

# X-TAR



## Cross flow open circuit cooling tower XTO

CONTENTS	Page(s)
Cross flow Open circuit cooling tower	2
Operation principle	3
Manufacturing Details	4-7
Options	8
Technical data - XTO	9
Drawings and dimensions	10-11
Support	12
Choice of location	13
Water treatment	14
Technical specifications - XTO	15-17

# Cross flow open circuit cooling tower – XTO

## JACIR

With more than 60 years of experience, our company:

- ∞ Invested in research and development in order to offer technical solutions in line with the protection of the environment through unrivalled achievements and numerous patents.
- ∞ Is today European leader with a technology that is ahead of market requirements.

## The strengths of the X-TAR series

### HYGIENIC DESIGN

Design compliant with hygienic standards.

### LOW POWER CONSUMPTION



EC (Electronically commutated) technology motors specially developed to minimize energy consumption and reinforced protection in humid air flow.

### EUROVENT CERTIFICATION

The cooling tower have been subject of a EUROVENT thermal performance certification.

### SILENCE

Very quiet towers in standard version reaching exceptionally low acoustic levels.

### EXCHANGE SURFACE

**X-PACK** infill, made of PP, shock resistant and offering maximum exchange surface.

### CORROSION PROTECTION

The casing of the tower is assembled without any welding, also available in **X-STEEL** stainless steel

### EASY MAINTENANCE

Specially designed for easy maintenance: EC motor integrated directly into the wheel and many accesses to the tower's internals

### MODULAR CONSTRUCTION

Running of the device available even during motor fan unit maintenance

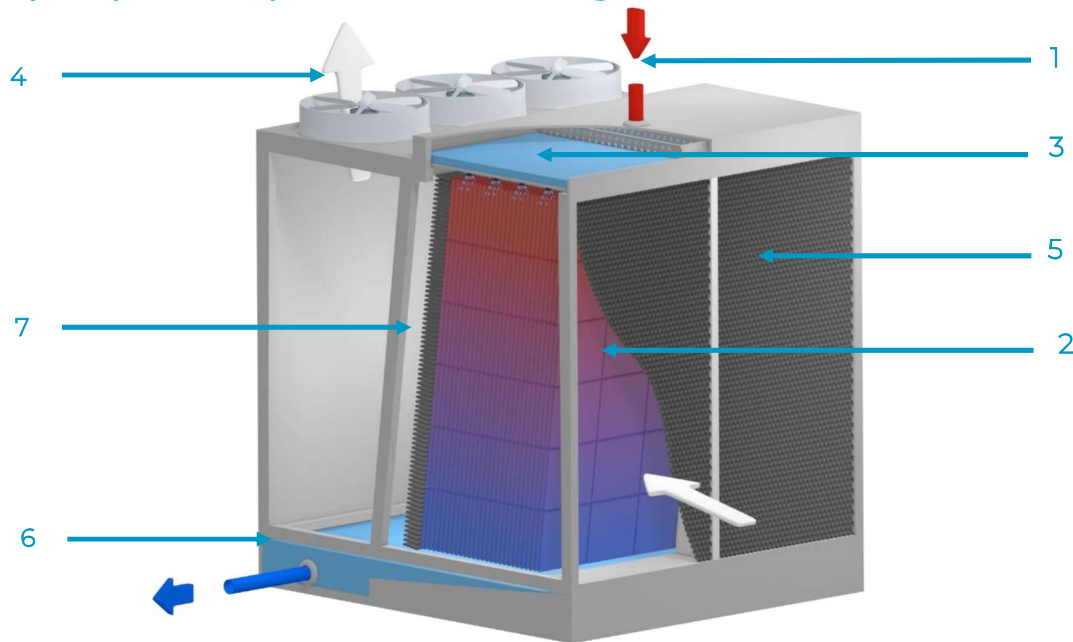
## Operation principle: XTO

### Principle of operation

Water cross-flow cooling tower whose innovative design meets all hygienic standards requirements, thermal performance **EUROVENT certified**.

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

### Operation principle of an Open Cross-Flow cooling tower:



The hot water to be cooled is driven to the top of the device through pipes (1). This water is fractionated and distributed by gravity over the heat exchange surface (2) by low pressure water distribution nozzles (3).

The air sucked in by the fans (4) enters through the side of the cell through the louvers (5) then escapes through the upper part after heating and saturating, passing between the runoff surfaces covered with water.

Under the action of the surface tension caused by the runoff surface, the water spreads evenly, and runs over their entire height. The exchange surface is thus increased.

The water, cooled thanks to the induced ventilation, falls into free fall into the sloped basin (6) located at the bottom of the device. Drift eliminators (7) are arranged at the air outlet to limit drift losses.

# XTO Manufacturing Details

## Tower casing

Self-supporting rigid panels, with double or quadruple fold on all four sides of the panel (JACIR design) allowing, if necessary, the belated soundproofing of the tower's casing. Thanks to this technique we can propose towers with an extremely low acoustic level.

The towers are assembled with waterproof stainless-steel rivets (strength and uniformity of tightening). No welding or screws for assembling the panels on parts in contact with water; the sealing between the panels is ensured by a specially designed seal with high filling power. The material of the hydraulic connections is identical to that of the tower casing.

As standard, the panels are made of silver steel 2 mm thick, ZENDZIMIR process at 275 gr / m<sup>2</sup> (the protection of galvanized sheets is ensured by formation of zinc oxidation on the surface).

Optionally, X-STEEL stainless steel is available (corrosion resistance higher than 316L)



## Inclined bottom basin

The bottom of the basin is flat and sloped for easy and total emptying.

On the servitude panel of this basin are:

- ∞ A high flow overflow,
- ∞ A drain hole and a POWER FLOW hatch below the lower level of the basin to enable the rapid evacuation of possible impurities during cleaning using a water jet (260 x 110mm),
- ∞ A make-up water system by solenoid valve and level sensors,
- ∞ One to two water outlets equipped with a strainer (stainless steel or HDPE according to DN), removable with largely sized flange whose suction design eliminates the risk of cavitation,
- ∞ Optional:
  - o antifreeze heater in 230V or 400V with waterproof thermostat,
  - o automatic deconcentration (DAi option).

For the control of antifreeze resistance, it is necessary to provide the appropriate contactors.

## Louvers

Fixed on their stainless-steel support, the polypropylene louvers prevent the water from being reflected outside the basin.

In addition, their double-direction and honeycomb shape prevent any direct UV rays from the sun into the basin or suction of large external particles, thus allowing a better control of bacteriological development. Their dismantling is very easy and gives full access to the exchange surface.



### Exchange surface X-PACK:

The **X-PACK** infill blocks are made of thermoformed and welded polypropylene sheets, they have an inclined cut, are shock-resistant and offer maximum exchange surface. Resistant up to 75°C as standard, their excellent thermal efficiency and low pressure drop promote energy savings.

- ∞ Good temperature resistance up to 75°C,
- ∞ Large area of high efficiency,
- ∞ Easy maintenance,
- ∞ High resistance to chemical agents,
- ∞ Available in PVC as an option.



### Water distribution:

The distribution of water is ensured by a splitter in a gravity water distribution tank equipped with high-efficiency nozzles. These polypropylene nozzles distribute water evenly at the top of the exchange surface and operate at low pressure (0.01 bar).

Very low pressure drops significantly reduce the risk of bacteriological contamination. Indeed, the low pressure also allows the creation of drops of a higher weight and therefore less sensitive to vesicular training.

Finally, the water's passage section is generously dimensioned, thus preventing dispersers' clogging even in the case of many suspended solids. The water distribution system is protected by covers with handles for easy inspection and maintenance.



### Drift eliminators

Highly efficient, drift eliminators (also called separators) are made of PVC sheets. They eliminate water entrainment at the tower outlet: the vesicular entrainment is 0.01% maximum of the recirculating flow.

Drift eliminators efficiency is certified by an independent party (EUROVENT) and compliant with December 2020 French NF E 38-424 and VDI 2047-2 standards relating to hygienic risks.



## EC Motors (Electronically Commutated)

State-of-the-art technology and outstanding performance have been planned for X-TAR range (Efficiency higher than IE5). Ip class 55, 380/400 V, 50/60Hz.

The choice of this technology is compliant with the Eco-design regulation (EU 327/2011 for application of Directive 2009/125/EC) ErP for yield minima threshold only after 202x.

This exceptional performance puts the **X-TAR** range at the top of energy efficiency. This efficiency is even more important when the motors operate in variable speeds, which is systematically the case on this range.

The reduced operating temperature allows a motor reduction size compared to asynchronous or permanent magnet motors. This weight and size reduction make easier the maintenance operations and offers long life for bearings and insulation materials. They have been especially selected for continuous operation.



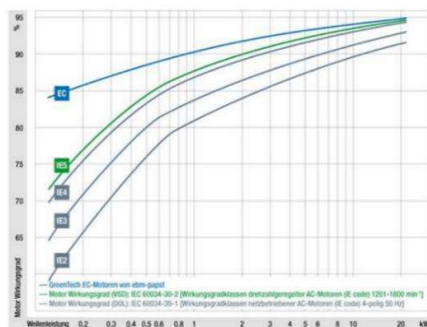
A junction box located at human height is provided for the quick connection of all motorcycle fans.

As an option, an emergency mode on the ventilation is also available: default start-up at 50% of the fans in case of malfunction of the PLC.

Also optional is Plug and Play system (integrated motor fan control)

These motors are eco-friendly products with a low carbon footprint.

### Comparative yields' table





## Accessibility

As standard, the basin is equipped with a POWER FLOW hatch (dimensions 260 x 110 mm) to quickly and completely evacuate muds and other materials accumulated at the bottom of the basin, using a water jet.

Fixed on their stainless-steel support, the louvers offer direct access to the infill and protect from water splashing and direct UV rays inside the tower.

To facilitate inspection and maintenance, the X-TAR range is equipped as standard with a total opening without threshold and with a mechanical shutter fitted with its safety sensor.

This immediate access to a maintenance corridor facilitates the safe inspection and maintenance of all tower's internals.

The maintenance corridor is also equipped with a grating floor lined and an additional blackout protection to prevent direct UV rays on the water inside the tower.

Optionally, the ladder and railing allow secure access to the water distribution protected by covers with handles for easy inspection and maintenance.

Also optional, maintenance and dismantling of the motor-fan units at the top of the tower can also be carried out using a secure handling bracket system provided for this purpose.

An optional insulation plate closes the gap left by a removed EC fan motor group for maintenance purposes, allowing efficient cooling to be maintained without prolonged process interruption.



## OPTIONS

- ∞ XTF series: closed circuit X-TAR – cross flows
- ∞ X-STEEL stainless-steel tower casing (corrosion resistance higher than 316L),
- ∞ Non-freezing heater with thermostat for the basin,
- ∞ Automatic Inductive Deconcentration (see also DAi documentation),
- ∞ Air pressure available for connection to a duct,
- ∞ Electrical cabinet
- ∞ Plug and Play system (fans control only)
- ∞ Handling bracket for motor fan unit's dismantling and maintenance
- ∞ Insulation plate for motor fan unit location during maintenance.
- ∞ One-piece delivery
- ∞ Support irons,
- ∞ Ladders and gateways,
- ∞ On-site assembly by our experienced technicians.



## Technical data XTO

### XTO series

	Average ref Power (1)	Number of fans	Max rotational speed	Fan type	Average airflow at tower outlet	Water inlet	Water outlet
	[kW]		rpm	Diam	[m3/h]	[DN]	[DN]
XTO-X-01-E09-S-03-1-011-24-PL-BA	324	1	1 070	910	26 950	125	125
XTO-X-02-E09-S-03-1-022-24-PL-BA	648	2	1 070	910	53 900	150	150
XTO-X-03-E09-S-03-1-033-24-PL-BA	973	3	1 070	910	80 850	200	200
XTO-X-04-E09-S-03-1-044-24-PL-BA	1 297	4	1 070	910	107 800	2 x 150	200
XTO-X-05-E09-S-03-1-055-24-PL-BA	1 621	5	1 070	910	134 750	2 x 200	250
XTO-X-06-E09-S-03-1-066-24-PL-BA	1 945	6	1 070	910	161 700	2 x 200	250
XTO-X-07-E09-S-03-1-077-24-PL-BA	2 269	7	1 070	910	188 650	3 x 150	2 x 200
XTO-X-08-E09-S-03-1-088-24-PL-BA	2 594	8	1 070	910	215 600	3 x 200	2 x 200
XTO-X-09-E09-S-03-1-099-24-PL-BA	2 918	9	1 070	910	242 550	3 x 200	2 x 250
XTO-X-10-E09-S-03-1-110-24-PL-BA	3 242	10	1 070	910	269 500	4 x 200	2 x 250
XTO-X-11-E09-S-03-1-121-24-PL-BA	3 566	11	1 070	910	296 450	4 x 200	2 x 250

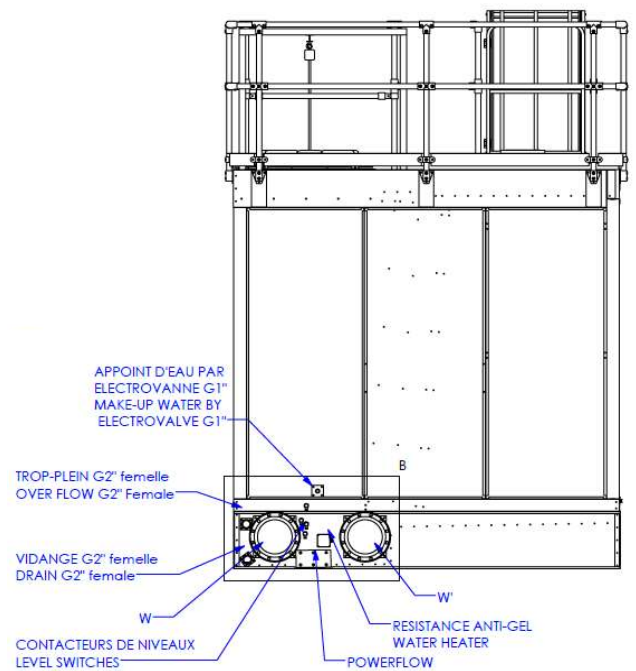
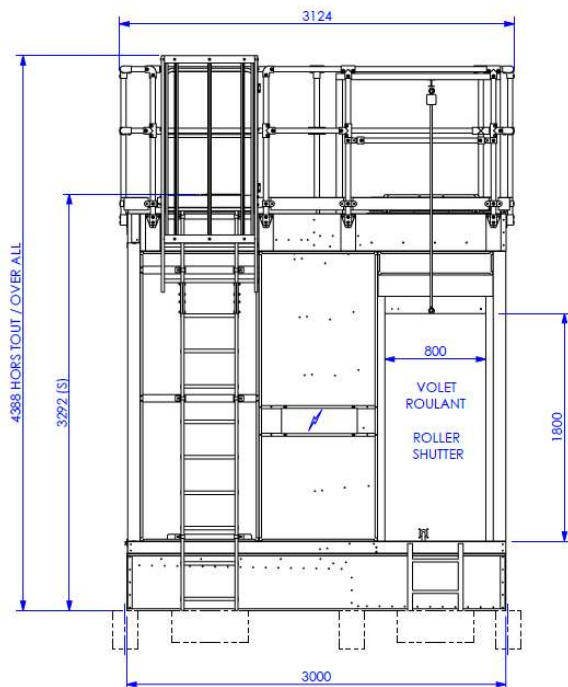
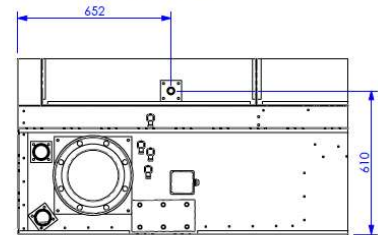
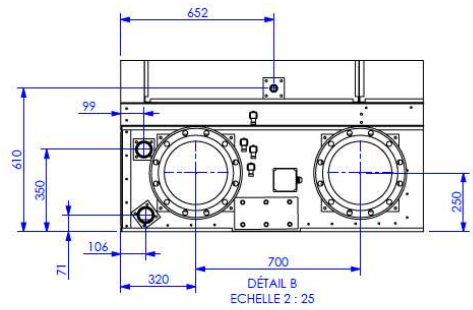
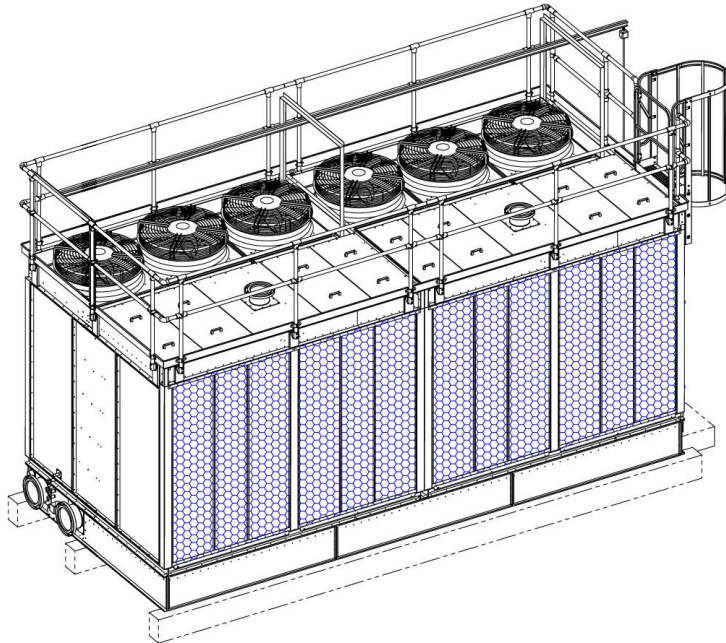
### XTO series

	Installed capacity	Sound level at 20 m(2)	Empty weight	Water weight	Overall dimensions Long x length x High (with access and without supports)
	[kW]	[dB(A)]	[kg]	[kg]	[mm]
XTO-X-01-E09-S-03-1-011-24-PL-BA	3,3	56	1 360	2 190	L 2,240 I 3,124 H 4,388
XTO-X-02-E09-S-03-1-022-24-PL-BA	6,5	57	1 800	3 450	L 3,340 I 3,124 H 4,388
XTO-X-03-E09-S-03-1-033-24-PL-BA	9,8	58	2 240	4 720	L 4,440 I 3,124 H 4,388
XTO-X-04-E09-S-03-1-044-24-PL-BA	13,0	58	3 330	6 630	L 5 640 I 3,124 H 4,388
XTO-X-05-E09-S-03-1-055-24-PL-BA	16,3	59	3 770	7 900	L 6,740 I 3,124 H 4,388
XTO-X-06-E09-S-03-1-066-24-PL-BA	19,5	60	4 210	9 160	L 7 840 I 3,124 H 4,388
XTO-X-07-E09-S-03-1-077-24-PL-BA	22,8	60	5 300	11 080	L 9,040 I 3,124 H 4,388
XTO-X-08-E09-S-03-1-088-24-PL-BA	26,0	61	5 740	12 340	L 10 140 I 3,124 H 4,388
XTO-X-09-E09-S-03-1-099-24-PL-BA	29,3	61	6 170	13 610	L 11 240 I 3,124 H 4,388
XTO-X-10-E09-S-03-1-110-24-PL-BA	32,5	61	7 260	15 520	L 12,440 I 3,124 H 4,388
XTO-X-11-E09-S-03-1-121-24-PL-BA	35,8	62	7 700	16 790	L 13,540 I 3,124 H 4,388

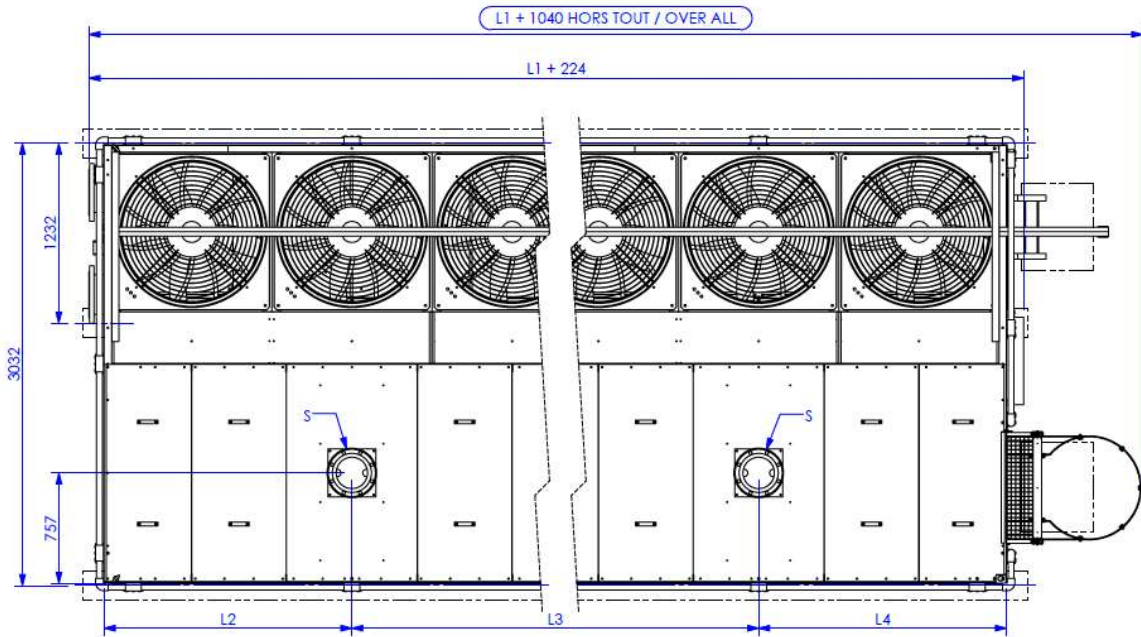
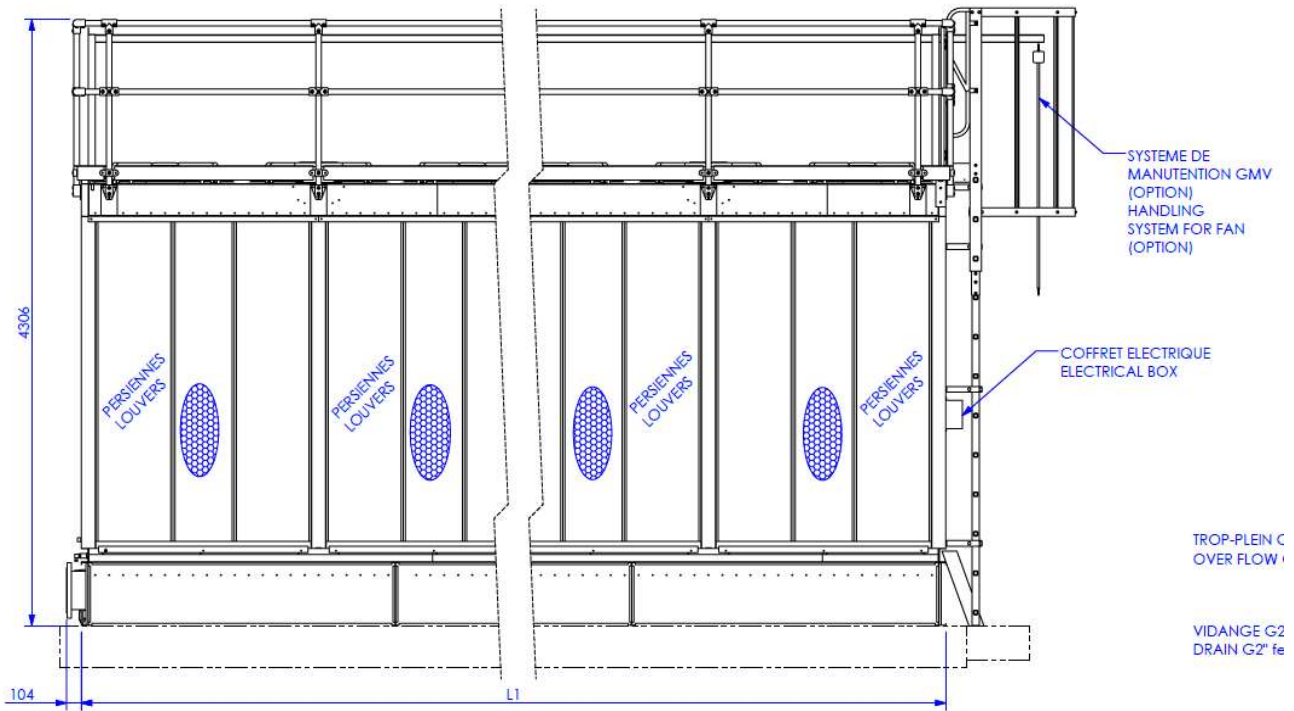
(1): average reference power calculated for a thermal regime of 32 / 27 / 21 ° C.

(2): sound level : Average pressure level (Lp) in free field in the 4 directions to the ground.1.5 m

## Drawings and dimensions XTO



## Drawings and dimensions XTO

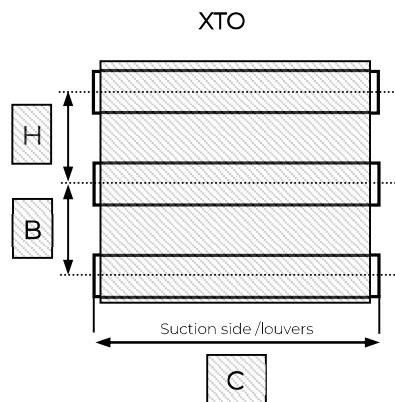


## XTO support

Our towers can be placed on the ground or on a concrete floor, but it is advisable to install them on concrete floor or support beams.

Ensure that the floor receiving the cooling tower can withstand the load in operation and that the floor or supports are correctly plane.

### Number and position of concrete beams or support irons (customer supply) for a non-soundproof tower



	Qty	Beam spacing sub-basin [mm] A	Beam spacing sub-basin [mm] B	Length greater than C [mm]
XTO-X-01-E09-S-03-1-011-24-PL-BA	3	1,232	1 650	1 500
XTO-X-02-E09-S-03-1-022-24-PL-BA		1 232	1 650	2 500
XTO-X-03-E09-S-03-1-033-24-PL-BA		1,232	1 650	3 700
XTO-X-04-E09-S-03-1-044-24-PL-BA		1,232	1 650	4 900
XTO-X-05-E09-S-03-1-055-24-PL-BA		1,232	1 650	6 000
XTO-X-06-E09-S-03-1-066-24-PL-BA		1,232	1 650	7 100
XTO-X-07-E09-S-03-1-077-24-PL-BA		1,232	1 650	8 300
XTO-X-08-E09-S-03-1-088-24-PL-BA		1,232	1 650	9 400
XTO-X-09-E09-S-03-1-099-24-PL-BA		1,232	1 650	10 500
XTO-X-10-E09-S-03-1-110-24-PL-BA		1,232	1 650	11 700
XTO-X-11-E09-S-03-1-121-24-PL-BA		1,232	1 650	12 800

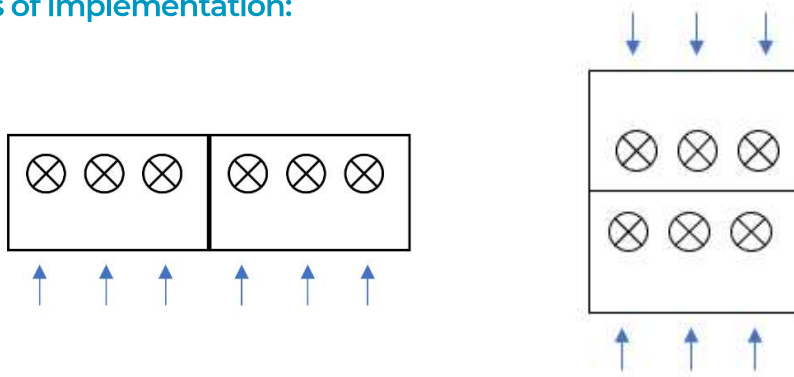
## Choice of location - XTO

The cooling tower should not be surrounded on all sides by a wall greater than or equal to its height, and moreover without opening, since a risk of "short circuit" could occur. The air discharged from the tower (hot air saturated with humidity) could then be recycled into the tower and consequently reduce its thermal power.

In any case, it is necessary to respect minimum space on all four sides of the tower to ensure proper feeding of fans and sufficient access for assembly and maintenance.

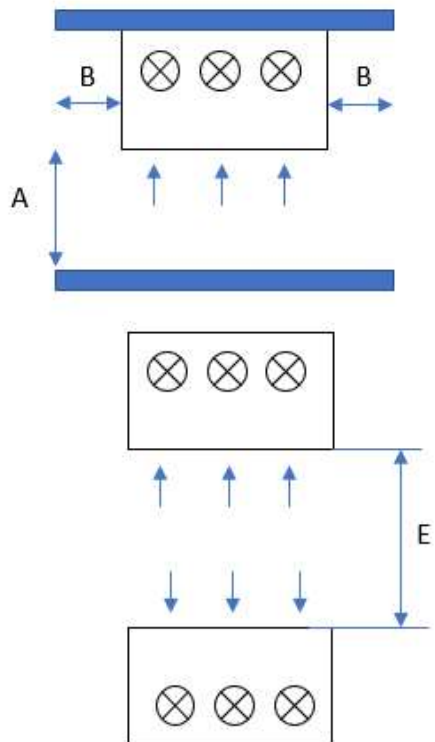
Failure to comply with these few rules would inevitably lead to the cooling tower's malfunction.

### Examples of implementation:



Contact us for a location advice

### Minimum recommended space in mm for standard towers: diagrams, seen from above



- A= minimum 0.9 m up to 3 fans
- A= minimum 1.2 m from 4 to 7 fans
- A= minimum 1.3 m from 8 to 11 fans
- B = minimum 1 m
- E = minimum 1.8 m (Up to 4 fans)
- E = minimum 2.4 m (From 4 to 7 fans)
- E = minimum 2.6 m (From 8 to 11 fans)



### WATER EVAPORATION

Water evaporation: this consumption by evaporation is approximately 1.7 kg/h per 1,000 kcal/h.

### DECONCENTRATION

Due to the evaporation and recycling of water, there is a concentration of impurities or salts in the water. To prevent this concentration from exceeding a limit value, it is necessary to carry out deconcentration purges.

Without this purging, considerable concentration rates ( $T_x$ ) of 10, 100, or even 1000 over time would obviously be reached. For the pre-design of galvanized steel installations, the value of 2 times the evaporation may be used ( $T_x=2$ ). For operation, in connection with a water treatment this value may decrease, especially with cooling tower's casing made of stainless steel (rate from 3 to 5 possible).

Depending on the case, three deconcentration solutions can be implemented:

#### 1- Continuous purges

Pitting to be carried out at the pump discharge just before the tower, if possible, at the spray ramps, so that the purge is carried out only when the circulation pump is in operation.

The purge flow rate is calculated by the formula:  $[100 S / (M - S) \%]$  of the make-up water flow in which:

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

M: Maximum permissible salinity in the circuits.

#### **Example:**

Salinity of make-up water = TH 20°

Maximum permissible salinity = TH 40°

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

So, the continuous purge must be equal to the volume of water evaporated.

As a result, the actual make-up water flow will be twice the theoretical rate of evaporation.

#### 2- Discontinuous purges

The conductivity of the water in the circuit is checked and the installation is purged according to the value not to be exceeded.

#### 3- Maintenance-free JACIR automatic inductive deconcentration

Through the conductivity measurement, it is possible to control a motorized valve that allows a flow to the sewer corresponding to the amount of water necessary to maintain a correct value of the concentration rate. (See separate document).

### WATER TREATMENT

To ensure the proper operation of a closed cooling system the good quality water is essential.

If the water is loaded with large impurities, it is recommended that a bypass filtration of 5 to 10% of the recycled water flow rate be provided. If the water contains encrusting salts or chemically aggressive elements, make-up water treatment is required to obtain a softer water closer to chemical neutrality, able to feed the machines to be cooled without the risk of damaging them.

In some cases, algae, mosses, fungi or shells may tend to grow in a cooling tower. There are products that, periodically added to the circuit water, prevent the development of these organisms.

**Water treatment will have to be entrusted to specialized companies.**

**PREVENTION OF THE RISKS OF LEGIONELLOSIS:** see separate document

## Technical Specifications XTO

Evaporative **cross flow open circuit** water-cooling towers, high energy efficiency, thermal performance **EUROVENT certified**, equipped with EC motors integrated with centrifugal jet fans, brand **JACIR XTO** range ... ..

The motor fan with suction lodge on one side will be continuously controlled by electronical commutation: its efficiency will be significantly higher than that of IE5, without any use of rare earth magnets. The power electronics integrated into the EC motors will be compatible for supply voltages from 380 to 480V-IP 55.

The system will imperatively be a direct air-water exchange against the current.

### Thermal characteristics

The power evacuated will be ..... kW for a regime of.....°C to .....°C with a humid temperature at suction of ..... °C.

The tower will have been the subject of a EUROVENT thermal performance certification.

### Acoustic characteristics

The sound pressure level of the tower must not exceed ..... dB (A) at ..... meters in free field in the 4 directions ; to do this, the tower will be equipped with soundproofing if necessary.

### Casing structure

The tower will be designed:

- ∞ In silver steel sheet with a thickness of 2mm Zendimir process at 275 gr/m<sup>2</sup> or,
- ∞ In X-STEEL stainless steel for longevity, water saving and possibility of acid cleaning.

### Tower casing and basin with sloped and plane bottom

The tower's casing will consist of self-supporting panels made of double or quadruple fold sheet metal on the 4 panels' sides. The side panels will be designed to receive later, if necessary, a belated soundproofing of the tower's casing.

The assembly will be done by stainless steel rivets with high clamping power, with Elastomeric seals and no application of sealant. There will be no welding nor screws for the assembly of sheets on parts in contact with water.

The light will be obscured in all upper parts of the basin.

The basin will be equipped with a solenoid valve and level sensors, a drain, an overflow and one or two anti-cavitation strainers filters.

The inclined bottom of the basin will allow easy and total emptying: the lower dimension of the drain hole (POWER FLOW) will be below the low point of the basin and of dimensions 260 x 110mm.

## Louvers

Fixed on their stainless-steel support, the polypropylene louvers will prevent water from being reflected outside the basin.

In addition, their double-direction and honeycomb shape prevent any UV rays into the basin or suction of large external particles, thus allowing better control of bacteriological development. Their dismantling is very easy and will give full access to the exchange surface.

## X-PACK Infill

X-PACK infill blocks are made of thermoformed and welded polypropylene sheets, with an inclined cut, they are shock resistant and offer maximum exchange surface. Resistant up to 75°C as standard, their excellent thermal efficiency and low pressure drop promote energy savings.

## Drift eliminators

The highly efficient PVC drift eliminators will be EUROVENT certified, complying with December 2020 French NF E 38-424 standard and VDI 2047-2 standards relating to hygienic risks. They eliminate water entrainments at the tower outlet: the vesicular drive will be a maximum of 0.01% of the recirculating flow. Resistant to UV rays, they are easily removable.

## Water distribution

The water distribution will be ensured by a gravity water distribution tank equipped with highly efficient nozzles.

These polypropylene nozzles will distribute water evenly at the top of the exchange surface and operate at low pressure (0.01 bar).

Finally, the passage section of the water will be generously dimensioned, thus avoiding the dispersers clogging, even in case of many suspended solids.

## EC Motor-fan groups

New generation of EC motor-fan groups - compact and quiet offering more power and efficiency, with EC motor integrated directly into the wheel.

Motor-fan groups aligned in a row at the top of the tower will draw air through the louvers and then through the packing blocks.

EC motors (Electronically Commutated), will be IP class 55, 380/400 V, 50/60Hz,

Each motor will integrate a variable speed drive driven by PLC,

A junction box located at human height is provided for the quick connection of all motor-fan groups.

## Accessibility and hygienic design

As standard, the basin will be equipped with a POWER FLOW hatch (dimensions 260 x 110 mm) to quickly and completely evacuate muds and other materials accumulated at the bottom of the basin; using a water jet.

To facilitate inspection and maintenance, the X-TAR range will be equipped as standard with a total opening without threshold and with a mechanical shutter fitted with a safety sensor.

This immediate access to the maintenance corridor facilitates the safe inspection and maintenance of all tower's internals. The maintenance corridor is also equipped with a grating floor lined and an additional occulting protection to prevent direct UV rays inside the tower.

Optional ladder and railing will allow secure access to the top of the tower to facilitate inspection and maintenance:

- ∞ the water distribution system protected by covers equipped with handles,
- ∞ motor-fan groups

## Options

An Automatic Inductive Deconcentration system can be integrated as an option (see separate technical sheet).

Also available in option:

- ∞ In silver steel sheet with a thickness of 2mm Zendzimir process at 275 gr/m<sup>2</sup> or,
- ∞ X-STEEL stainless steel tower's casing
- ∞ Non-freezing heater with thermostat
- ∞ Support irons
- ∞ Electrical cabinet
- ∞ Ladders and walkways
- ∞ The equipment can be delivered in parts to be assembled, with on-site assembly by our experienced technicians, ...