain thanks to the (POWER FLOW) drain hole located under the lowest part of the basin in order to ease the cleaning. The size of this opening will be 260x110 mm. Height between basin bottom and the infill is 1400mm for easy access.

## Casing structure

The cooling tower panels casing will be made of:

- ∞ As a standard, galvanized steel 2 mm thick ZENDZIMIR process 275gr/m<sup>2</sup> or;
- ∞ Option, X-STEEL stainless steel (corrosion resistance higher than 316L) for its long-lasting properties, water saving and easy cleaning.

## Accessibility

As a standard, the basin will be delivered with access door(s) sized 390 x 540mm, and a POWER FLOW access 260 x 110mm allowing express draining and cleaning of sludge or other accumulated parts of the bottom casing using simple water jet.

A large door sized 1290 x 640mm in the same material as the cooling tower casing will also be provided, and will allow quick removing of the drift eliminators, the nozzles, the packing (infill) and the water distribution pipes.

## Fans

The low-pressure centrifugal fan(s) with forward-inclined blades and double air admission will be placed outside the basin in dry airflow and at man chest to access without disassembly.

The polyester inlet duct(s) stand out to optimise air suction will be simple to disassemble for easy maintenance.

The impeller is protected from corrosion by a baked epoxy coating. The elliptical scroll is made of X-STEEL stainless steel.

Optionally, the impeller can be made of stainless-steel.

Each fan will be coupled with its own motor.

## Electric motor and coupling

The IE3 asynchronous three-phase motor(s) will be closed type ventilated case(s) with a power of maximum kW....., rpm ....., IP55 protected, class F/B. Coupling will be made of trapezoidal belts selected for 150 % of nominal power.

## Water distribution

Water distribution will be made of PVC pipes through highly efficient polypropylene water distributors: the nozzles will distribute the water uniformly on the whole exchange surface and will be easily removable.

## Exchange surface

Made of thermoformed and welded polypropylene sheets, EFFI-PACK heat exchange surface will be resistant to chocks and will offer a large available surface. This system will ensure fouling risks reduction.

## Drift eliminators

Highly efficient EUROVENT certified, the PP sheets drift eliminators will prevent the water from being sprayed out at the outlet tower. Ultraviolet resistant, they will be easy to remove from the top in order to access to the distributors and to the exchange surface if needed. The drift will be 0.01 % maximum of the re-circulating water flow.

## Connections

All the connection pipes will be hot dip galvanized or in stainless steel option for optimized inside and outside protection.

The servitudes panels will include a high-level switch, a drain hole and water make up.

## Options

An Automatic Inductive blown down (DAi) inside the exchanger room may be integrated, as an option (see separate documentation).

Will be available also as option: plume suppression coil system, fans frequency drive, water level control with electric valve, EFFI-SILENT basin sound attenuation, and all accessories made of stainless-steel (fan casing, wheel, plume suppression coil, etc). Equipment delivered in parts, ready to be assembled on site by our experimented technicians.