

ADIABATIC SYSTEMS



SPRAY ADIABATIC SYSTEM



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HYGENIC CERTIFICATION +**Compliant with VDI 2047 Part 2 RELATIVE HUMIDITY INCREASE %** +30% WATER CONSUMPTION ితి LOW

Inlet air humidification system through water atomisation. A very thin water mist generated by specific nozzles fills and humidifies the inlet air, thus making it colder, depending on the different working conditions.



AVAILABLE FOR THE FOLLOWING PRODUCT RANGE



HYBRID SPRAY SYSTEM (H.S.S.) - OPEN CIRCUIT



AVAILABLE FOR THE FOLLOWING PRODUCT RANGE





COMBO









WATER **RECIRCULATION SKID** (CLOSE CIRCUIT)

SUPERJUMBO

TOWER

WALL

ΗV

OPTIONAL: WATER CONSUMPTION ••• **VERY LOW**

INDUSTRIAL ADIABATIC SYSTEM (PADS) - OPEN CIRCUIT





Inlet air humidification system by means of special adiabatic panels. The panels, placed in front of the heat exchangers on the air inlet side, are homogeneously soaked through a distribution system with no water recirculation. The air, by passing through the panels, increases its humidity and gets colder depending on the different working conditions.



AVAILABLE FOR THE FOLLOWING PRODUCT RANGE











SUPERJUMBO

COMBO







WATER RECIRCULATION SKID

Designed to minimise water consumption in a closed circuit adiabatic system. The water used to allow the adiabatic saturation of the air is directed into the basin and redirected into the circuit through the recirculation pump. Water consumption is thus limited to the quantity evaporated during the adiabatic process.







COMPARISON CHART

	SPRAY	H.S.S.	PADS
SATURATION	80%	100%	99%
INCREASING R.H.	30%	100%	60%
AIR TEMP. REDUCTION	-5 K	-10 K	-8 K
VENTILATION ENERGY Saving	2/10	5/10	4/10
DIRECT ENERGY Consumption	1/10	1/10	1/10
WATER CONSUMPTION	4/10	5/10 OPEN CIRC. 3/10 CLOSE CIRC.	9/10 OPEN CIRC. 3/10 CLOSE CIRC.
INVESTMENT	2/10	3/10 OPEN CIRC. 5/10 CLOSE CIRC.	6/10 OPEN CIRC. 5/10 CLOSE CIRC.
WATER QUALITY	6/10	8/10	3/10
HIGIENIC CERTIFICATION	OK	UNDER APPROVAL	OK

ADIABATIC SYSTEMS

REFRICN a better innovation

THEORY

EXAMPLE:

SPRAY: T_{AMB} 32,0°C (R.H.= 50%)> T_{CALC} = 26,3°C (R.H. = 80%) H.S.S.: T_{AMB} 32,0°C (R.H.= 40%)> T_{CALC} = 21,5°C (R.H. = 100%) PADS: T_{AMB} 32,0°C (R.H.= 40%)> T_{CALC} = 21°C (R.H. = 99%))	35
The adiabatic saturation reduces the suction air temperature (respect to the ambient air) and therefore the efficiency of the heat exchanger increases. The adiabatic saturation temperature lowers - since evaporating water removes heat - though	S same	0.030
it is still higher than the dew temperature, as evaporation itself raises the partial pressure of water vapour. Thanks to Refrion's systems, the adiabatic saturation guarantees an increase of the relative humidity up to the whole saturation of the air (R.H.=100%).		0000 Mater / and Mater / and Dry Air)
To Weithing Support To	PADS	0.015 mb) 0.010 Hunditiy Partio
		0.005
Dry Bulb Temperature (°C) 21	1,5 21,6 26,3 32,0	

REFRIUN better innovation

A.S. MANAGER



Modbus[®]

A unique controller for the control and diagnostics of all Refrion adiabatic systems and related on-board equipment (pressure, temperature and humidity sensors, UV lamps, actuation valves).

Overview:

- Enclosure in UV resistant plastic, protection rating IP54 (IEC Standard 60529).
- Operating temperature -25°C +50°C
 Multifunction LCD Display (resolution 128x64), remote
- control distance 600m 4 control buttons
- Multilanguage menu

Features:

- Non-volatile memory to retain parameters and event logs
 RTC (Time/Date) with battery backup
- Humidity/temperature sensor
- Input: remote start/stop (clean contact or Modbus)
 Output: operating state (clean contact)
 Output: alarm state (clean contact)

- Output: room thermostat state (clean contact) • 2 password levels: user/manufacturer

Connectivity: • RS485 Modbus RTU Slave communication interface

- Technical data:
 - Single-phase supply, voltage 100-240V, frequency 50/60Hz.

 - Power supply overcurrent protection using fuse
 USB Host Interface allows flash drive connection to upgrade software and download data logs
 - RS485 interface
 - Signal buzzer
 - Signai buzzer
 Electromagnetic system for reducing limescale build-up
 Complies with European Directive 2014/30/EU EMC
 Complies with European Directive 2014/35/EU LVD

PROTECTION COATINGS



- PRE-PAINTED HYDROPHILIC COATING • High surface tension: it gives the drops of water wetting the
- fin a flattened shape (contact angle>15°). It favours circulation and the adiabatic saturation of the air.
- Corrosion resistance (ASTM B117): 250 hours.

THERMOGUARD®

- Polyurethane based coating.
- High flexible properties.
- Heat conduction and UV
- resistant properties. Prevents chemical and
- galvanic corrosion.
- Corrosion resistance
- (ASTM B117): 3000 hours.

ELECTROFIN®

- Water-based, flexible cationic epoxy
- polymer using an electro-coat process.
- It guarantees complete heat exchanger
- coverage. Corrosion resistance (ASTM B117): 6000 hours.
- C5M & C5I High Durability (ISO 12944).



PRE-PAINTED HYDROPHOBIC COATING

- It gives the drops of water wetting the fin a spheroid shape (contact angle>50°) for easier draining.
 Corrosion resistance (ASTM B117): single layer 1000 hours (colour plack double layer 1000 hours (colour plack) double layer 1500 hours (colour black).

BLYGOLD®

- Heat conductive pigmentation.
- Very high chemical resistance at a low layer thickness.
- Corrosion resistance (ASTM B117): 4000 hours.

HERESITE®

- Suitable for marine and salt air environments.
- Withstand exposure to an extensive variety of corrosive and chemical fumes.
- Corrosion resistance (ASTM B117): 6000 hours.

O USAGE LIMITATIONS

		LIMIT OF USE [HOURS/YEAR]						
	SPRAY ADIABATIC SYSTEM Hybrid Spray System	PRE-PAINTED HYDROPHILIC (single layer)	PRE-PAINTED HYDROPHOBIC (single layer)	PRE-PAINTED HYDROPHOBIC (double layer)	THERMOGUARD®	BLYGOLD®	HERESITE®	ELECTROFIN®
WATER QUALITY	To prevent corrosion: • $6 < pH < 8$ • Conductivity <1500 µS/cm • Chlorides < 100 ppm To prevent formation of scale: • Hardness 2-4 °f = Max. 1.1-2.2 °dH = Max. 20-40 ppm of CaCO ₃	150	300	400	800	1000	1500	1500
	To prevent corrosion: • $6 < pH < 8$ • Conductivity <500 µS/cm • Chlorides < 50 ppm • Sulphate < 50 ppm To prevent formation of scale: • Hardness 2-4 °f = Max. 1.1-2.2 °dH = Max. 20-40 ppm of CaCO ₃	300	1000	1200	2400	3000	4000	4000

INDUSTRIAL ADIABATIC SYSTEM

To prevent corrosion: • 6 < pH < 8 • Conductivity < 1500 µS/cm • Chlorides < 200 ppm • Chlorides < 200 ppm • Direvent formation of scale: • Hardness <25 °f = 14 °dH = Max. 250 ppm of CaC03 • CaC03	OPTION
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