

De evolutie van de koeltorens en de verschillende bestaande systemen; hun implicaties

.... En hun waterbehandeling

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Sales Engineer



Topics

1. Intro BAC
2. Market Needs
3. Solutions
4. Water Quality
5. Questions

INTRO BAC

Our vision



BALTIMORE AIRCOIL COMPANY

Be the leading provider
of products and services
for heat transfer and
thermal storage in all
markets served.



Global facilities & partners



- Licensees (2)
- Headquarter (1)
- Wholly owned (10)
- Joint Ventures (2)

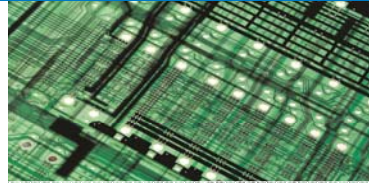


Industries Served

HVAC



Comfort cooling



Mission critical



District cooling

Refrigeration



Industrial refrigeration



Cold storage



Commercial refrigeration

Power & process



Powergen & cogen



Chemical & petrol processing



Primary metals

Manufacturing



Pharmaceutical



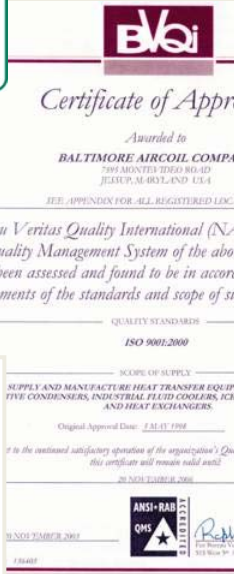
Industry & light manufacturing



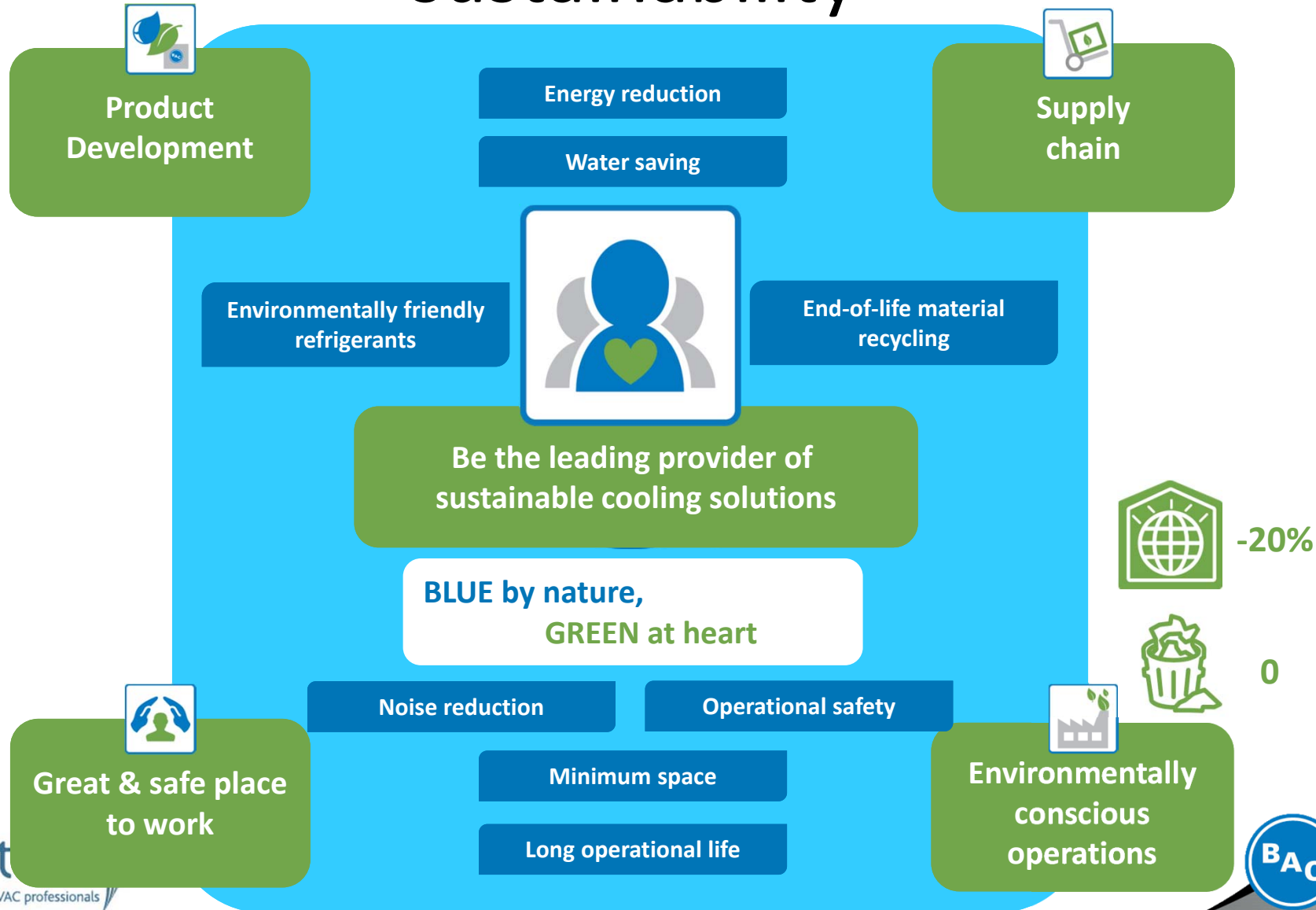
Chemical & plastics

Commitment to independent certification

ISO 9001:2008
certified

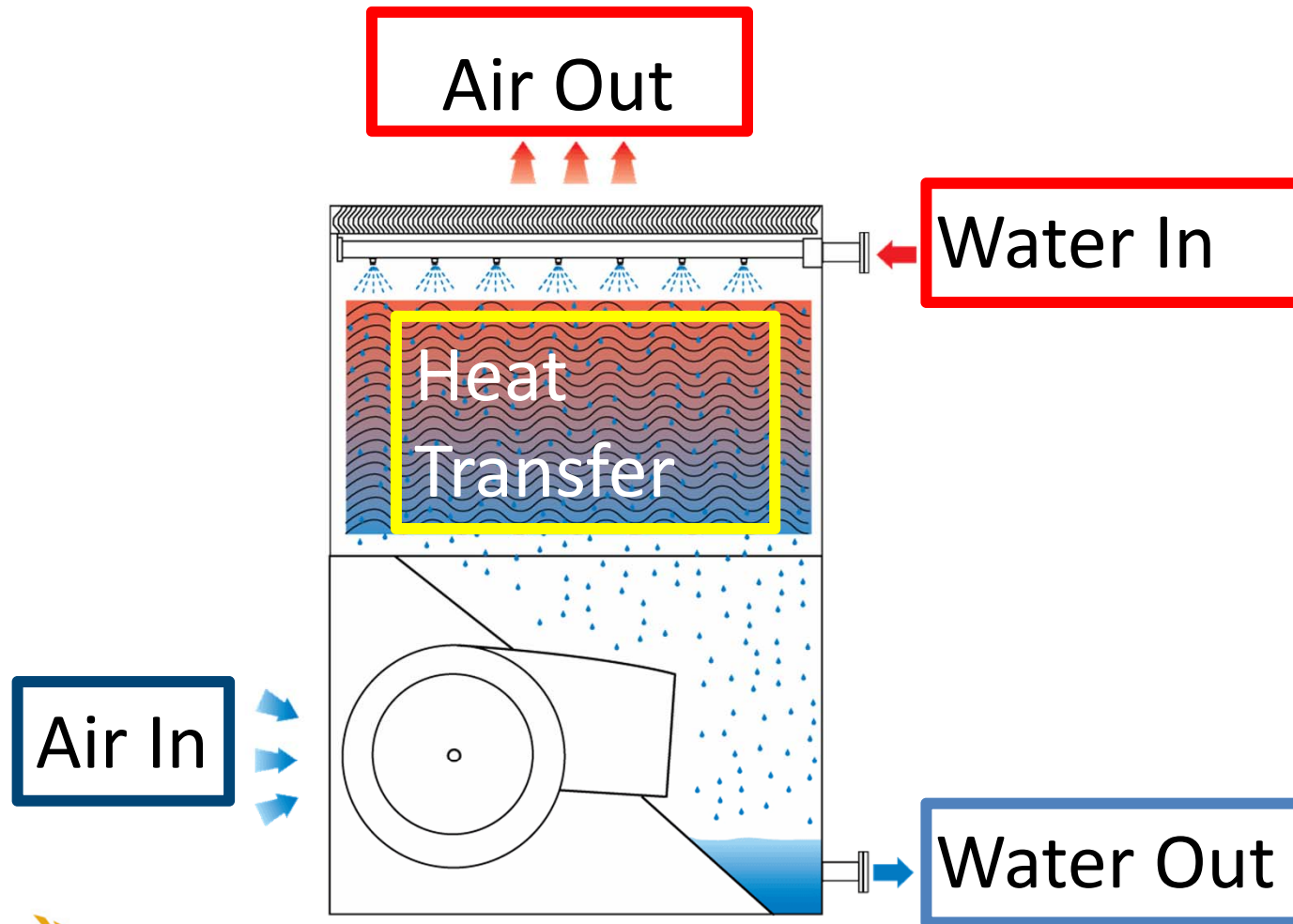


Our strong commitment to sustainability



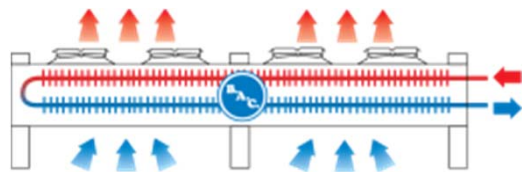
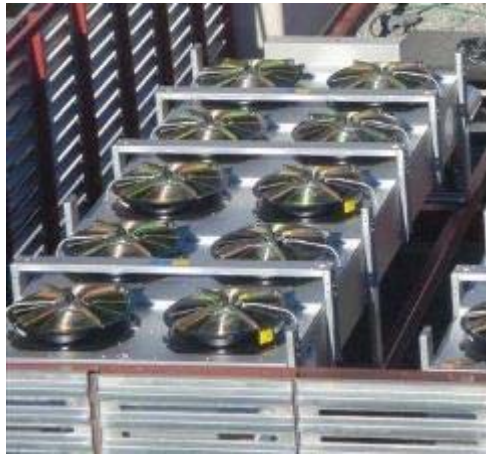
WORKING PRINCIPLES

Principles of Evaporative Cooling

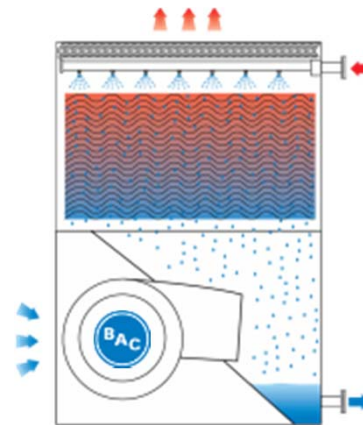


Methods of cooling

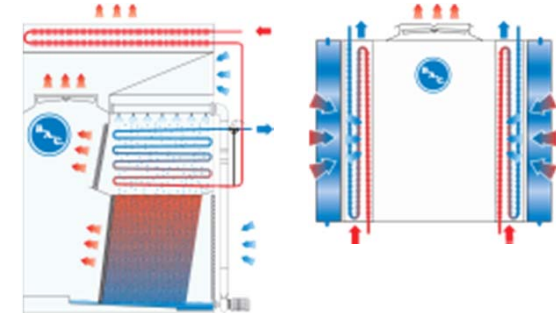
Air cooled



Water cooled

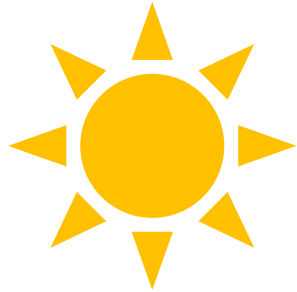


Hybrid, wet/dry, adiabatic



Methods of cooling

Air cooled

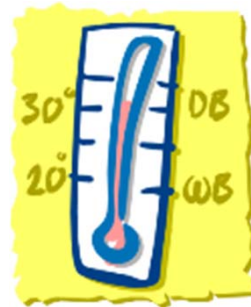


Dependent on ambient
(dry bulb)
temperature

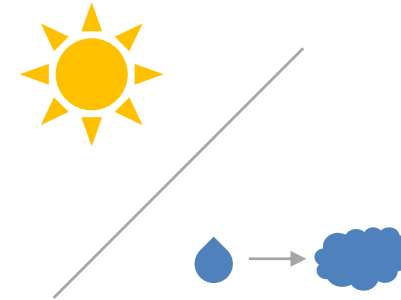
Evaporative cooled



Evaporative cooling,
dependent on wet bulb
temperature



Hybrid, wet/dry, adiabatic



Dependent on both
dry bulb and wet bulb
temperatures



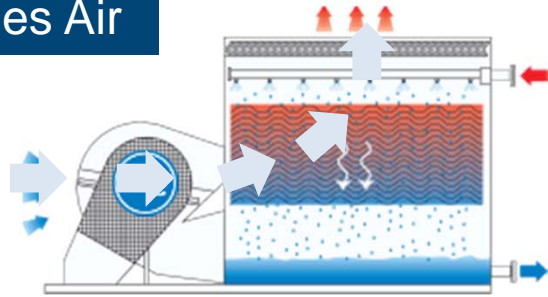
Typical 10°C difference between wet bulb and dry bulb

Types of Water Cooled Equipment

Method of moving **air** through a cooling tower

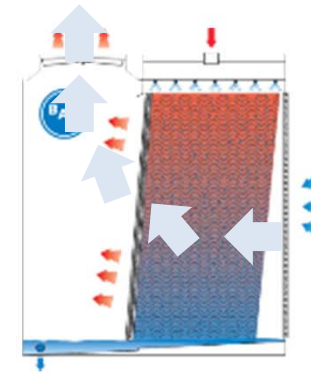
Forced Draft

Pushes Air



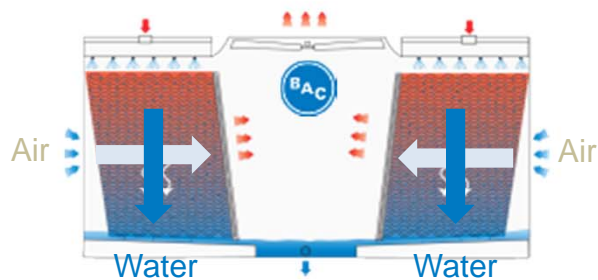
Induced Draft

Pulls Air



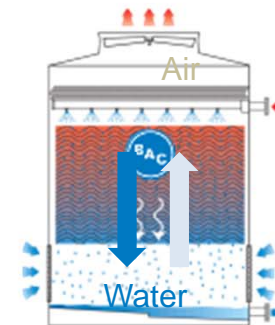
How **air** and **water** mix - direction of air and direction of water

Crossflow



90° interaction of air and water

Counterflow



180° interaction of air and water



MARKET NEEDS

Main Needs

- Energy efficiency (fan, circulation pump,...)
- Sound
- Weight
- Space
- Water consumption
- Price/quality 😊

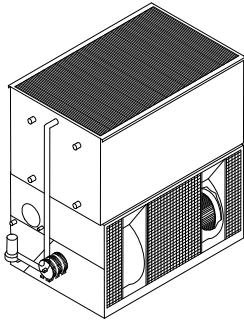
System optimisation

- Operational considerations
- Free Cooling
- COP objectives / water consumption
- Lay out flexibility
- ROI / TCO analysis

SOLUTIONS

Evaporative Cooling Benefits

Design



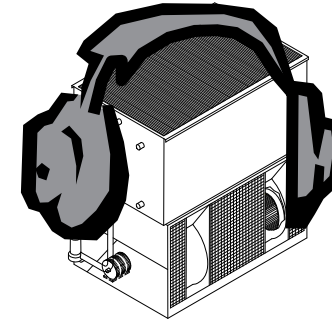
Compact, cost effective

Min. space requirements



50 % of air-cooled

Low noise



Easy to silence

Efficiency



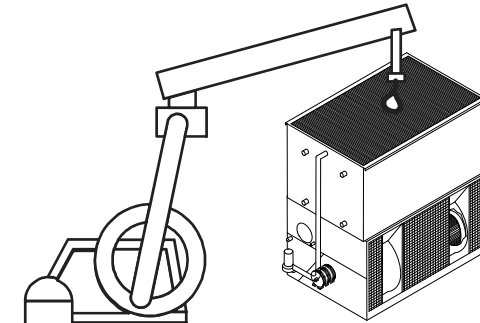
Increased process efficiency

Low refrigerant charge



evaporative others

Easy to install



Lower crane cost

Solutions

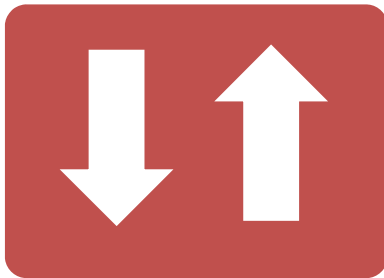
1. Evaporative (crossflow / open or closed)

- ✓ High system efficiency
- ✓ Minimum space requirements
- ✓ Low sound
- ✓ Water quality

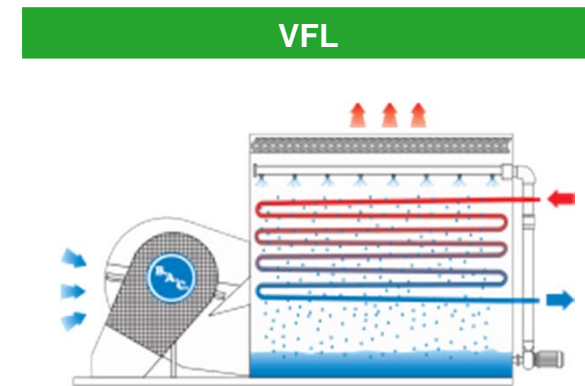
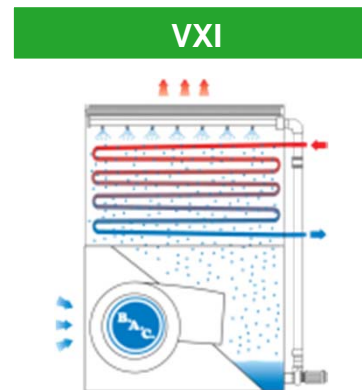
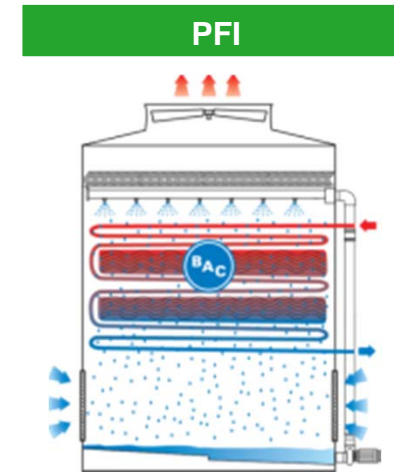


Principles of Operation

Counterflow

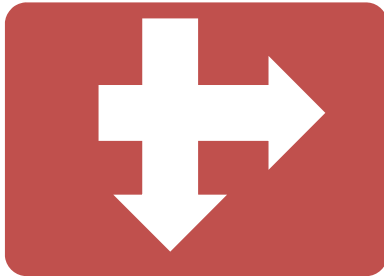


- + Best thermal efficiency
- + Small foot print
- Difficult access to fill & water distribution

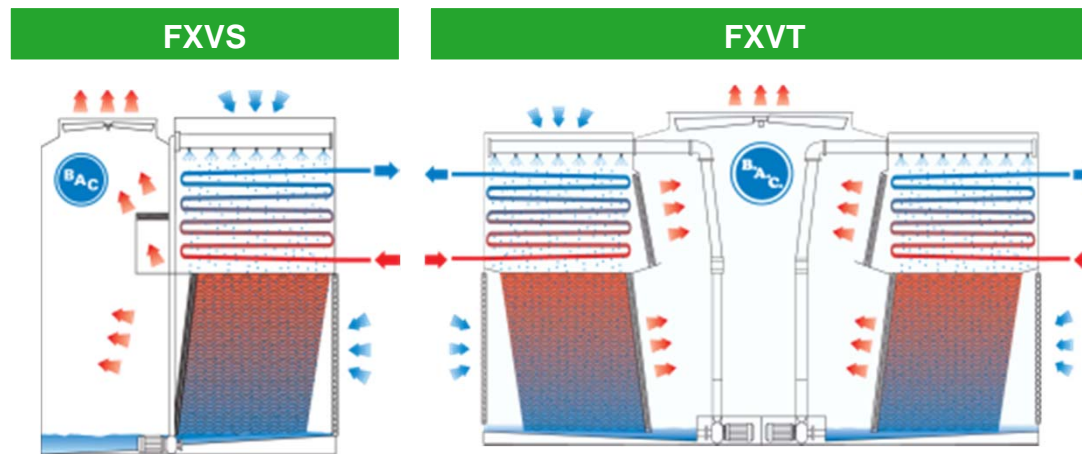


Principles of Operation

Crossflow



- + Extremely good access to fill & water distribution system (during operation)
- + Low water noise



Closed circuit cooling towers



Open cooling towers



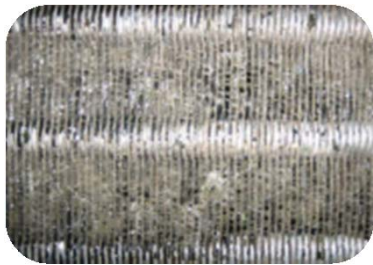
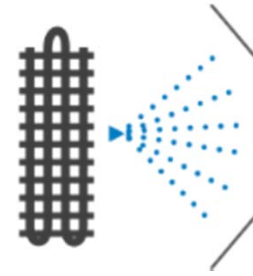
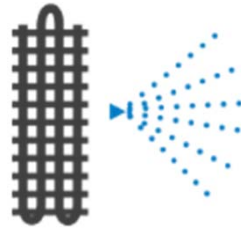
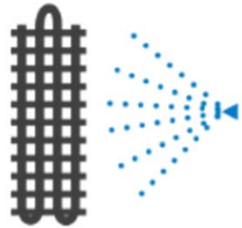
Solutions

2. Adiabatic with pre-coolers

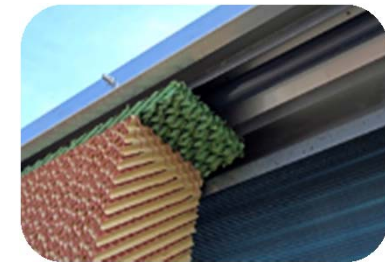
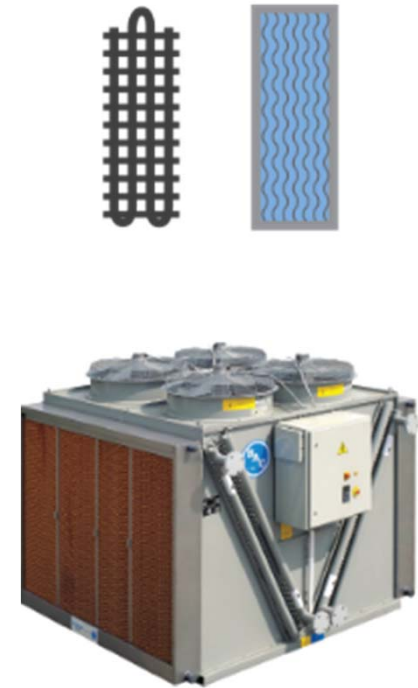
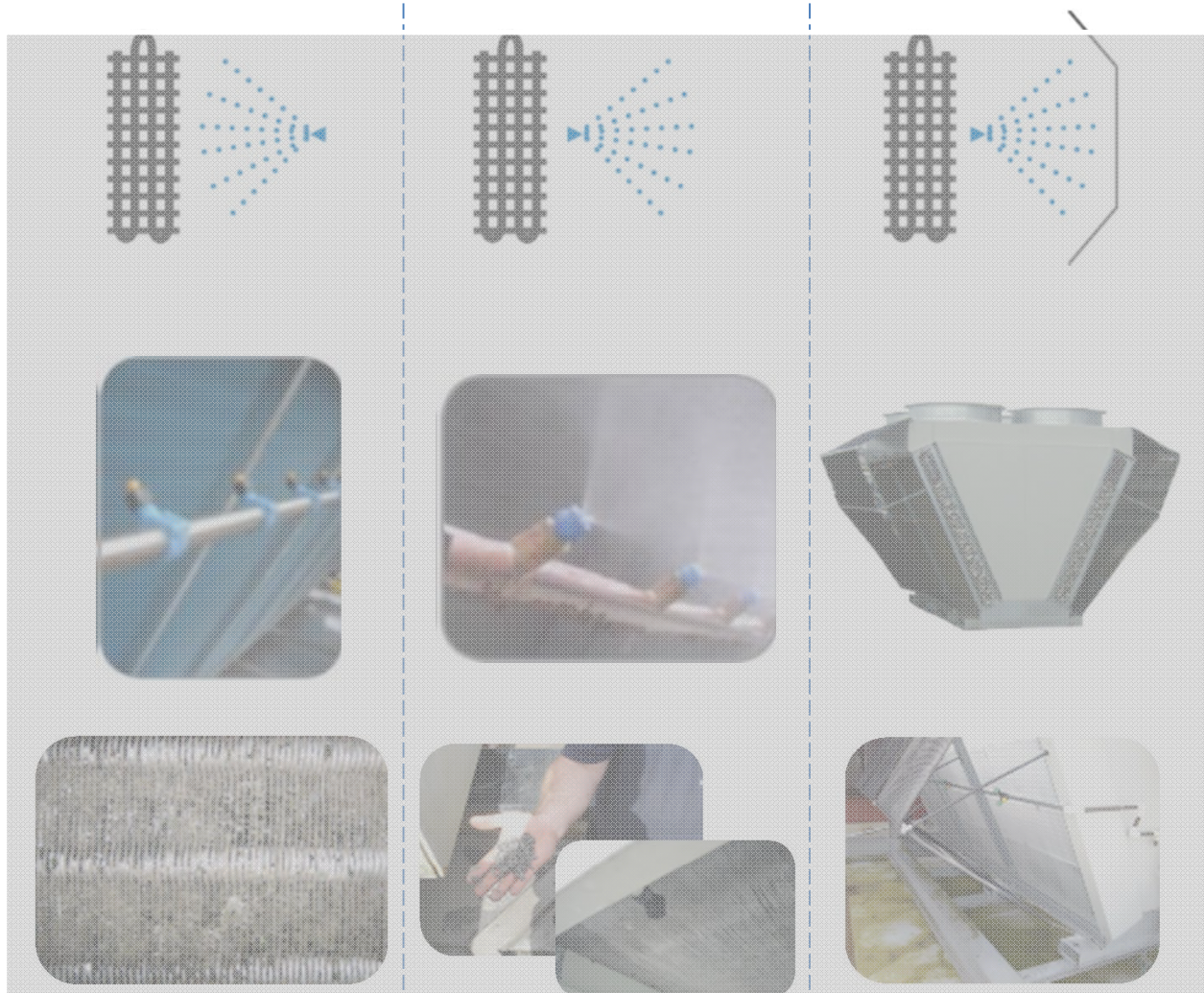
- ✓ Less space
- ✓ Lower temperatures
- ✓ No water treatment



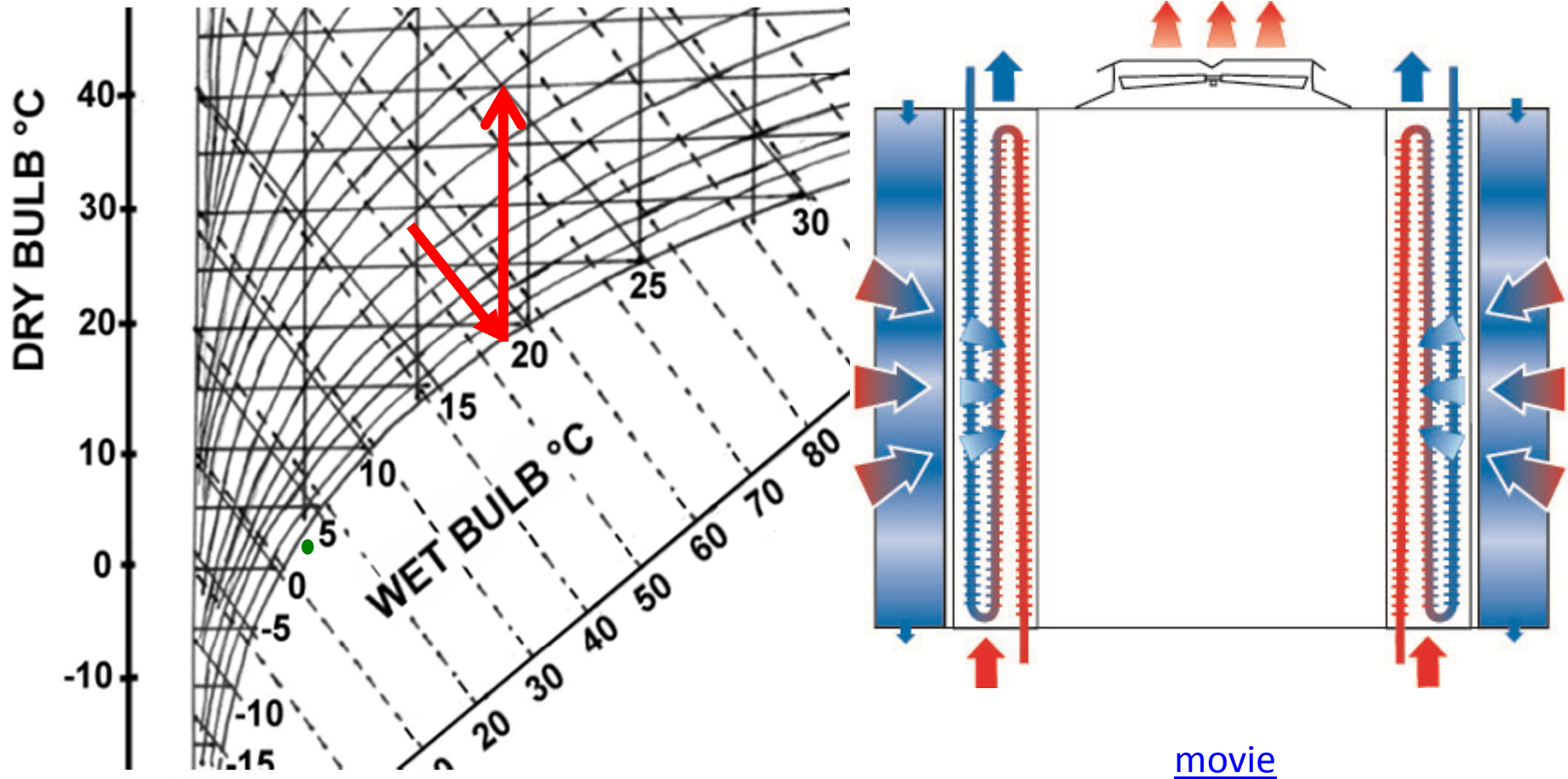
Adiabatic system



Adiabatic system

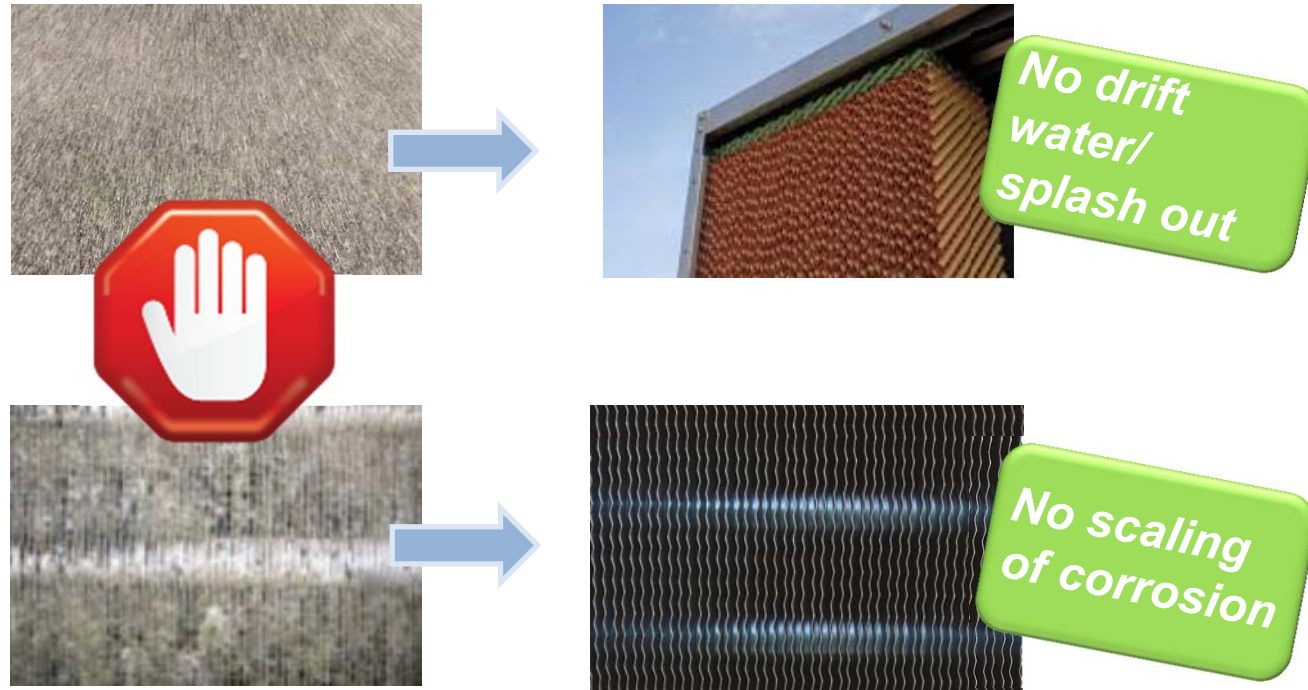


Working principle



[movie](#)

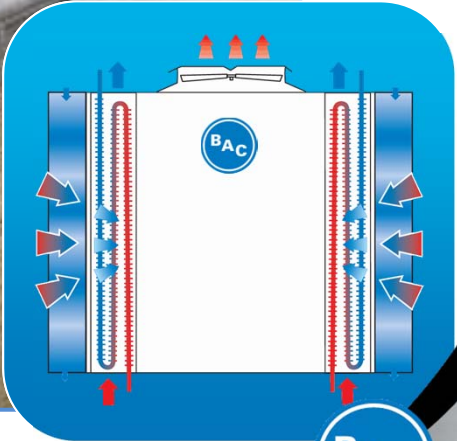
Maintenance & Hygiene



Once through system :
neither recirculation nor standing water

Guaranteed working without any spray / aerosol

Dry coolers with adiabatic pre-coolers



Atic
for HVAC professionals

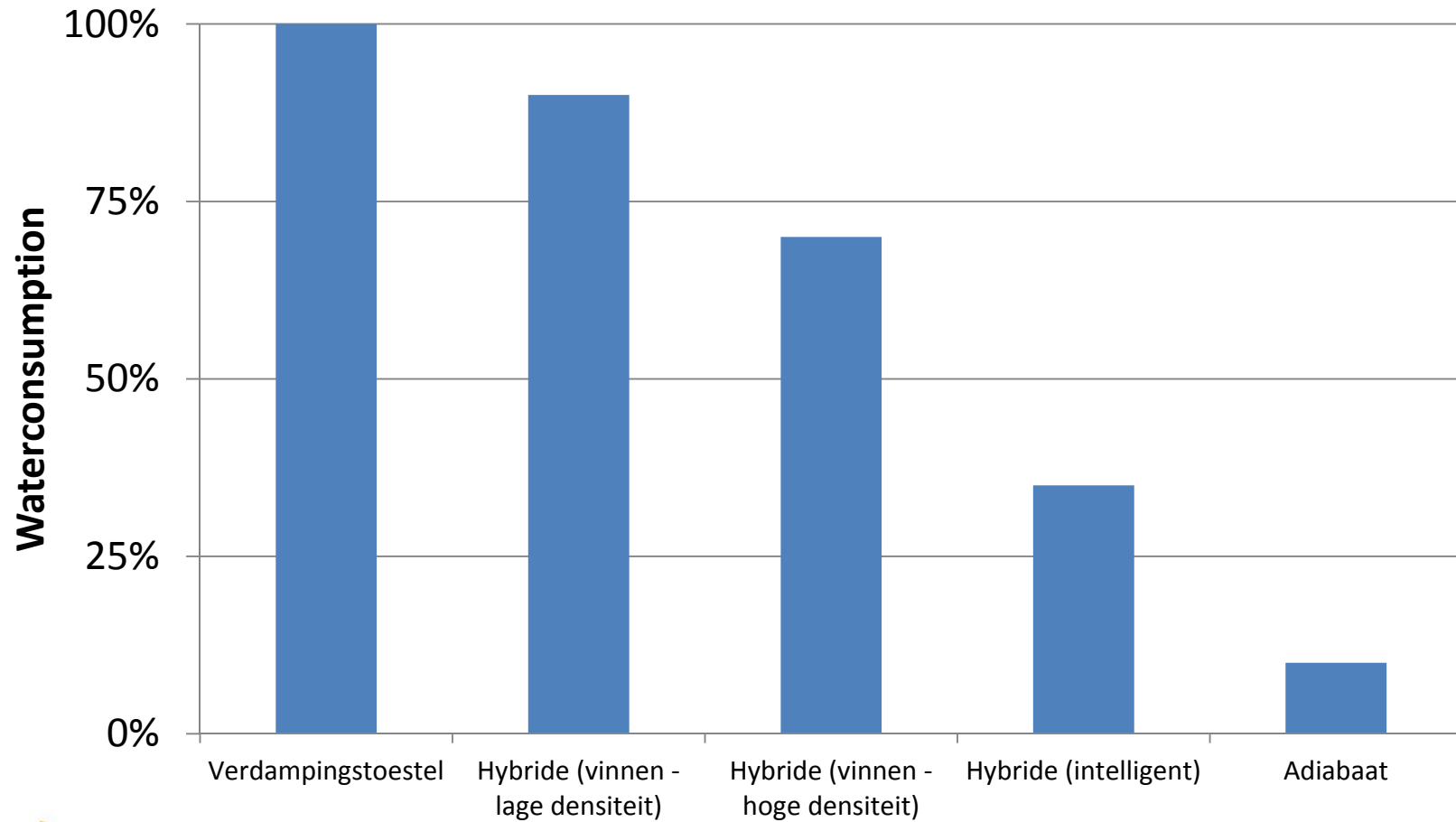


SpartiumCooler
— one of the TrilliumSeries

(5) SP 6A-M610
1,8 MW



Water consumption

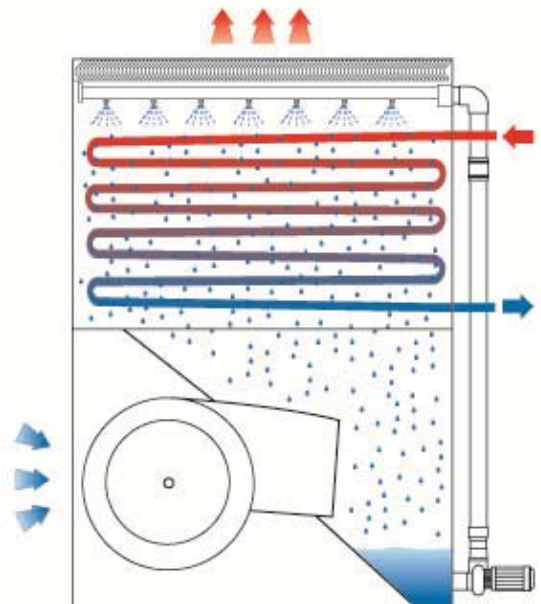
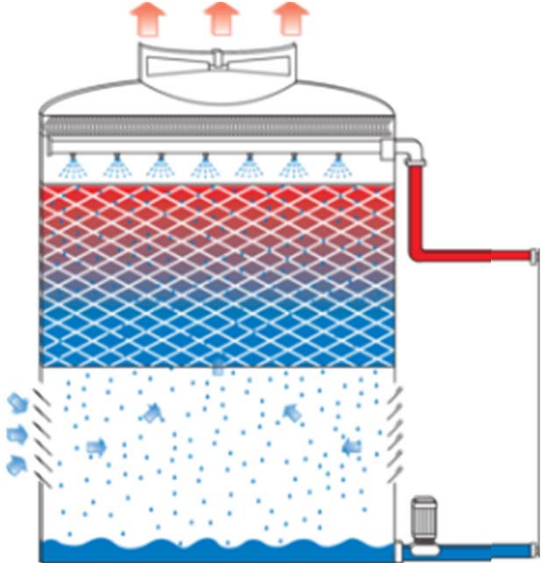


WATER QUALITY

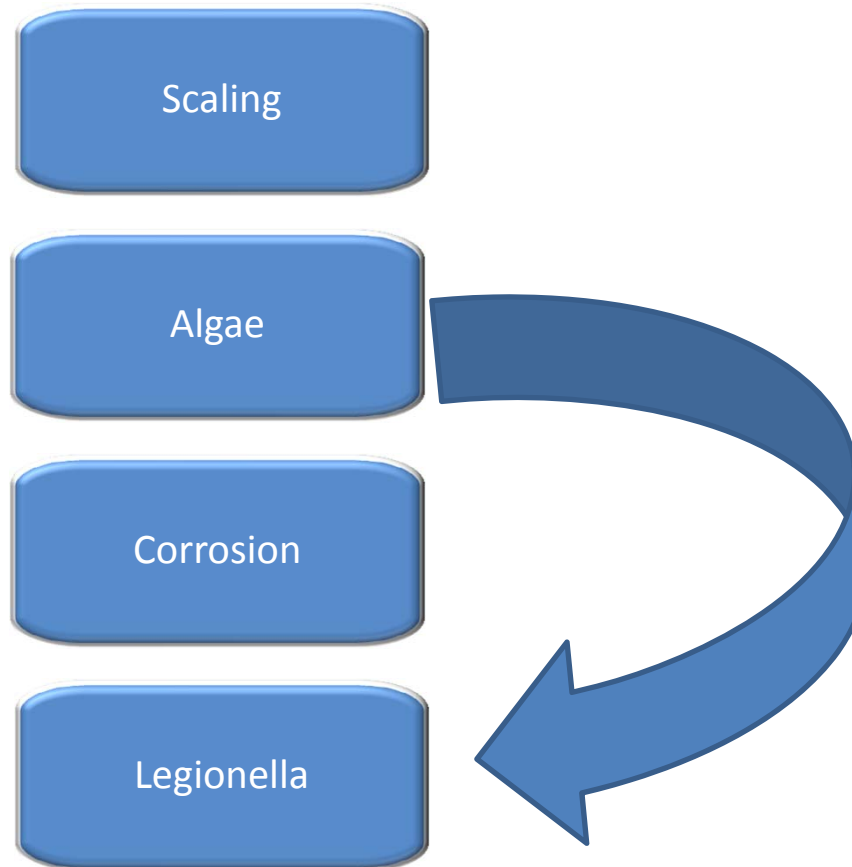


Open cooling tower with heat exchanger

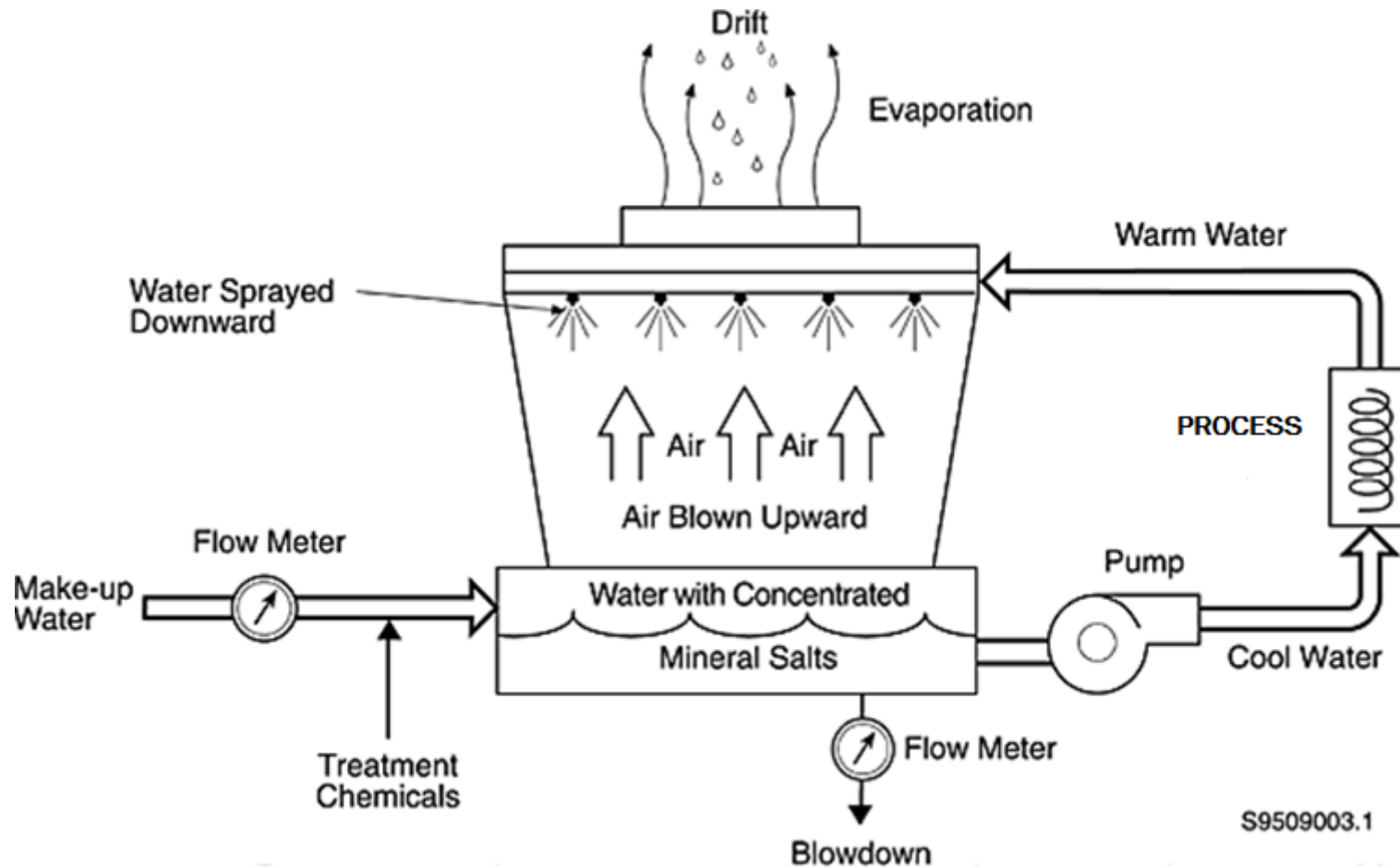
Closed cooling tower



Typical problems

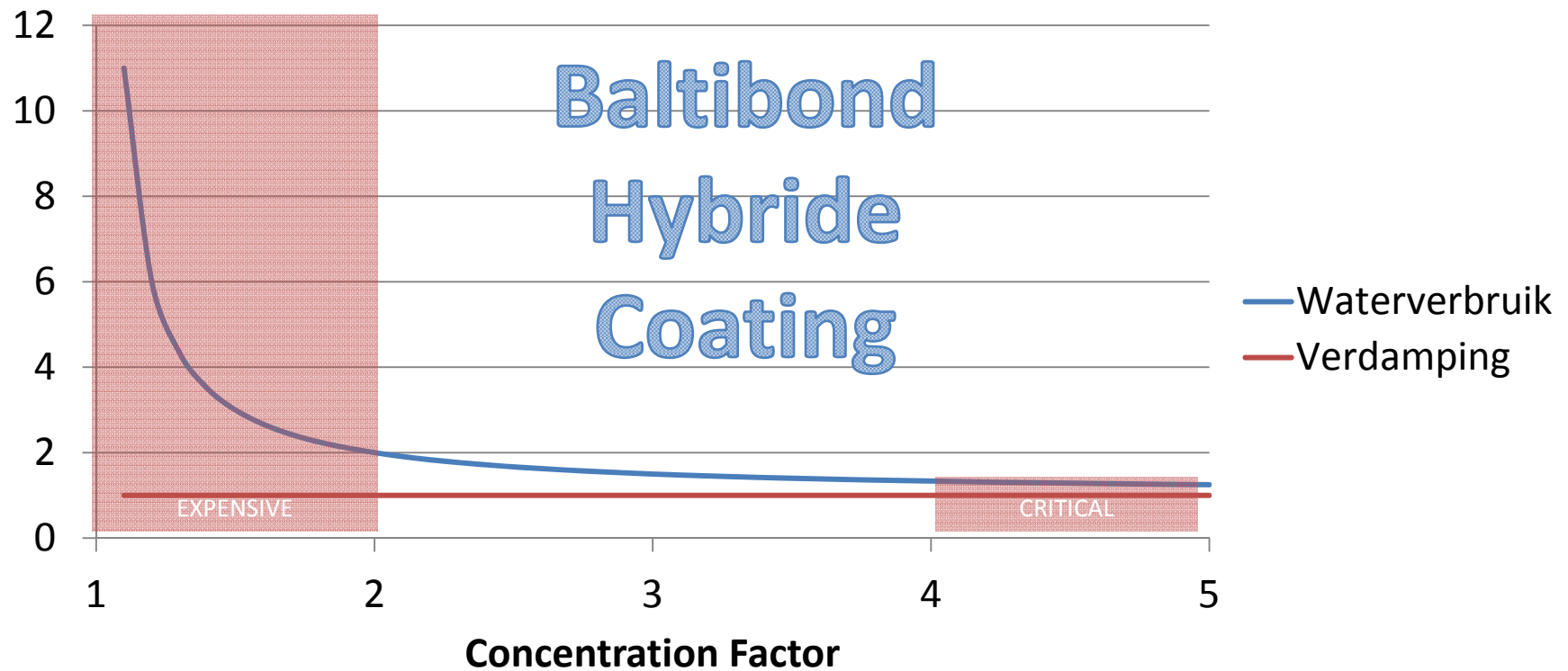


WATER CONSUMPTION



$$\text{Make-up water} = \text{evaporation} + \text{blowdown} (+\text{drift})$$

Blowdown



$$\text{Blowdown} = \frac{\text{Evaporation}}{\text{concentration factor} - 1}$$

Maintenance & Hygiene

- Water treatment
 - Prevent algae growth
 - Pollution prevention / scaling (negative impact)
 - Corrosion prevention
- Accessibility
 - During operation
 - simple
- Regular inspection
 - Drift eliminators
 - Water distribution
 - Cold water basin
- Original features

Helping our customers being green

Al Bahr Towers, Abu Dhabi
Silver LEED Certification



Angelos Law Center, Baltimore USA
Platinum LEED Certification



Macquarie House, Sydney
6 Green Stars



Bridge Par, South Africa
5 Green Stars



Walkie Talkie, London UK
BREEAM Excellent rating



Ping An Center, Shenzhen China
Golden LEED Certification

Questions





Thanks for your
attention