

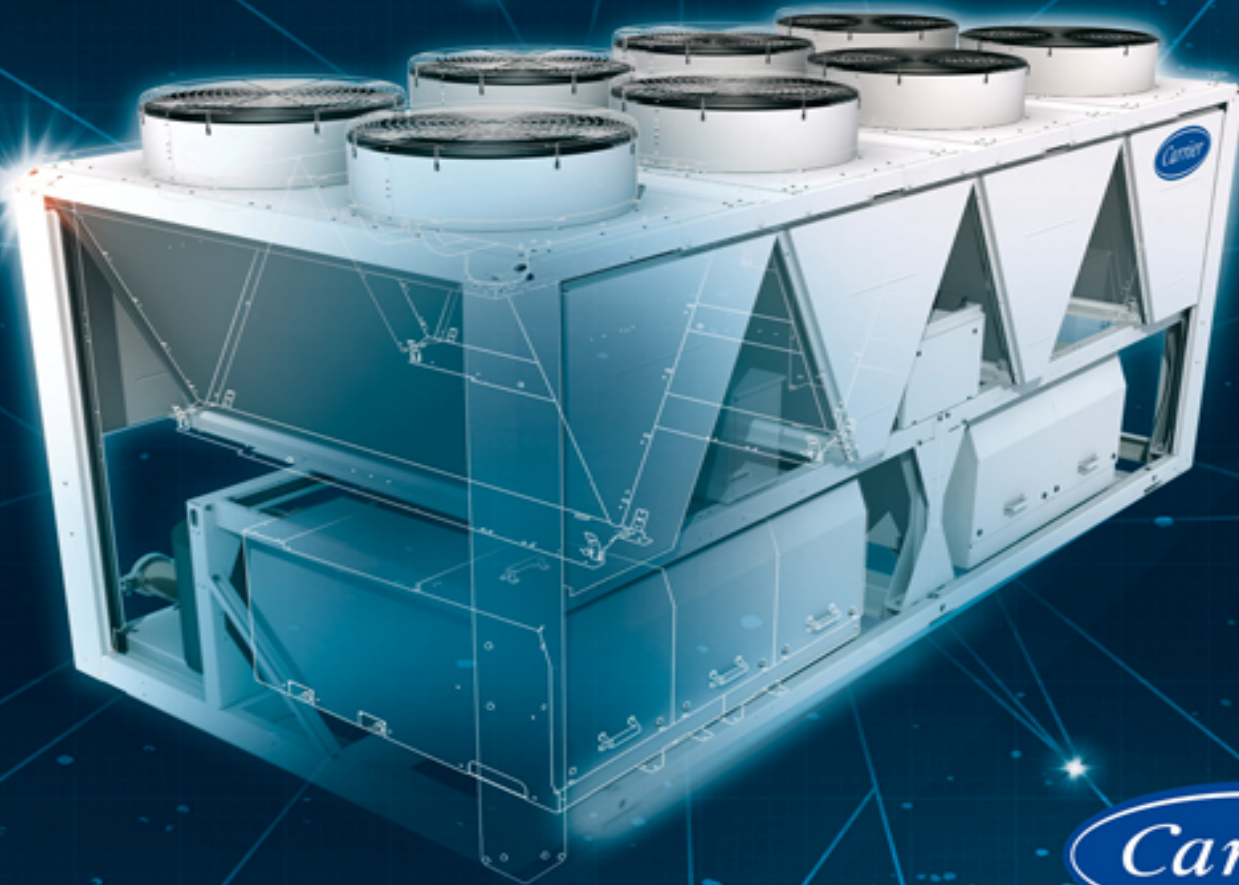
BAHWAN ENGINEERING COMPANY LLC

Nomination for Oman Green Awards 2010

Category – Green Footprint Award

ATTACHMENT - 2

# AQUAFORCE™



*Carrier*

Carrier

AQUAFORCE™

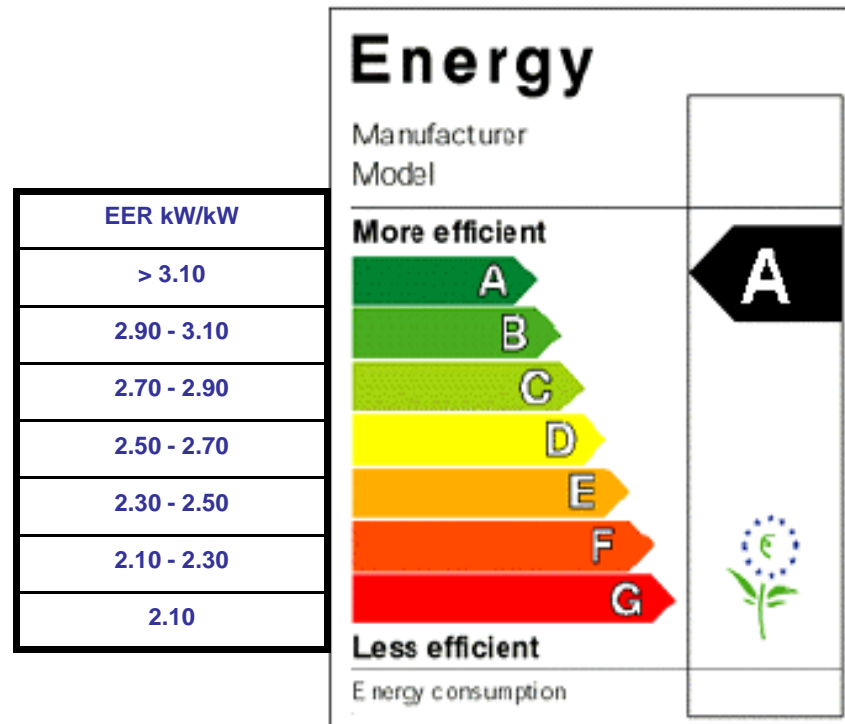


Low operating costs

HYDRONIC  
**CHILLER/  
HEAT PUMP**  
*Solutions*

# LOW OPERATING COSTS

## Record energy efficiency



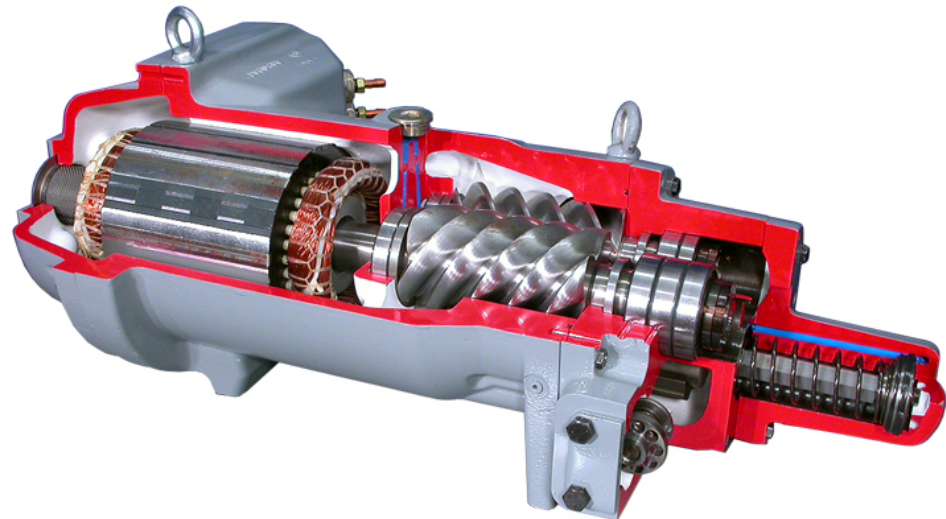
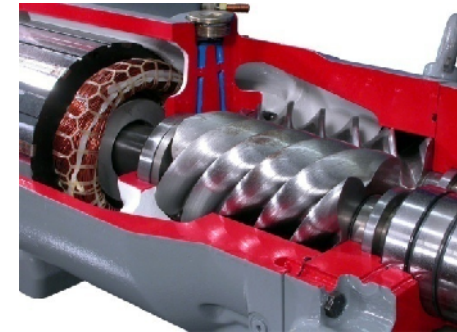
**Aquaforce high efficiency units**  
**Average EER 3.15 kW/kW/Eurovent class A**



## LOW OPERATING COSTS

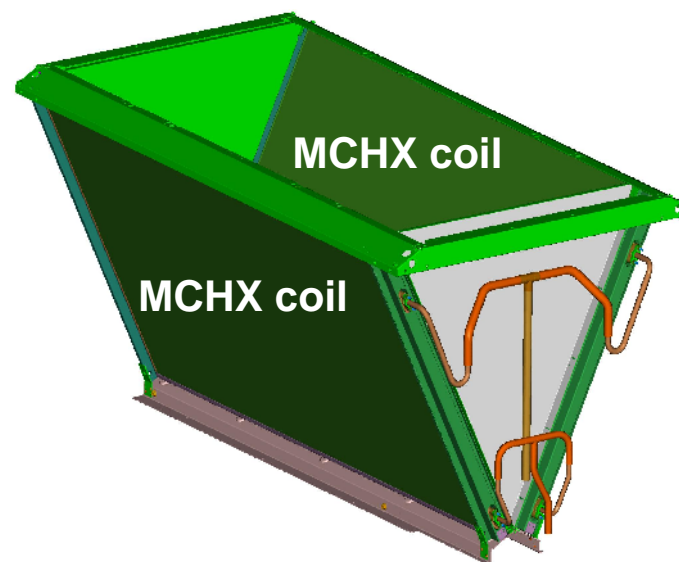
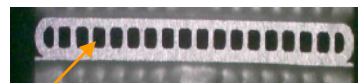
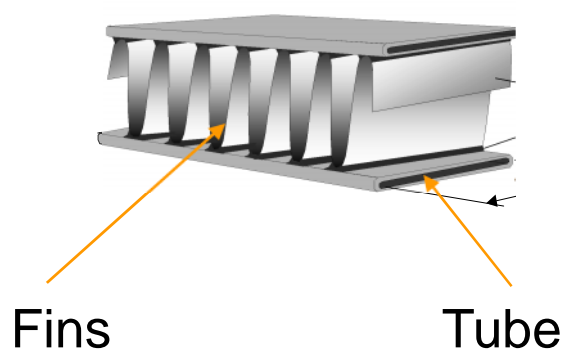
### Compressor

- Top efficiency motor
- Latest 5/6 lobe rotor design optimized for R134a
- Low pressure drop design
- Long stroke capacity control valve from 25 to 100%



## LOW OPERATING COSTS

### Micro Channel Heat Exchanger "MCHX"



**10% more efficient than standard coils**

Carrier

## LOW OPERATING COSTS

### Micro Channel Heat Exchanger "MCHX"

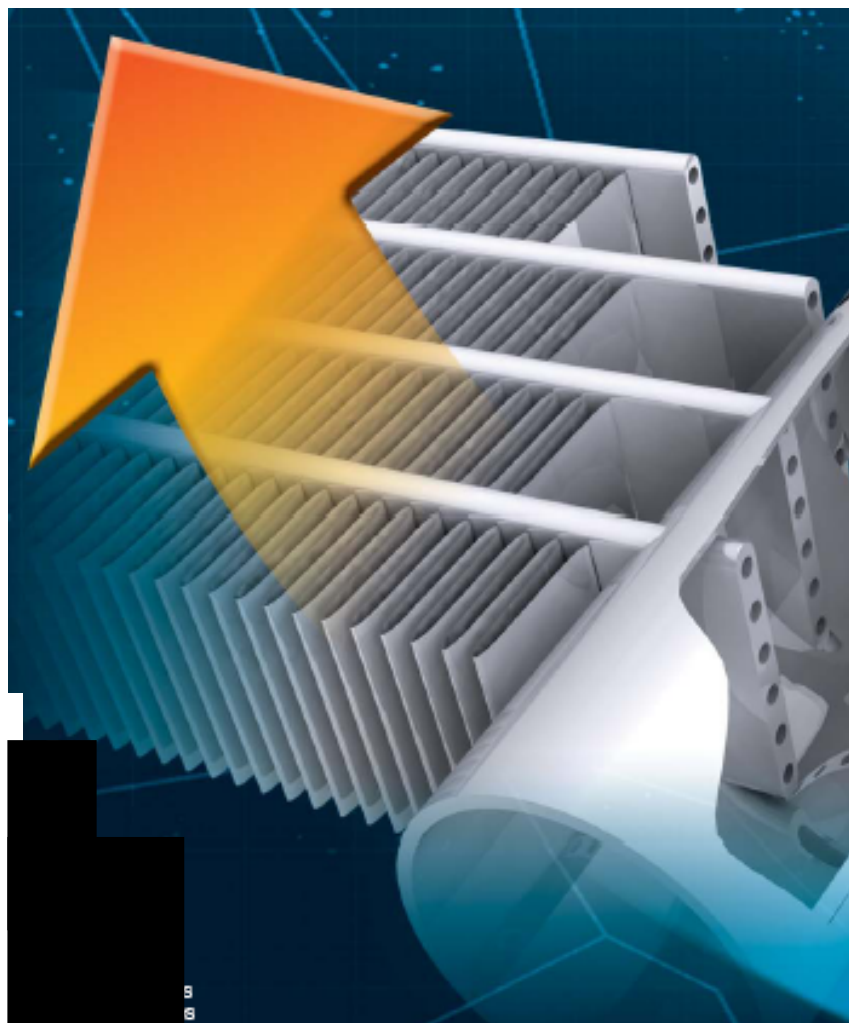
AQUAFORCE™

3.5 times more  
resistant to  
corrosion

30% less  
refrigerant

Reduced  
maintenance

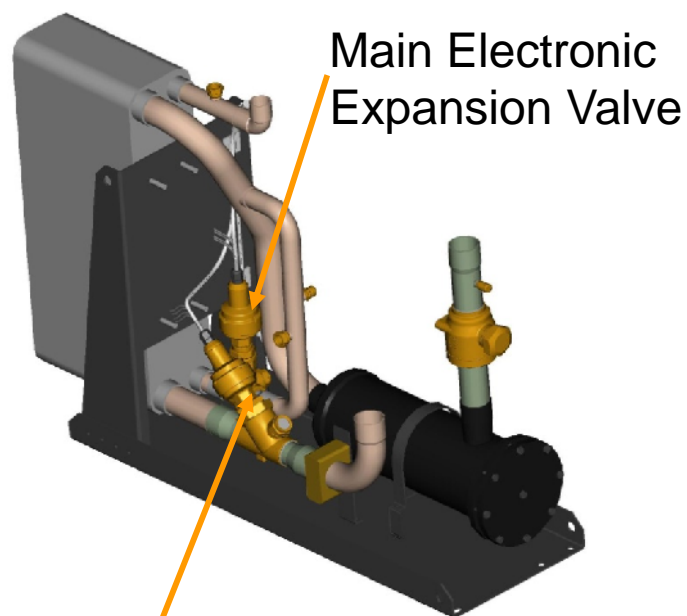
10% More  
efficient



HYDRONIC  
**CHILLER/  
HEAT PUMP**  
*Solutions*

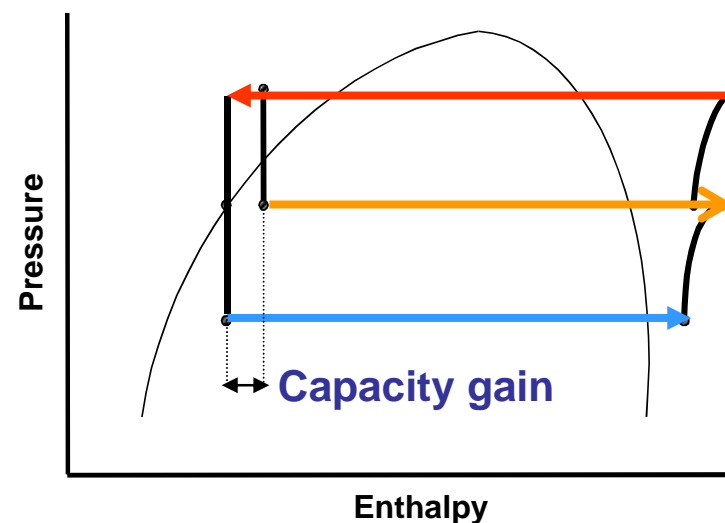
# LOW OPERATING COSTS

## Economizer with EXV



Main Electronic  
Expansion Valve

Economizer Electronic  
Expansion Valve



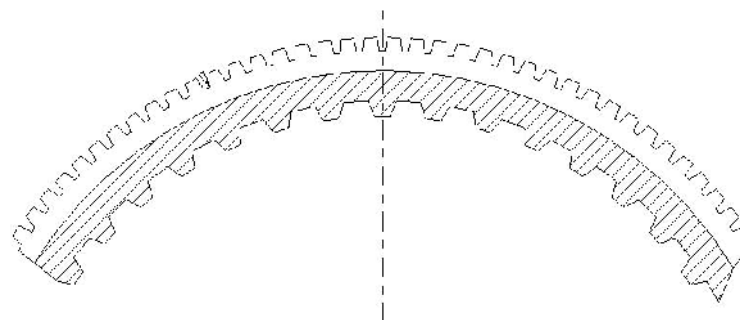
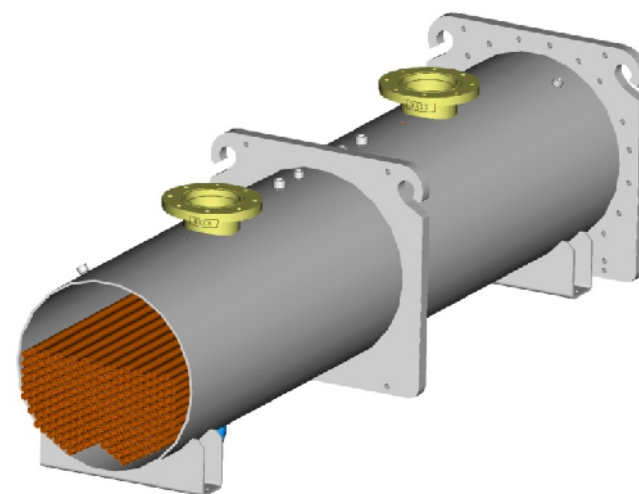
**10% gain in capacity, improved efficiency**



## LOW OPERATING COSTS

### Evaporator

- Flooded technology
  - Tube submersed in refrigerant
- New tubes with micro grooves
  - Maximum heat transfer
  - Optimized water pressure drop

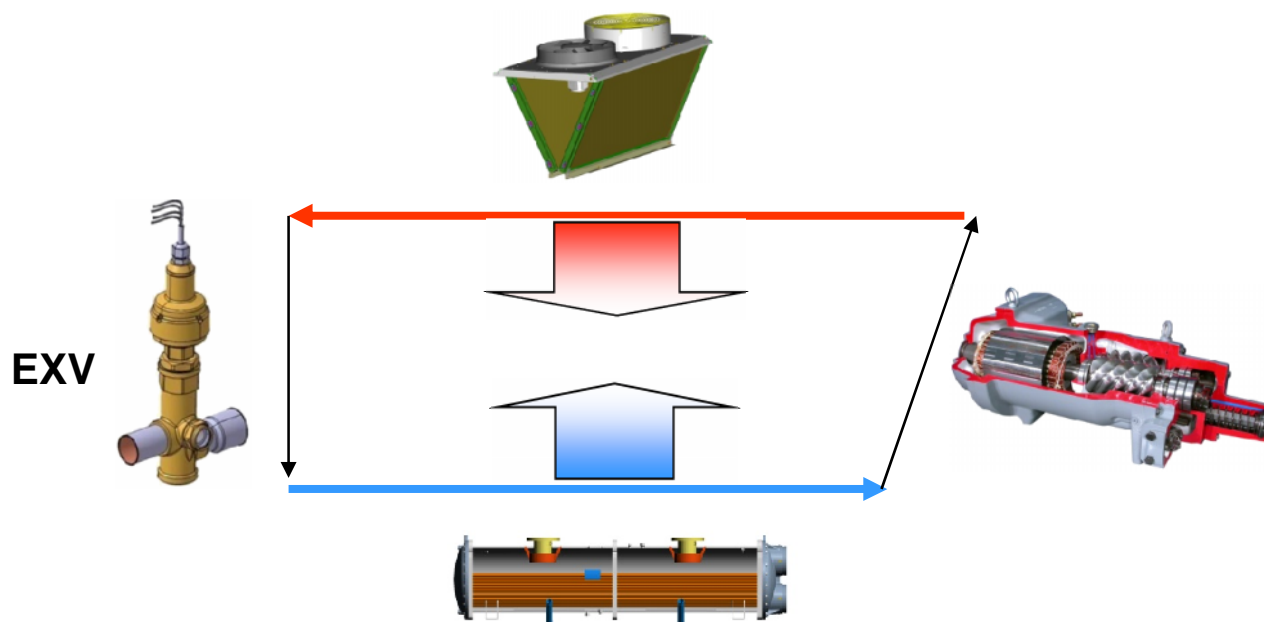


**Flooded evaporator for optimum heat transfer**

## LOW OPERATING COSTS

### Unique control algorithms\*

- Condensing pressure with floating set point
- Superheat control



\* Carrier patented

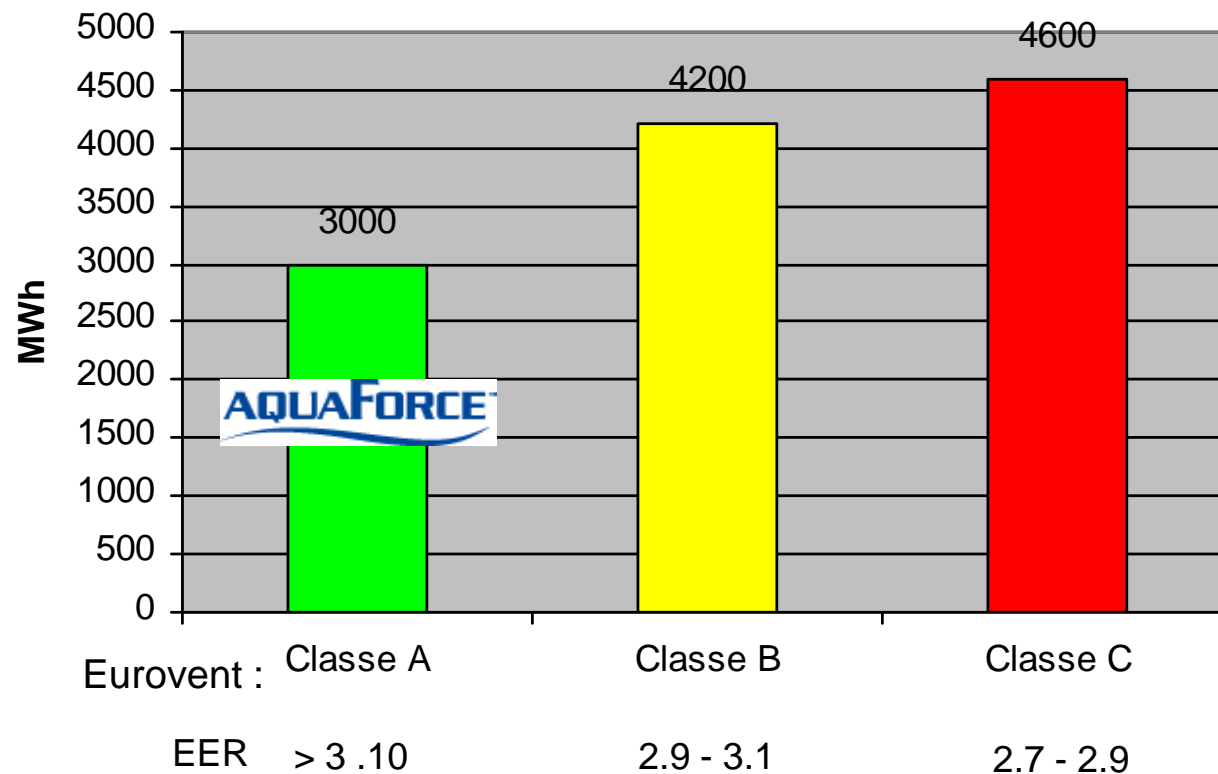
**Improved efficiency at part load operation**

# LOW OPERATING COSTS

Quick pay back on your energy bill



Energy consumption after 15 years (M Wh)



Assumptions: office building in London ,900 kW chiller, 5000 hours/year

**Up to 35% less kWh than Class B/Class C chillers**



Minimum environmental impact



# MINIMUM ENVIRONMENTAL IMPACT

## Total Equivalent Warming Impact

### TEWI



DIRECT



Refrigerant impact

5%



INDIRECT



Energy use impact

95%

# MINIMUM ENVIRONMENTAL IMPACT

## Industry responsible solutions

### TEWI



DIRECT



INDIRECT

Reduce refrigerant charge

Reduce potential refrigerant leaks

Improve energy efficiency

No energy waste: Free cooling  
/Heat recovery

# MINIMUM ENVIRONMENTAL IMPACT

## Carrier solutions: direct impact

- 30% less refrigerant
  - Thanks to Micro Channel Heat Exchanger
- Less risk of refrigerant leaks
  - Elimination of 50 % of manual brazed joints
  - Elimination of capillary tubing & “flare” connections
  - Very precise factory leak detection (5 mg/an)

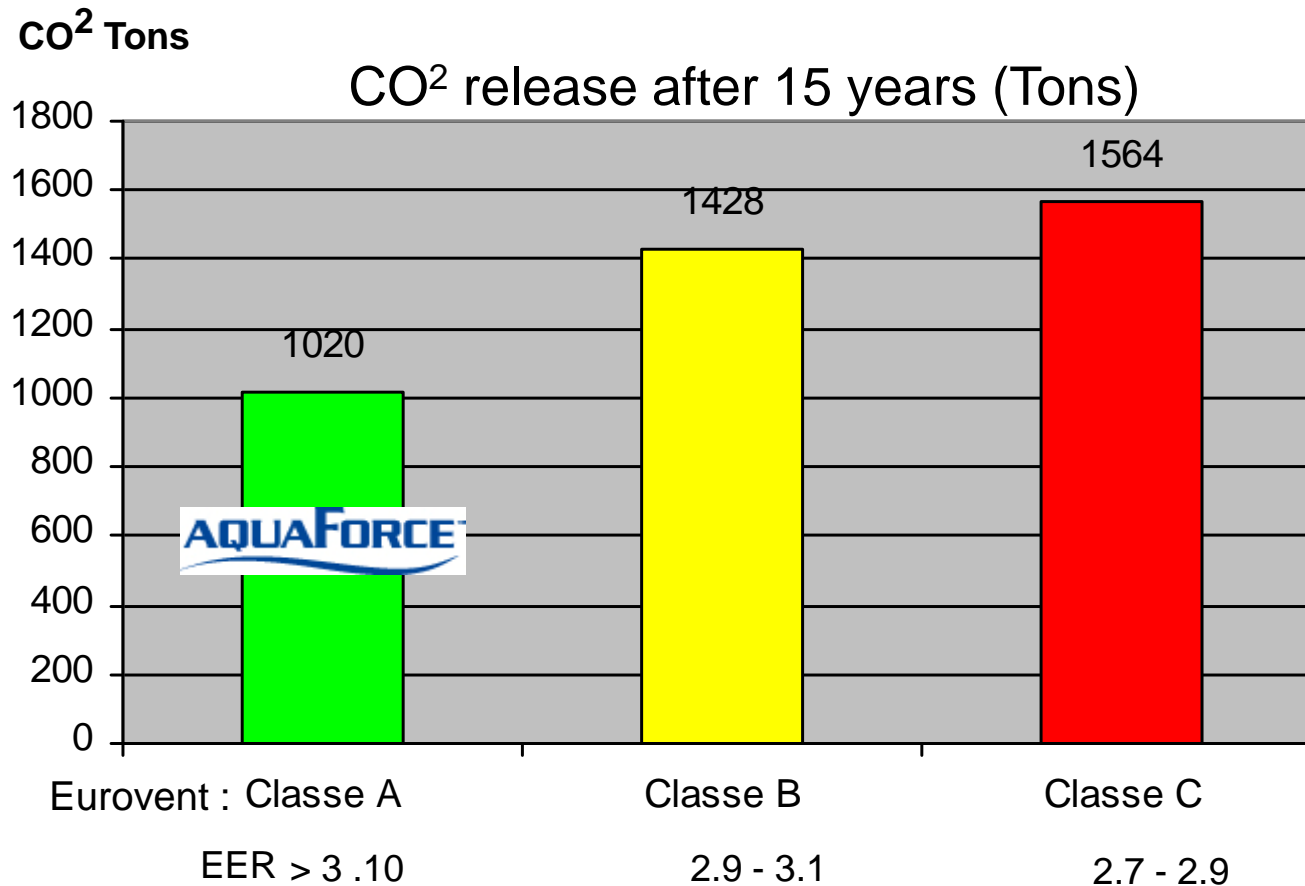


Automatic coil brazing



# MINIMUM ENVIRONMENTAL IMPACT

## Carrier solutions: indirect impact



Assumptions: office building in London ,900 kW chiller, 5000 hours/year, 340 g CO<sub>2</sub>/kWh (Europe average)

**Up to 35% less CO<sup>2</sup> release than class B/C chillers**

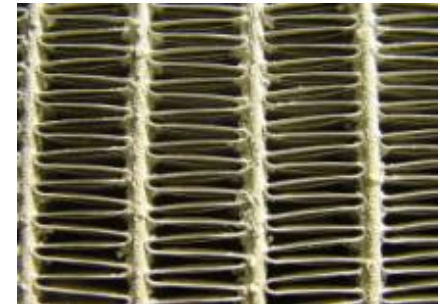


## RELIABILITY, LOW MAINTENANCE

### Micro channel heat exchanger

- 100% aluminium design eliminates galvanic corrosion
  - Elimination of bi metallic galvanic couple
- Excellent for coastal and urban environments

4000 h test: salt + acid



MCHX coil



Cu/Al coil

**3.5 X TIME MORE RESISTANT TO CORROSION**

Carrier

AQUAFORCE™



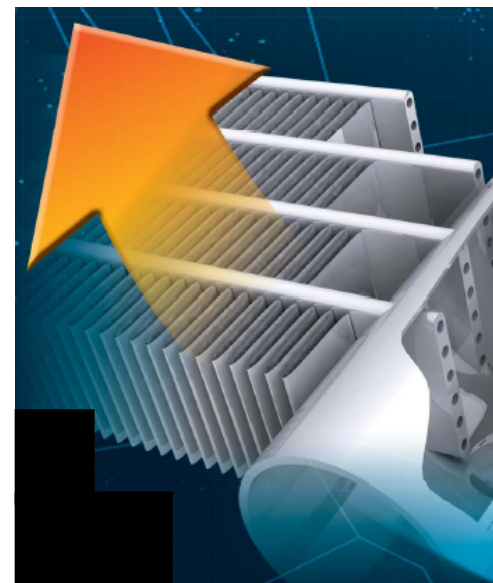
## Reliability and Maintenance

HYDRONIC  
**CHILLER/  
HEAT PUMP**  
*Solutions*

## RELIABILITY, LOW MAINTENANCE

### Micro channel heat exchanger

- Less sensitive to clogging
  - One row with 25 mm only thickness
  - 50% less air pressure drop
- Quick cleaning
  - High pressure cleaner



Cu/Al coil

# AQUAForce™

Innovative  
Low operating costs  
Minimum environmental impact  
Quiet  
Economical to install  
Reliable and low maintenance costs  
Easy to operate  
Customizable

**THE FORCE IS WITHIN**