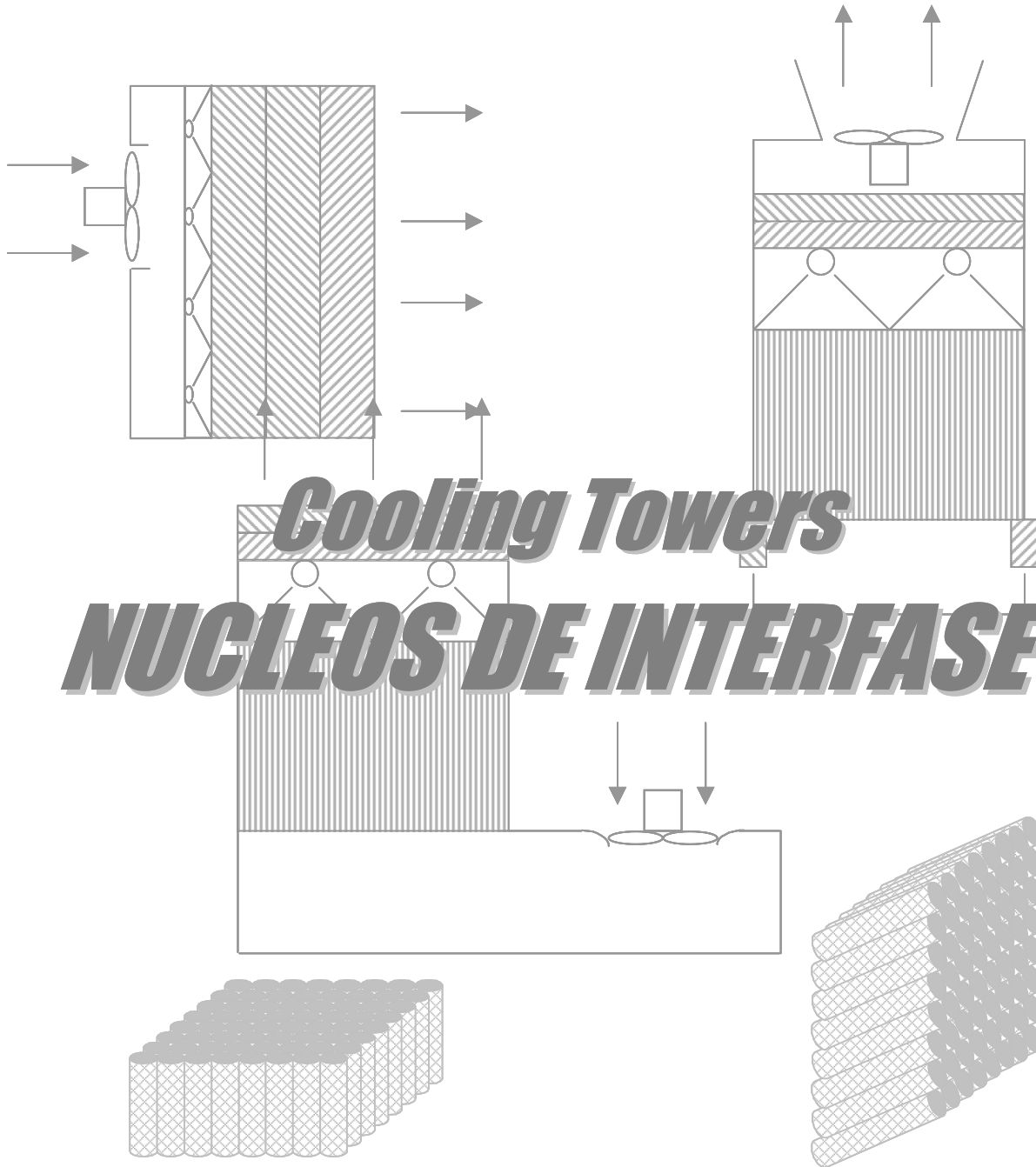
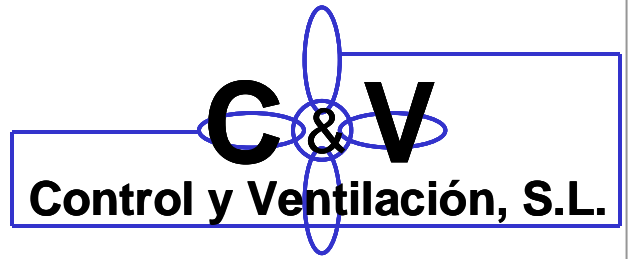


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 **Núcleos de
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1. NUCLEOS DE INTERFASE COOLING TOWERS

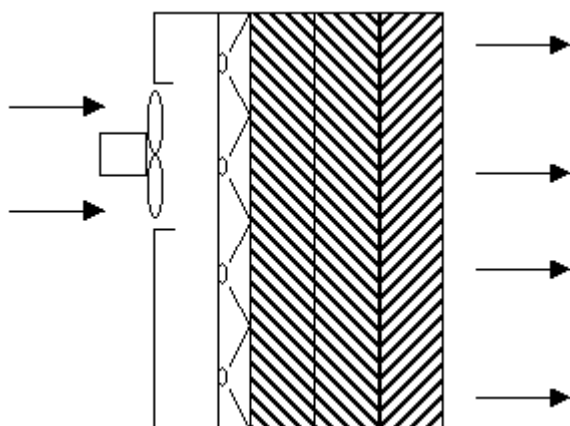
1.1. DESCRIPTION

The main material used in the construction of the Nucleos cooling towers is plastic. This material is used for two main reasons: (1) to avoid the effects of corrosion and (2) in order to benefit from a production in-series where the moulds are carefully designed and studied in order to avoid water leaks and other problems typical of towers made from joined plates.

The casing is made from polyester reinforced with glass-fiber, the water distribution and nozzles are made from PVC, and the fill and drift eliminators are made from high-density polythene. This reduces the use of metals to the screws and the supports for the motor and the fill. These items are all made from stainless steel.

1.2. CONSTRUCTION

a) Series YH.



The cooling towers in the YH series consist of just one case, which can be divided into the following sections:

Air drive ventilator and water distribution network. The air is pushed horizontally through the unit and the water is distributed via a network of tubes connected to nozzles.

Thermal interchange and drift eliminator. The thermal interchange takes place when the water and air

comes into contact with the evaporative pads. The pads are placed in two layers and positioned in a V-shape. The second layer of the pads also functions as a drift eliminator.

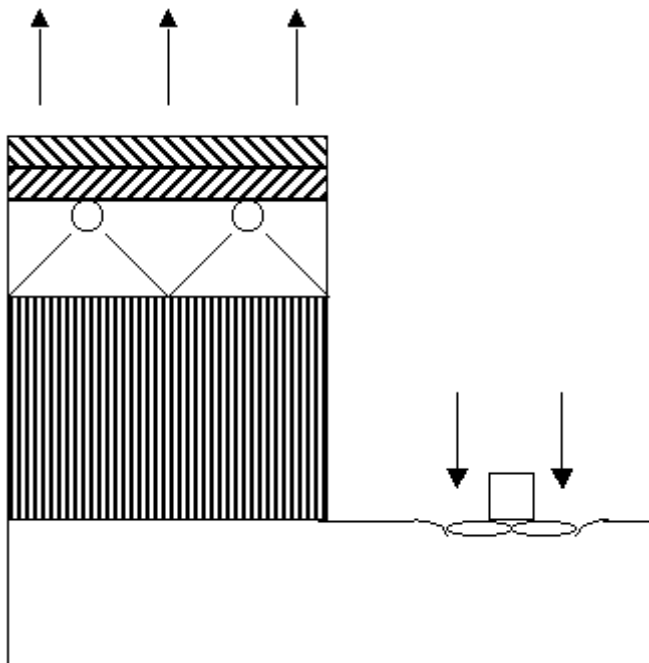
The water basin is placed in the lower part of this section. The connections to the entry and exit of the water are situated on the side wall of the unit along with outlets for water intake, emptying, and spillway.

b) Series YL.

The cooling towers in the YL series consists of two casts which can simply be mounted one-on-top-of-the-other. It can be divided into the following sections:

Lower unit: water basin and motor-driven ventilator. One of the characteristics of this series is the elongated lower part where the water basin is located. This allows, not only, for a large volume of water in circulation, but also for easy access to the motor-driven ventilator which is

situated above the water basin supported by a stainless steel structure. The electrical connections are made directly over the axis of the motor. The axial ventilator is connected directly to the axis of the motor.

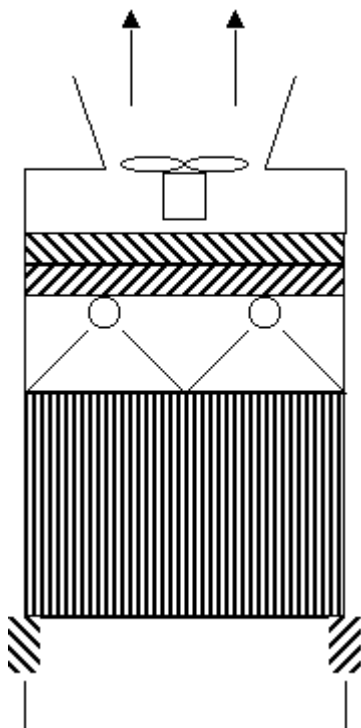


The cold water exit with incorporated filter is situated on the frontal wall of the water basin along with outlets for water intake, emptying, and spillway.

Also situated on that wall is a sluice for inspection and maintenance purposes.

Upper unit: Thermal interchange. The thermal interchange section consists of blocks of pads supported by steel frames, the drift eliminator, and the water distribution network.

c) Series YN



The cooling towers in the YN series consist of two casts which are simply mounted one-on-top-of-the-other. It can be divided into the following sections:

Lower unit: Water basin, thermal interchange in the form of a block of pads supported by a steel frame, and the air intake. Also situated in the lower unit are the cold water exit with incorporated filter and the water intake, emptying, and spillway. Inspection of the components is done through the air intake removing the polyester deflectors.

Upper unit: Situated here are the water intake, the water distribution network, the drift eliminator, and the motor-driven ventilator. There is also a relatively large opening for maintenance and inspection purposes.

The axial ventilator is connected directly to the axis of the motor, positioning this horizontally, fastened to the roof by a stainless steel frame.

2. SPECIFICATIONS

2.1. FILL

The fill is made from high-density polythene (HDPE) mesh. The use of this mesh, whose geometry has been carefully studied, ensures that the whole surface will be wetted: The water forms a continuous plate supported by the reticular structure, and this plate remains exposed at both sides when it comes into contact with the air. The mesh is soldered together so as to form triangular flutes. In the YL and YN series the flutes are positioned in parallel to the air flow and in the YH series they are positioned oblique.

It is very difficult to obstruct the pads due to the design, which incorporates flutes of ample size that do not intertwine.

This construction also eases the cleaning process.

The area of the fill used in the cooling towers series YL and YN is $160\text{m}^2/\text{m}^3$ in the 224, $200\text{m}^2/\text{m}^3$ in the 324 and $240\text{m}^2/\text{m}^3$ in the 424. The YH series uses fill with the area $240\text{m}^2/\text{m}^3$.

Other types of fill also exists for specific purposes.

2.2. DRIFT ELIMINATOR

The drift eliminator is similar in its structure to that of the fill. The drift eliminator is different in the way that the flutes are inclined. They are inclined so as to capture the water drops expelled from the air thereby eliminating the loss of water.

2.3. WATER DISTRIBUTION NETWORK

The sprinklers that are in charge of distributing the water over the pads are made from turned PVC with stainless steel static propellers. They produce a full cone-shape of water spray. Their nominal size is 90mm and they are joined to the pipes via stainless steel brackets.

In the YH cooling tower the water spray produced is that of a hollow cone-shape and the sprinklers are joined to the pipes via threads 3/8".

2.4. MOTOR-DRIVEN VENTILATOR

a) Series YH

The motor driven ventilator is very compact. It forms a square with the diffuser and the mesh and its blades are connected directly onto the mobile part of the motor.

b) Series YL/YN

The ventilator used in these models is axial and is connected directly onto the axis of the motor without any type of transmission.

The ventilators are made from aluminum (the coupling and flange) and polypropylene (the blades).

The number of protection for the motor is IP55

The cooling towers in this series are made in three versions; **BV** (Low speed motor with low noise-level), **AV** (High speed motor), and **DV** (Two-speed motor).

The two-speed motor permits the best utilization of the cooling tower. At peak times it can be set on high speed and at night or on cooler days it can be set on low speed in order to save energy.

3. ADDITIONAL DATA

3.1. INSTALLATION AND IMPLANTATION

a) Series YH.

The cooling towers are delivered in one single piece ready for installation. It is fastened using the four bolts as indicated in the drawing. They are screwed into four iron fittings situated in every inside corner of the tower.

The electrical connections are obtained directly upon the terminals of the motor.

b) Series YL / YN.

The cooling towers in these series are delivered in two parts as described earlier. It is, however, not difficult to install them because they simply fit one-on-top-of-the-other and it is not necessary to fasten them further with screws and bolts, it is, however, recommended to draw a line of silicone between the two parts.

The cooling towers should be placed upon an even platform as illustrated in the drawing. They are fastened using the four bolts also indicated in the drawing. The bolts are to be screwed into the iron fittings situated in every inside corner of the water basin.

ATTENTION: Do not install silent-blocks. The elasticity of the plastic material itself makes the installation of these unnecessary.

The electrical connections are made directly upon the terminals of the motor.

3.2. ENTRANCE FOR WATER TO BE COOLED

a) *Series YH*

The connection to the water entrance is situated in the side wall and is of the type 1 ¼" thread gas.

b) *Series YL*

In the standard version the connection to the water entrance is situated in the upper part of the tower. The connection is of the type flanged PN 10 DN 2576 size 3" in the YLA, 4" in the YLB model, 5" in the YLC model, and 6" in the YLD model.

In the special version the water entrance is placed in the frontal wall of the water basin (maintaining the same nominal sizes).

c) *Series YN*

In the standard version the connection to the water entrance is situated in the upper part of the tower. The connection is of the type flanged PN 10 DN 2576 size 3" in the YNA, 4" in the YNB model, 5" (two entrances) in the YNC model, and 5" (three entrances) in the YND model.

3.3. EXIT FOR COOLED WATER

a) *Series YH*

The connection to the water exit is situated on the same vertical as the connection to the water entrance and is of the type 1 ¼" thread gas.

b) *Series YL / YN*

The connections for the water exits have the same nominal sizes as those for the water entrance.

The outlet is connected on the inside of the water basin to a PVC tube. The tube functions as a filter and it can be cleaned easily by simply removing any obstructions from the outside. In order to clean the tube more thoroughly the lid at the end of the tube can be unscrewed and the tube can be cleaned from there.

ATTENTION: The water exit is designed to be connected to the pump intake. If it is desired that this exits works by gravity the technical department should be consulted.

3.4. WATER REPLENISHMENT

The outlet for the water replenishment is connected to a float valve type ½" thread gas in the YH series, 1" in the YLA, YNA, YLB, and YNB series, and finally 1 ¼ " in the YLC, YNC, YLD, and YND series.

3.5. SPILLWAY AND EMPTYING

The outlets for spillway and emptying are of the type 1 ¼" thread gas in the YH series, 1 ½" in the YL and YN series. They are situated in the same vertical so that they can be connected to the same collecting tube.

ATTENTION: The above mentioned collection tube is compulsory in order to permit an uninhibited water exit.

Installation of cooling towers in parallel:

In an installation of various cooling towers connected in parallel the water basins are connected through a collector tube.

This collector should be sufficiently large so that the loss of the load is minimized. If the collector is not sufficiently large it will cause differences in the water levels of the water basins.

This can also be avoided by installing an independent connection between the water basins. For this purpose a tube size of 3" is recommended.

In any case each cooling tower is supplied with its own intake float valve and to further avoid any problems each outlet for emptying and spillway should be connected to an independent funnel which connects to the general emptying tube.

3.6. SERVICE

Generally speaking the cooling towers are to be installed outside, far from things that might hinder the circulation of the air. Additionally, the cooling towers in the series YL need to be installed in a place where there is at least two meters of free space in front of the unit in order to allow space for the water connections and entry for maintenance of the mechanical equipment. The side walls and the back may be placed against other units connected in parallel or against walls.

Adjustment of the ventilator blades:

The angle of the ventilator blade is measured on the outside of this, on the concave side. It is measured with a ruler with angle and lever.

In order to modify the angle of the blade it is necessary to loosen the screws of the flange.

After such a change has been made it is advised to test the consumption of the motor.

The angels for each model are:

Type	Degree
YLA	32,5
YLB	37,5
YLC	32,5
YLD	31

3.7. MAINTENANCE

For the correct maintenance of the cooling towers, the following is recommended:

Period	Task to perform
Monthly	<ul style="list-style-type: none"> .- Clean the water filter and the air filter. .- Test the water purging system.
Annually	<ul style="list-style-type: none"> .- Clean the water filter. .- Clean the ventilator blades. .- Empty and clean the water basin. .- Inspect and if necessary clean the pads and drift eliminator. .- Clean and lubricate the motor using a grease with EP additives (high pressure).

Furthermore local rules and regulations for maintenance of cooling towers should be obtained and followed.

3.8. GUARANTEES

Control y ventilación, S.L guarantees the following:

a) Thermal:

The cooling capacity with a maximum tolerance in respect to the water temperature of 1°C.

b) Loss of water:

A maximum water loss due to air drag of 0,05% of the total flow.

c) Materials:

The materials and equipment have a guarantee of 24 months from the day of delivery.

d) General:

The values included in the table of characteristics with a maximum tolerance of 5%.

4. TABLE OF GENERAL CHARACTERISTICS.

	MODEL	WEIGHT EMPTY (Kg.)	WEIGHT IN SERVICE (Kg.)	AREA OF INTERCHANGE (m ²)	AIR FLOW (m ³ / H)	WATER FLOW* (m ³ / H)	MOTOR POWER (Kw.)	MOTOR (RPM)	NOISE LEVEL (dBA)**
	YH 055	60	130	38	5.800	5	0,38	1.300	48
	YH 110	100	210	63	9.200	8	0,68	1.300	48
L O W S P E E D	YLA 224 BV	260	860	224	8.270	22	0,55	1.000	48
	YLA 324 BV	280	880	280	8.270	23	0,55	1.000	48
	YLA 424 BV	300	900	336	8.270	25	0,55	1.000	48
	YLB 224 BV	460	1.810	504	18.700	50	1,50	1.000	54
	YLB 324 BV	490	1.840	630	18.700	53	1,50	1.000	54
	YLB 424 BV	520	1.870	756	18.700	55	1,50	1.000	54
	YLC 224 BV	860	3.260	896	35.300	95	2,20	750	59
	YLC 324 BV	900	3.300	1.120	35.300	100	2,20	750	59
	YLC 424 BV	940	3.340	1.344	35.300	104	2,20	750	59
	YLD 224 BV	1.280	4.880	1.344	46.900	125	3,00	750	59
	YLD 324 BV	1.340	4.940	1.680	46.900	132	3,00	750	59
YLD 424 BV	1.400	5.000	2.016	46.900	138	3,00	750	59	
H I G H S P E E D	YLA 224 AV	260	860	224	12.700	33	1,50	1.500	57
	YLA 324 AV	280	880	280	12.700	36	1,50	1.500	57
	YLA 424 AV	300	900	336	12.700	37	1,50	1.500	57
	YLB 224 AV	460	1.810	504	28.100	75	4,00	1.500	63
	YLB 324 AV	490	1.840	630	28.100	80	4,00	1.500	63
	YLB 424 AV	520	1.870	756	28.100	83	4,00	1.500	63
	YLC 224 AV	860	3.260	896	47.500	127	5,50	1.000	65
	YLC 324 AV	900	3.300	1.120	47.500	134	5,50	1.000	65
	YLC 424 AV	940	3.340	1.344	47.500	139	5,50	1.000	65
	YLD 224 AV	1.280	4.880	1.344	62.500	167	7,50	1.000	65
	YLD 324 AV	1.340	4.940	1.680	62.500	176	7,50	1.000	65
YLD 424 AV	1.400	5.000	2.016	62.500	184	7,50	1.000	65	

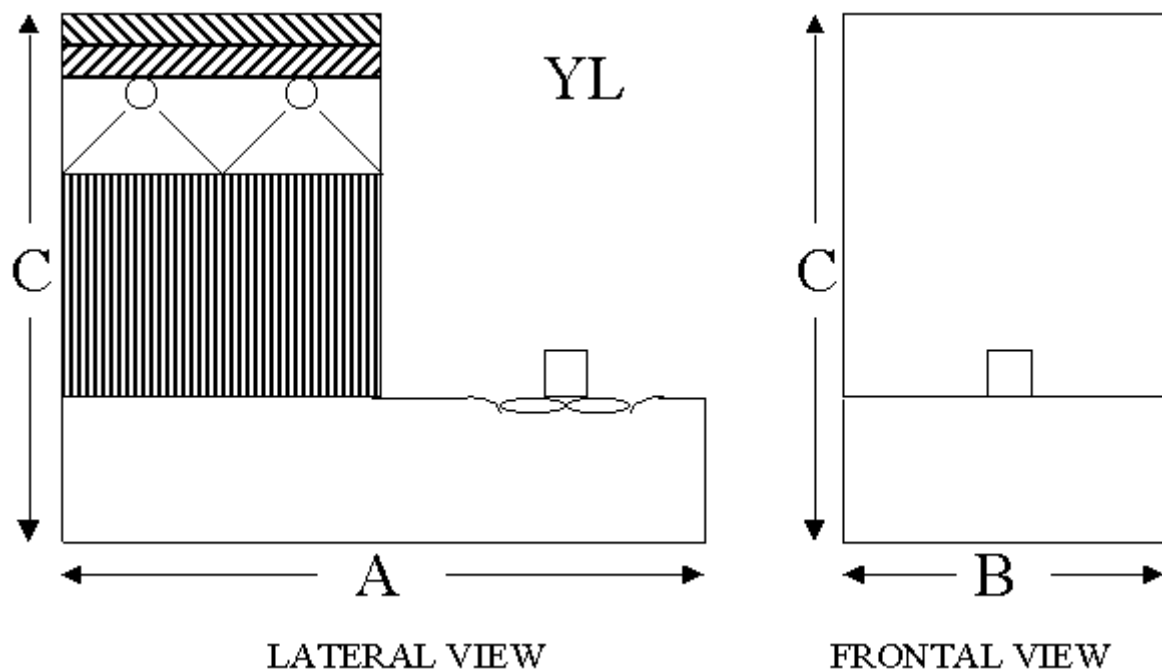
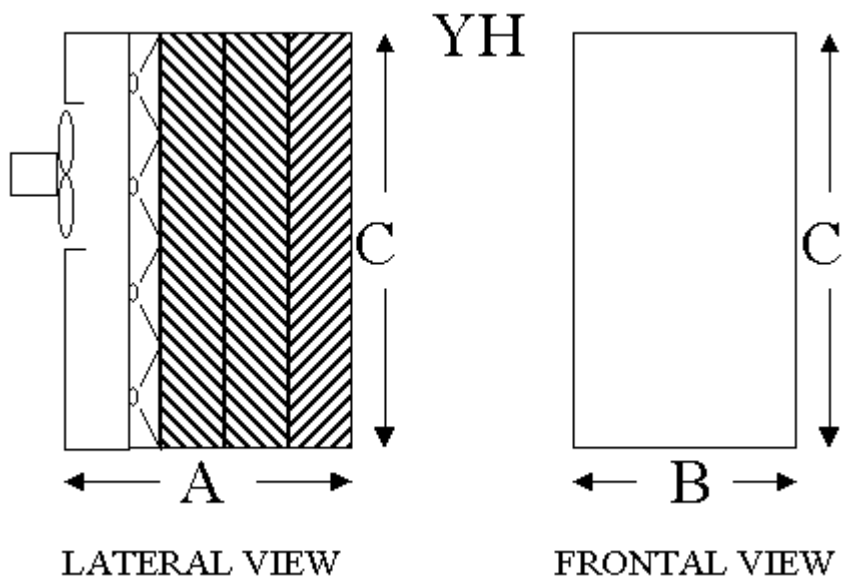
	MODEL	WEIGHT EMPTY (Kg.)	WEIGHT IN SERVICE (Kg.)	AREA OF INTERCHANGE (m ²)	AIR FLOW (m ³ / H)	WATER FLOW* (m ³ / H)	MOTOR POWER (Kw.)	MOTOR (RPM)	NOISE LEVEL (dBA)**
L O W S P E E D	YNA 224 BV	190	490	224	8.270	22	0,55	1.000	48
	YNA 324 BV	210	510	280	8.270	23	0,55	1.000	48
	YNA 424 BV	230	530	336	8.270	25	0,55	1.000	48
	YNB 224 BV	320	1.000	504	18.700	50	1,50	1.000	54
	YNB 324 BV	350	1.030	630	18.700	53	1,50	1.000	54
	YNB 424 BV	380	1.060	756	18.700	55	1,50	1.000	54
	YNC 224 BV	700	1.900	896	35.300	95	2,20	750	59
	YNC 324 BV	740	1.940	1.120	35.300	100	2,20	750	59
	YNC 424 BV	780	1.980	1.344	35.300	104	2,20	750	59
YND 224 BV	880	2.680	1.344	46.900	125	3,00	750	59	
YND 324 BV	940	2.740	1.680	46.900	132	3,00	750	59	
YND 424 BV	1.000	2.800	2.016	46.900	138	3,00	750	59	
H I G H S P E E D	YNA 224 AV	190	490	224	12.700	33	1,50	1.500	57
	YNA 324 AV	210	510	280	12.700	36	1,50	1.500	57
	YNA 424 AV	230	530	336	12.700	37	1,50	1.500	57
	YNB 224 AV	320	1.000	504	28.100	75	4,00	1.500	63
	YNB 324 AV	350	1.030	630	28.100	80	4,00	1.500	63
	YNB 424 AV	380	1.060	756	28.100	83	4,00	1.500	63
	YNC 224 AV	700	1.900	896	47.500	127	5,50	1.000	65
	YNC 324 AV	740	1.940	1.120	47.500	134	5,50	1.000	65
	YNC 424 AV	780	1.980	1.344	47.500	139	5,50	1.000	65
YND 224 AV	880	2.680	1.344	62.500	167	7,50	1.000	65	
YND 324 AV	940	2.740	1.680	62.500	176	7,50	1.000	65	
YND 424 AV	1.000	2.800	2.016	62.500	184	7,50	1.000	65	

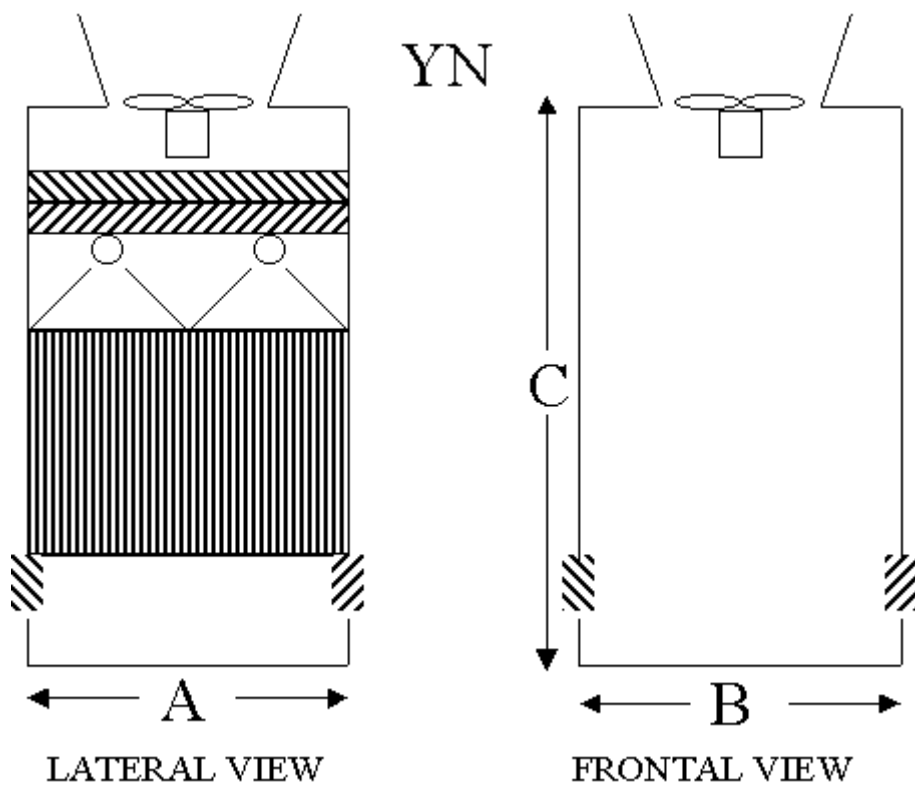
* Water flow cooled for the following temperatures:

Water entry (°C)	33,00	34,50	36,00	37,50
Water exit (°C)	27,50	29,00	30,50	32,00
Humid bulb (°C)	23,00	25,00	27,00	29,00

** measurements made with 10m of free space.

5. APPENDIX – DRAWINGS OF THE MODELS





	mm									
	YH055	YH110	YLA	YLB	YLC	YLD	YNA	YNB	YNC	YND
A	850	850	2.000	3.000	4.000	5.400	1.000	1.500	2.000	2.000
B	600	1.000	1.000	1.500	2.000	2.200	1.000	1.500	2.000	3.000
C	1.250	1.250	2.950	2.930	3.200	3.850	4.330	4.330	4.865	5.260

6. APPENDIX – EU DECLARATION OF CONFORMITY

EU DECLARATION OF CONFORMITY

Mr. Pedro J. Ventura Rodríguez, Director of and representing:

CONTROL Y VENTILACION, S.L

C/Isaac Peral, 23, Pol. Ind. La Pedrera
03720 Benissa (Alicante), Spain

hereby declares, under his responsibility, that the cooling towers, models:

YH55, YH110, YLA224, YLA324, YLA424, YLB224, YLB324, YLB424, YLC224, YLC324, YLC424, YLD224, YLD324, YLD424, YNA224, YNA324, YNA424, YNB224, YNB324, YNB424, YNC224, YNC324, YNC424, YND224, YND324, and YND424

are in compliance with the basic security requirements outlined by **Machine Directive 98/37/CEE**.

For the specific requirements for these units the following standards and technical specifications have been applied:

- **Directive Standard EN 292-1:93** Machine safety. Basic concepts, general design method. Part I: Basic terminology, methodology.
- **Directive Standard EN 292-2:93** Machine safety. Basic concepts, general design method. Part II: Principles and technical specifications.
- **Directive Standard EN 60204-1:99** Machine safety. Electrical equipment in machines. Part I: General requirements.

Benissa, the 27th of October 2003



Signed by: Pedro J. Ventura Rodríguez
Director of CONTROL Y VENTILACIÓN, S.L