# The importance of being CTI-Eurovent

## Summary



## Introduction

The three sections of this paper will touch the following topics:

1) A brief explaination of the aim of the third-part certification;
2) A comparison between the datasheet of a third-part certified unit and the datasheet of a non certified unit.
3) An evaluation of the impact of the third-part certification on the Key Parameters Indicator performances for cooling technologies.

## Aim of Third-part certification

**The aim of third-part certification is safety.**

If you are providing a high quality product you aren't interested in saving money on the material quality or the performances of the heat transfer media, guaranteed performance is going to allow you to achieve the performance requested even if the design process wasn't perfect. Being certified prevents issues even if environmental conditions become more critical than expected and even if

operating and maintenance conditions are not optimal. Also the use of a certified product guarantees you to get the specified unit performance using the lowest possible energy.

## Third part certification vs manufacturer guaranteed performance

In the following section there will be a comparison between performances of a third-party certified unit and a unit with a manufacturer's guarantee.

### CERTIFIED

**(1) ATWB 8-5K21**

0293990441
ecarpinelli@evapco.it

**Product Description**

The ATWB is a prime-surface steel **coil only** closed circuit cooler, featuring **CrossCool™ Internal Tube Enhancement**, designed around EVAPCO's induced draft Advanced Technology (AT) tower. The ATWB line offers the most box size configurations in the industry while also providing **nominal dry cooling capacity at reduced loads**. This is not true for most evaporative closed circuit coolers in the industry! The ATWB is a maintenance friendly product, designed for all routine maintenance to be performed from outside the unit.

Hot Saturated Discharge Air
Hot Fluid In
Cooled Fluid Out
Cool Dry Entering Air

| Selection Criteria | Total | Each Unit |
|---|---|---|
| Flow: | 47,8 LPS | 47,8 LPS |
| Fluid: | Water | Water |
| Entering Fluid Temp: | 35,0 C | 35,0 C |
| Leaving Fluid Temp: | 30,0 C | 30,0 C |
| Entering Wet Bulb: | 25,0 C | 25,0 C |

**Required Capacity**

1.000,00 kW
860.010 kcal/hr
227,52 Tons

Entering Dry Bulb Switchover: -7,8 C

**Unit Selected**

One(1) EVAPCO ATWB 8-5K21 at 103,4% capacity (1.033,76 kW)

**Product line is CTI certified for water, propylene glycol or ethylene glycol as process fluid. Selection is rated in accordance with CTI Standard 201 RS.**
**Product line is Eurovent (ECC) certified. Selection is rated in accordance with TCR ECP-04**

**Physical Data Per Unit**

| | |
|---|---|
| Overall Dimensions (WxLxH): | 2.388mm x 6.401mm x 4.032mm |
| Operating Weight: | 14.869 kg |
| Shipping Weight: | 9.974 kg |
| Heaviest Section: | 8.620 kg |

*weights and dimensions could vary depending on options selected

**IBC Design Capability**

IBC Standard Structural Design
1.0 Importance Factor Specified

| | |
|---|---|
| Seismic(Sos): | up to 1.6 g, z/h = 0 |
| Wind Load(P): | up to 13.79 kPa |

**Fan Motor Data Per Unit**

| | |
|---|---|
| Number of Fans: | 2 |
| # of Fan Motors: | 2 |
| Nameplate Power (400/3/50): | 15,00 kW Per Motor |
| Total Connected Nameplate Power: | 30,00 kW |
| Typical Nameplate FLA: | 27,9 Amps Per Motor |

*Nameplate FLA could vary

**Pump Motor Data per Unit**

| | |
|---|---|
| No.of Pumps: | 1 |
| Nameplate Power (400/3/50): | 5,5 kW per pump motor |
| Design Amps: | 11,4 Amps Per Motor |

*Design amps could vary

**Additional Details Per Unit**

| | |
|---|---|
| Air Flow: | 48 m³/s |
| Coil Volume: | 2.127,2 L per unit |
| Coil Design Pressure: | 10 Bar |
| Riser Pipe Diameter: | 152,4 mm |

**Hydraulic Data**

| | |
|---|---|
| Spray Water Flow: | 66 LPS |
| Pressure Drop Through Coil: | 110,1 kPa |
| Evaporated Water Rate: | 0,34 LPS |

### NOT CERTIFIED

| Selection Criteria | Total | Each Unit | Required Capacity |
|---|---|---|---|
| Flow | 47,8 lps | 47,8 lps | 1000 kW |
| Fluid | Water | Water | 860.010 kcal/hr |
| Entering Fluid Temp | 35,0 °C | 35,0 °C | 227,52 Tons |
| Leaving Fluid Temp | 30,0 °C | 30,0 °C | |
| Entering Wet Bulb | 25,0 °C | 25,0 °C | |

**Unit Selected**

XXXX at 103,6% capacity [1036,40 kW]

**Physical Data per Unit**

| | |
|---|---|
| Overall Dimensions [W x L x H] | 2.388 mm x 6.401 mm x 3.632 mm |
| Operating Weight | 12.143 kg |
| Shipping Weight | 7.738 kg |
| Heaviest Section | 6.380 kg |

| Fan Motor Data Per Unit | | Pump Motor Data per Unit | |
|---|---|---|---|
| Number of Fans | 2 | N° of Pumps | 1 |
| # of Fan motors | 2 | Nameplate Power [400/3/50] | 5,5 kW |
| Nameplate Power (400/3/50) | 11,00 kW per motor | Design Amps | 11,4 Amps per Motor |
| Total connected Nameplate Power | 22,00 kW | | |
| Typical Nameplate FLA | 21,7 Amps per Motor | | |

**Additional Details Per Unit**

| | |
|---|---|
| Air Flow | 47 m3/s |
| Coil Volume | 1.296,2 L per unit |
| Coil Design Pressure | 10 bar |
| Riser Pipe Diameter | 152,4 mm |

**Hydraulic Data**

| | |
|---|---|
| Spray Water Flow | 66 lps |
| Pressure Drop Through Coil | 67,8 kPa |
| Evaporated Water Rate | 0,34 lps |

Comparing a third-part certified unit with a non-certified unit can be very challenging when dealing with closed circuit coolers because it is not always easy to identify the differences.

THIRD-PART CERTIFICATION

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Required Capacity
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227,52 Tons
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Pump Motor Data per Unit

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| No.of Pumps: | 1 |
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Full Spectrum Evolution
evapco

Additional Details Per Unit

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Hydraulic Data

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| Evaporated Water Rate: | 0,34 LPS |

OVER-ESTIMATED CAPACITY

| Selection Criteria | Total | Each Unit | Required Capacity |
|---|---|---|---|
| Flow | 47,8 lps | 47,8 lps | 1000 kW |
| Fluid | Water | Water | 860.010 kcal/hr |
| Entering Fluid Temp | 35,0 °C | 35,0 °C | 227,52 Tons |
| Leaving Fluid Temp | 30,0 °C | 30,0 °C | |
| Entering Wet Bulb | 25,0 °C | 25,0 °C | |

Unit Selected
XXXX at 103,6% capacity [1036,40 kW]

Physical Data per Unit

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|---|---|
| Overall Dimensions [W x L x H] | 2.388 mm x 6.401 mm x 3.632 mm |
| O | 3 kg |
| Shipping Weight | 7.738 kg |
| Heaviest Section | 6.380 kg |

-25% Weight
-10% Height

| Fan Motor Data Per Unit | | Pump Motor Data per Unit | |
|---|---|---|---|
| Number of Fans | 2 | N° of Pumps | 1 |
| | | Nameplate | |
| # of Fan motors | 2 | Power [400/3/50] | 5,5 kW |
| Nameplate Power (400/3/50) | 11,00 kW per motor | Design Amps | 11,4 Amps per Motor |
| Total connected | | | |
| Nameplate Power | 22,00 kW | | |
| Typical Nameplate FLA | 21,7 Amps per Motor | | |

| Additional Details Per Unit | |
|---|---|
| Air Flow | 47 m3/s |
| Coil Volume | 1.296,2 L per unit |
| Coil Design Pressure | 10 bar |
| Riser Pipe Diameter | 152,4 mm |

| Hydraulic Data | |
|---|---|
| Spray Water Flow | 66 lps |
| Pressure Drop Through Coil | 67,8 kPa |
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- 25% installed power
Only 60% of coil Volume

As a rule of thumb, be aware that the "core" of the heat transfer is the coil in a closed circuit cooler/condenser and the fill in an open cooling tower.

When possible, asking **the volume of the heat transfer media** gives an indication of the size of the heat transfer media.

Furthermore, other parameters that impact on the performances are:

a) height

b) installed fan power

c) weight

d) pressure drop [only for closed circuit coolers]

In this case there can be high degree of confidence on the differences between the two units in terms of thermal performance because of the clear declaration on the datasheet of

a) heat transfer media size, b) height, c) installed fan power, d) weight and e) pressure drop.


The safety margin given by CTI-Eurovent certification is easily verified with a direct comparison of constructive parameters of the two units on the two sides of the datasheet.

In particular we see that the unit on the right side has only 60% coil volume with respect to the unit on the left side and lower weight, height, electrical installed power and pressure drop.

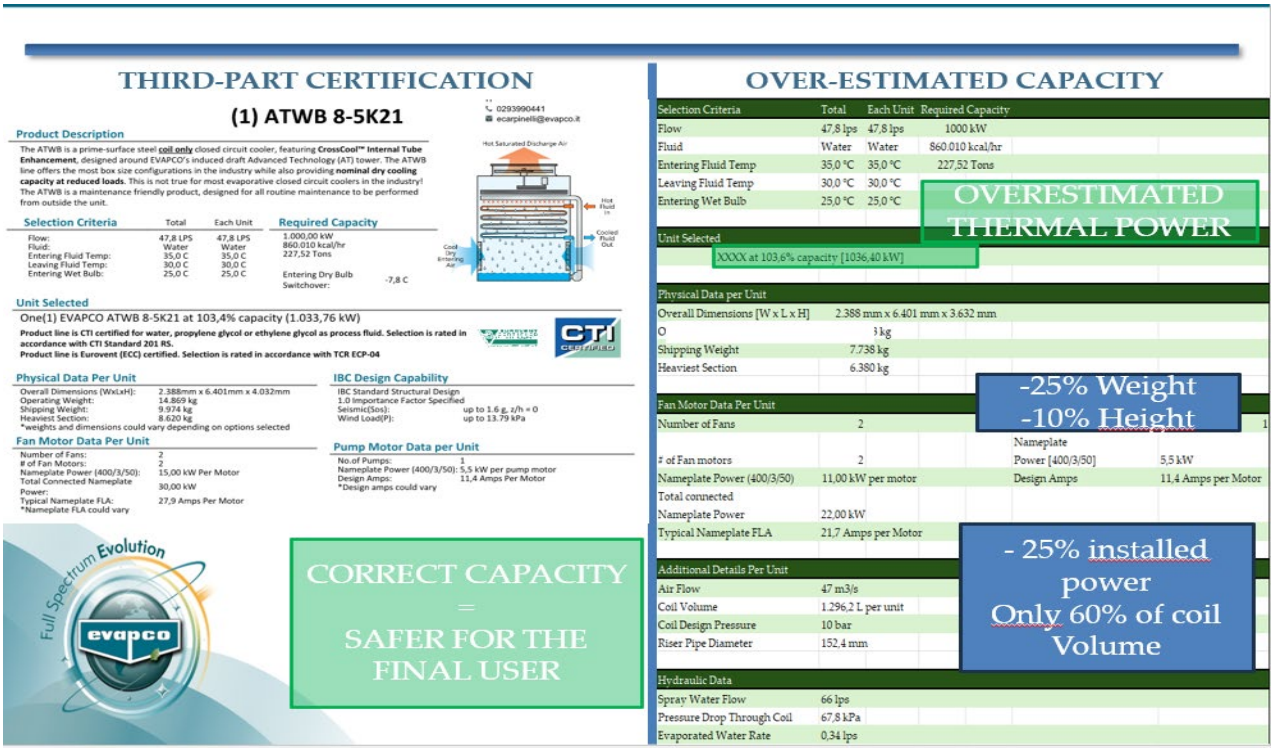
According to the constructive parameters in the table, the real thermal capacity of the model on the right side should be about 80% that of the certified unit.

What happens to the process?

At nominal conditions the process outlet temperature is 30,5 °C.

20% of missing capacity means that the desired setpoint temperature of 30 °C is not reached for wet bulbs below than 23,7 °C.

Assuming Milano Linate as installation site, based on the weather data on https://ashrae-meteo.info/v2.0/ this means that for the unit on the right side of the table the desired setpoint temperature is not achieved for 175,2 hours/year.




What if the comparison is not so clear?

The real challenge about the comparison of two different solutions is that sometimes is not very easy to catch the differences on the performance parameters declared.

Even if the datasheet doesn't include all the parameters indicated or even if one of those information is not correct, the strength of the CTI-Eurovent certification is not on the entity of the numbers declared themselves, but on the reliability of the numbers declared.

If the customer is doubtful about the performance declared, if he wants to be sure of the equipment in their plant, the certification entities CTI and Eurovent give the possibility to the customer to re-verify the thermal performances of the units according to the ongoing protocol.

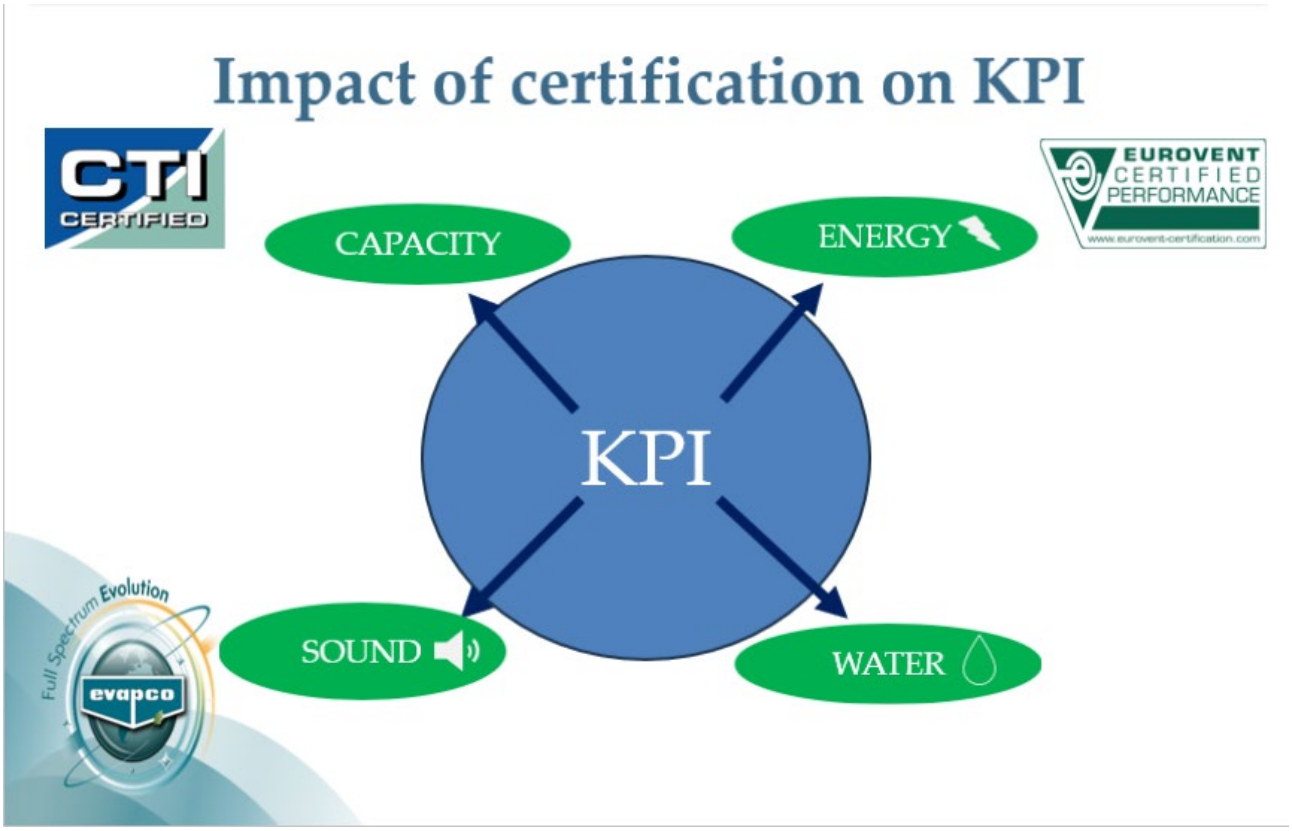
And If the thermal performances certified are not satisfied the customer has the right to be refunded for the deficiency.

**That's the second strength point of the marks below, reliability.**

CTI CERTIFIED

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

## Impact of certification on Key Performance Indicators of evaporative cooling technologies




Key Performance Indicators of a cooling tower are 1) Capacity (Thermal Performance); 2) Energy consumption; 3) Sound emissions and 4) Water consumption.

### 3.1) Thermal performances

Chapter 2 on "Third part certification vs manufacturer guaranteed performance" already sums up well the impact of CTI-Eurovent certification on thermal performances.

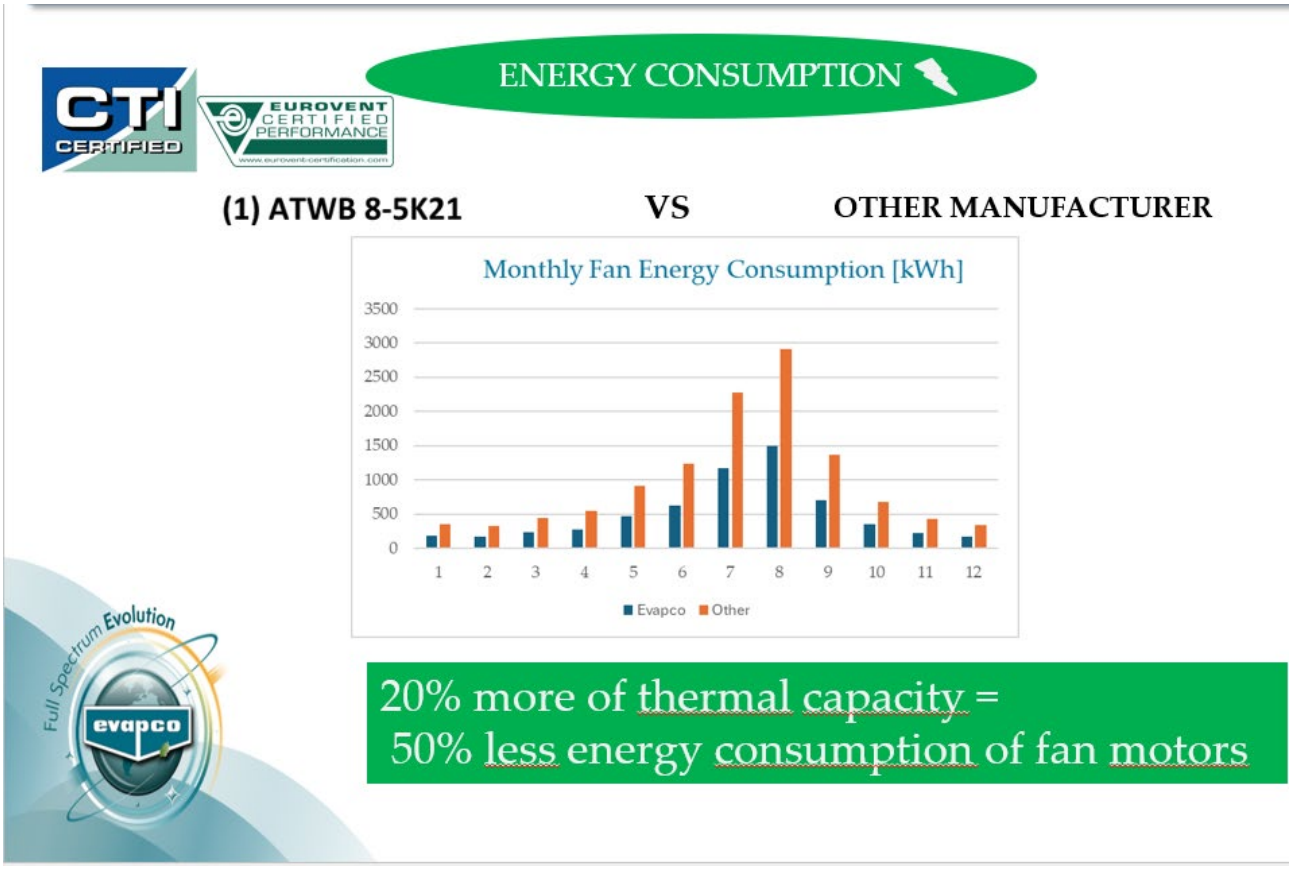
To stress again the concepts note that the following equivalence is valid:

Third part certification = Manufacturer forced to declare the correct capacity = safer product for the final user = no need to over-size the equipment since under-sizing the unit is forbidden by the third part entity = setpoint temperature always achieved.

## 3.2) Energy consumption

If a customer has a long-term vision of his plant he should consider that in most cases energy costs are higher than the costs of the initial investment itself.

If we take into account again the comparison of the two models in the table above, through our newer Energy and Water Analysis tool we have been able to estimate that energy consumption is much lower for the certified unit.




As a general rule note that for units operated under variable frequency drive, 20% of ratio on thermal capacity is about 50% ratio on the energy consumption.

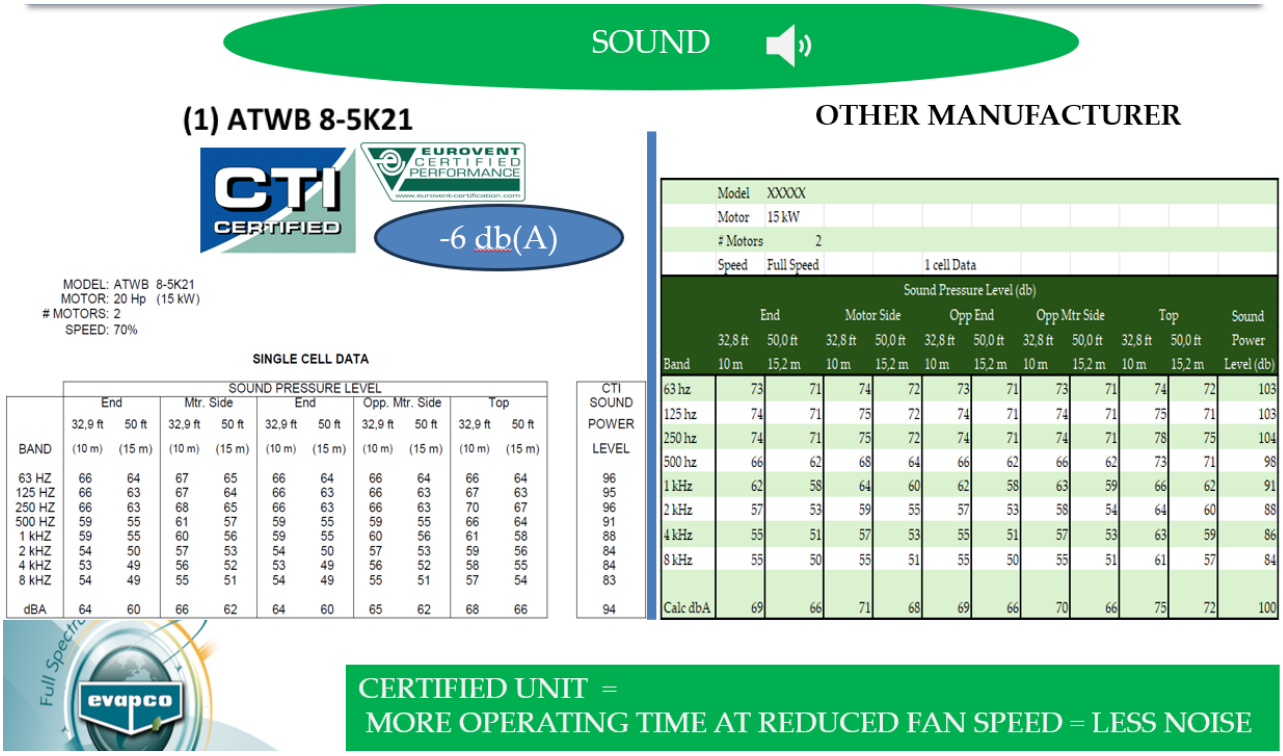
Please note that a huge difference in energy terms comes from a minor difference on setpoint tempertatures, since you had only 0,5 °C temperature difference on the setpoint [30 °C achieved by Certified unit, 30.5 °C achieved by non-certified unit].

## 3.3) Sound Emission

When sound is an issue (especially in urban applications) many solutions exists to limit noise created by the unit.

Evapco features forced draft solutions with inlet and outlet attenuation systems and induced draft solutions featuring mostly sound attenuation solutions without loss of thermal capacity (water silencers, super low sound fans, offset sound attenuation walls).

It must be underlined that CTI-Eurovent itself is a further warranty of the reduction of the noise emission, because having an implicit safety factor on the thermal performances means that in real conditions units are going to operate at lower fan speed.



## 3.4) Water Consumption and possibility to achieve dry performances.

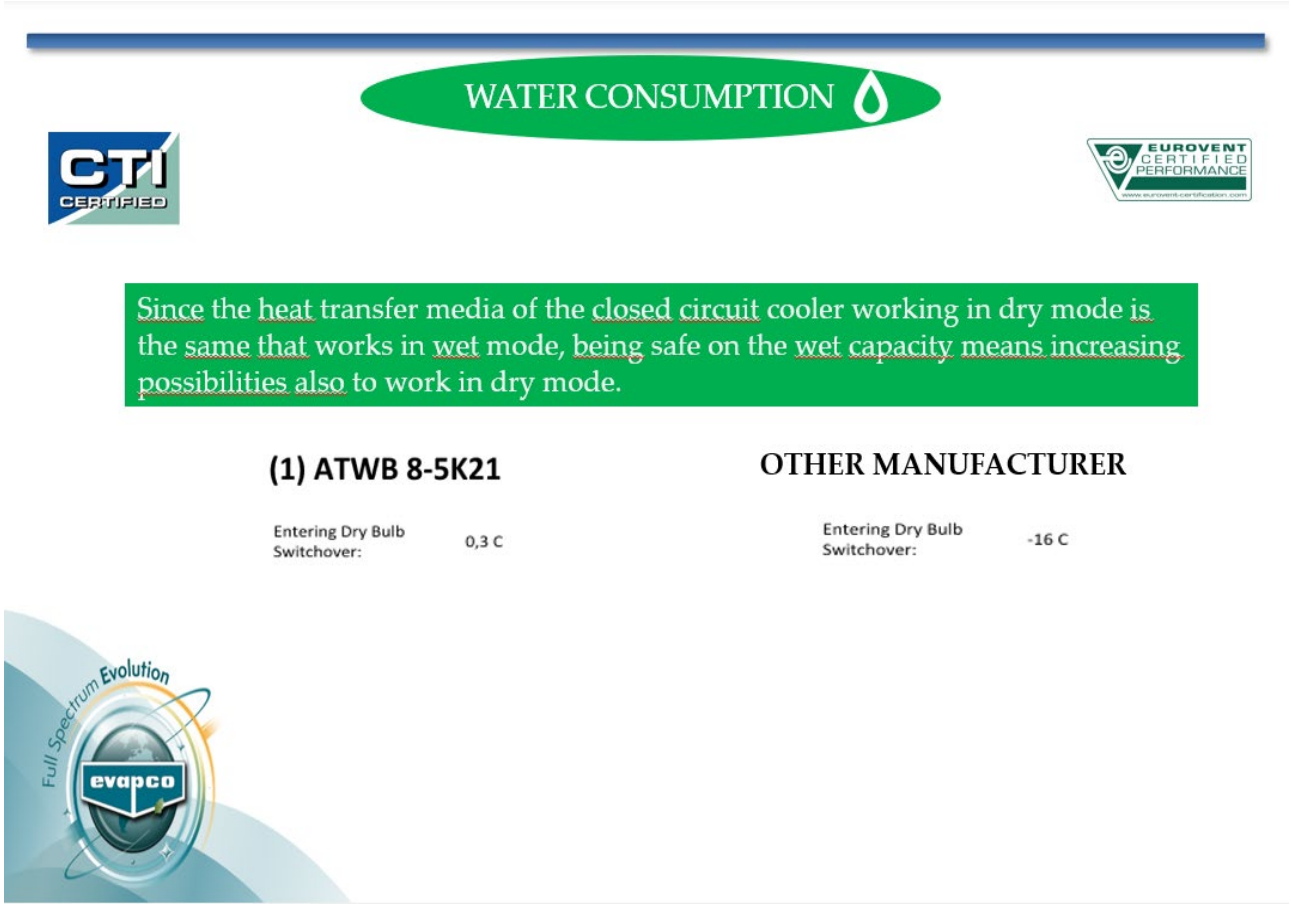
Evapco features fully evaporative to fully dry units.

For open circuit cooling towers there is no possibility to achieve water savings on the evaporative part, but only on the blowdown of the unit.

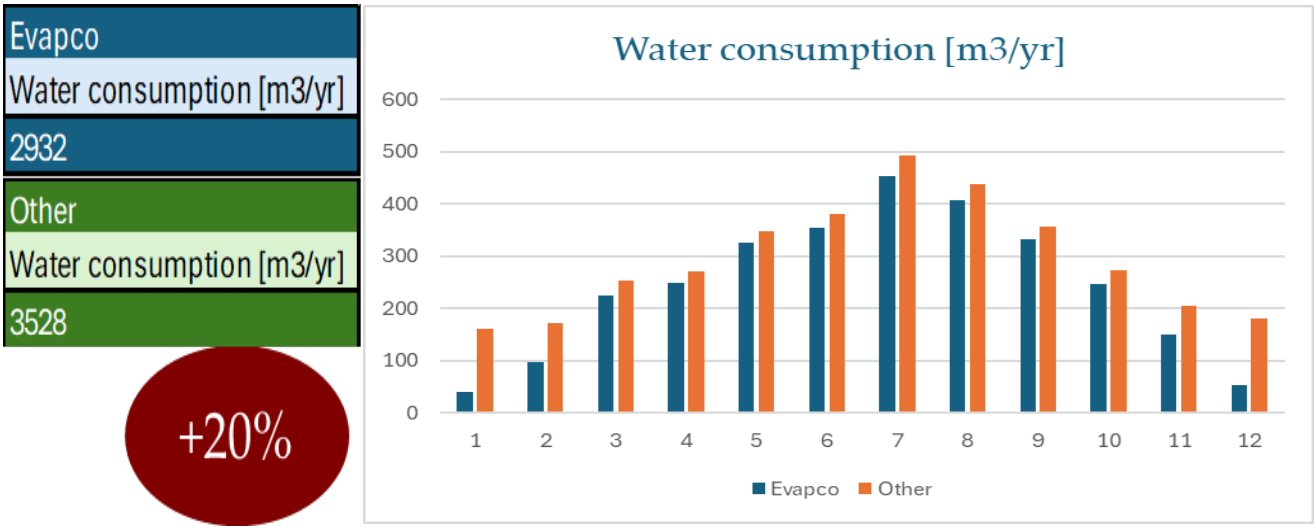
For closed circuit coolers/condensers (from fully evaporative to fully dry) there are several possibilities to achieve water savings. Water savings on evaporative part will automatically bring water savings and also on the blowdown part through reduced consumption of chemical products.

The Key Parameter Indicators of Water saving are the followings:

1) Dry Bulb Switch-Over for evaporative and hybrid coolers;
2) Percentage of dry load [specifically for eco-ATWB-H];
3) Depressed Dry Bulb for Adiabatic coolers;
4) For dry coolers/condensers only dry mode exists.



All of them are indicated at 100% thermal power on Evapco's datasheet and the safety factor implicit in the third-part certification process makes the possibility to achieve water savings very interesting as well.




As we can see after running a Water analysis according to our newest software of advanced calculation, the water consumption of the unit not certified is 20% more than the Evapco's certified ATWB. Please note that ATWB is a unit with smooth coil with limited capacity of working in dry mode. Only due to CTI-ECC certification of thermal performance it can achieve 20% of water savings with respect to a not certified unit.

## Conclusion

CTI-Eurovent certification not only assures thermal performance but also limits noise pollution and promotes water and energy conservation, aligning with global sustainability objectives.

In conclusion, CTI-Eurovent certification transcends mere compliance, embodying a commitment to performance, efficiency, and sustainability in evaporative cooling technologies. Its impact resonates throughout the industry, shaping standards, and driving innovation towards a more resilient and resource-efficient future.