



# Industrial Cooling





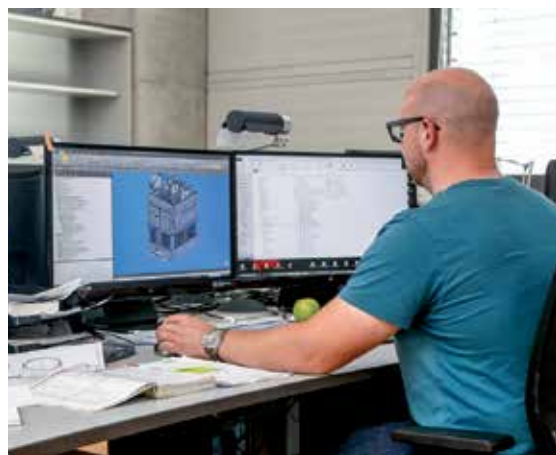


## THE COMPANY

Bernd Löffler, supported by his father Willy Löffler, founded **thermofin**® in Heinsdorfergrund in June 2002. In the headquarter in Heinsdorfergrund, we have already started the production of finned heat exchangers in autumn 2003.

Our components are applied both in commercial and industrial refrigeration and in the

production and storage of food, for freezing systems and distribution centers as well as in ice rinks. The scope of application in industrial cooling ranges from smaller applications in building technology and process cooling to data centres and large systems for energy transmission lines, for turbine and motor cooling as well as for special applications in nuclear power systems.



## FLEXIBILITY

The basis of our service range are matured series, continually developed and adapted according to current results from tests and research and customers' requirements.

Considering project-specific requirements, customer-related special designs can be implemented in dimensioning, design and manufacture. Upon request, the products can be supplemented by in-house developed control technology.

## WE ACCOMPANY YOUR SUCCESS



Our technical sales team offers support already during projecting of your systems. The close cooperation with leading international research institutes always gives us the opportunity to implement the current state-of-the-art in our products. In cooperation with international universities, we examine in test stands amongst others hybrid dry coolers and different moistening and spraying systems.

## PRODUCT DEVELOPMENT

The core of our development department is an own test stand. With the objective to continually develop and optimise our products, calculated values are examined here in practical simulations for different cases of operation. Targeted measurements of noises and vibrations offer our customers the possibility to verify the specified values already in our factory.

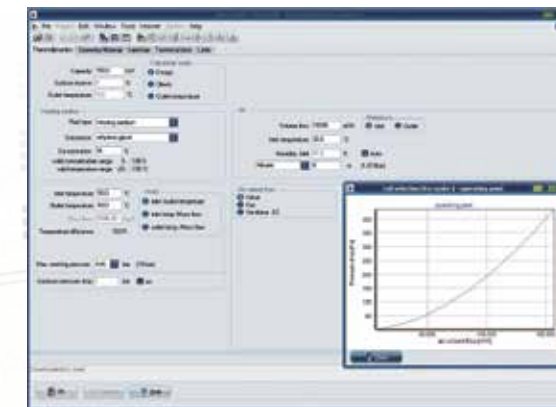


We can also complement the order-related documentation with usage lists, non-destructive examinations as well as strength calculations. On demand, we additionally provide calculations according to other international regulations and standards.



## THERMOFIN® SELECTION SOFTWARE

- wide range of variants
- application-related, optimally adapted dimensioning of the units considering different influencing values: special acoustic requirements, installation conditions, energy consumption







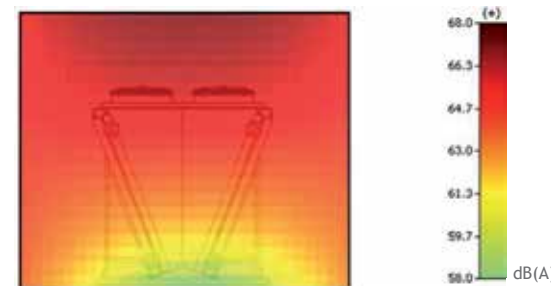
## QUALITY MANAGEMENT

The highest objective of our quality policy is to preserve the trust and the satisfaction of our customers. Within the frame of our certified quality management system, we can ensure the traceability from the finished unit back to the raw material.

- test sequence plans for the documentation of all steps of production
- material test certificates for the pressurised parts (DIN EN 10204) and fin materials
- tests and records of electrical elements

## FURTHER, PROJECT-RELATED QUALITY INSURANCE

- FATs in our factory
- noise pressure level tests
- preparation of a test field by means of the enveloping surface method using several measuring points (DIN EN 13487)
- evaluation of new types of units and fans
- consideration of the unit design in noise dates



We offer the certainty of a manufacture in compliance with the following standards and guidelines:

- **Quality management system:**  
Certificate according to DIN EN ISO 9001:2015
- **Welding quality requirements:**  
Certificate according to DIN EN ISO 3834-3
- **Manufacturer of pressure equipment according to Directive 2014/68/EU:**  
Certificate according to AD 2000-instructions HP0
- **Internal manufacturing checks with monitoring of the final assessment (module A2) according to Directive 2014/68/EU:**  
Certificate according to module A2-Directive 2014/68/EU



## CASING DESIGN

Dry coolers used in industrial areas are normally subjected to particular ambient conditions. In order to continually ensure the high quality and performance of our units, we pay special attention to the design of the casing.

**standard design:**

- sendzimir galvanised sheet metal according to EN 10346

## DUPLEX SYSTEMS

The duplex system for the protection against corrosion is a combination of a galvanising and one or multiple coating layers based on polyesters and resistant against weather and UV exposure. Based on the synergy effects between

the galvanising and the coating, the resistance is particularly high and the protection period can be considerably increased.

		SPECIAL DESIGN IN STAINLESS STEEL	
		DUPLEX SYSTEM C5	
STANDARD DUPLEX SYSTEM	base layer: min. 60 µm	base layer: min. 80 µm	highest demands on corrosion resistance
	top layer: min. 70 µm	top layer: min. 80 µm	coating of cold-rolled sheet, made of corrosion-resistant steel on the outer side of the casing
C3 (industrial area) protection period > 15 years*	C4 (corrosive industrial area) protection period > 15 years*	C5-M (highly corrosive area - sea) protection period 5 ... 15 years*	C5-M and C5-I (highly corrosive area sea/industry) protection period > 15 years*
C4 (corrosive industrial area) protection period 2 ... 5 years*		C5-I (highly corrosive area - industry) protection period 5 ... 15 years*	
all connection elements made of stainless steel			
304		316	

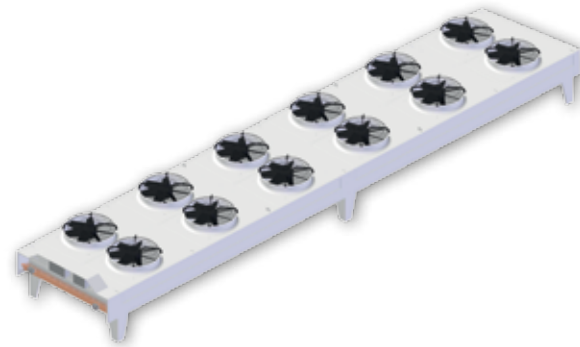


\*The given values are minimum values and depend on the actual ambient conditions.



# Dry coolers

## PRODUCT OVERVIEW



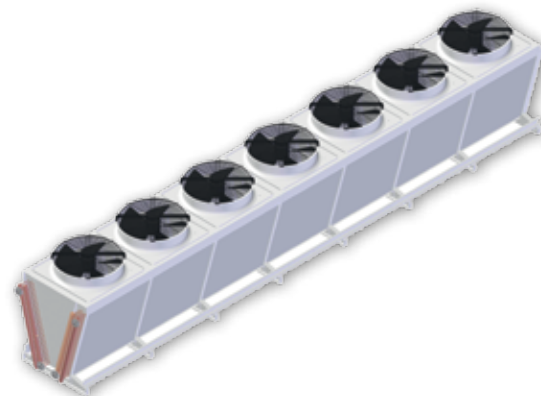
■ **DRY COOLER INDUSTRIAL LINE** 10|11

**TDH** dry cooler industrial line horizontal



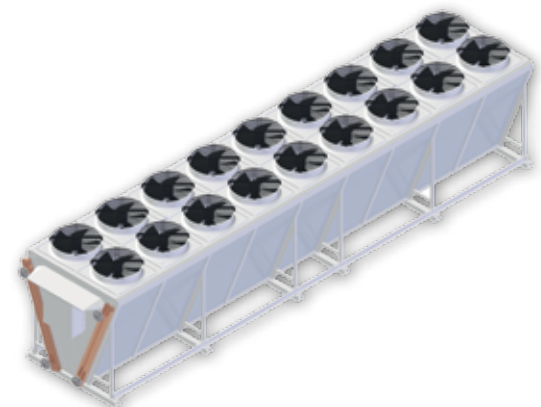
■ **DRY COOLER INDUSTRIAL LINE** 10|11

**TDV** dry cooler industrial line vertical



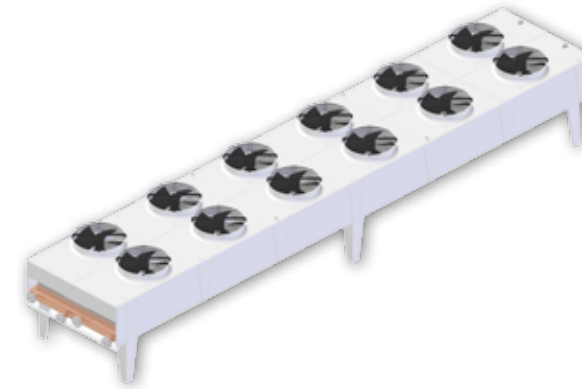
■ **DRY COOLER V-SHAPE** 12|13

**TDW** dry cooler "V-shape" single-row



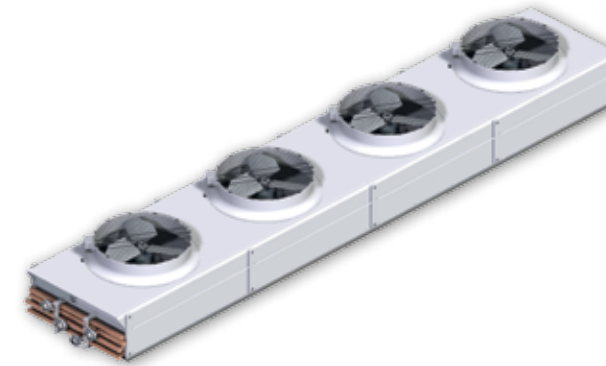
■ **DRY COOLER V-SHAPE** 12|13

**TDD** dry cooler "V-shape" double-row



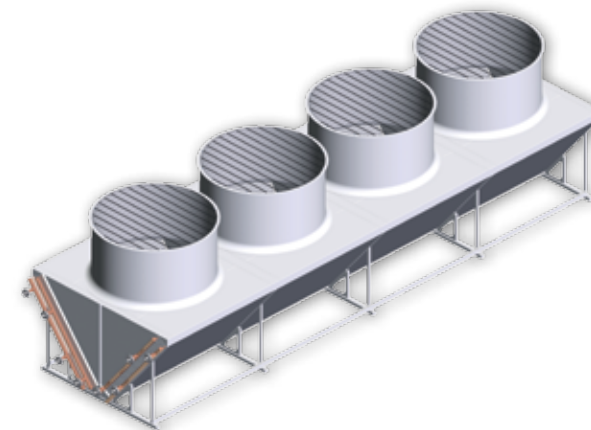
■ **SELF-DRAINING DRY COOLER** 14|15

**TSDH** self-draining dry cooler horizontal



■ **DRY COOLER FOR POWER PLANTS** 16|17

**TMDH** dry cooler for power plants horizontal



■ **DRY COOLER FOR POWER PLANTS** 16|17

**TDDP** dry cooler for power plants "V-shape"



■ **HYBRID DRY COOLER** 18|19

**THDD** hybrid dry cooler  
**THDW** hybrid dry cooler



## Dry coolers

### DESIGN OVERVIEW

The dry coolers of thermofin® are available in a wide range of performance.

The series are especially designed regarding high requirements of performance and stability. In-house developed special solutions ensure the optimum integration into system concepts.

The requirements given by the different ambient conditions can be realised by material selection and various surface coatings. All units can be adapted individually to the prescribed noise values. Water and water-glycol mixtures as well as demineralised water and oil are applied as mediums.



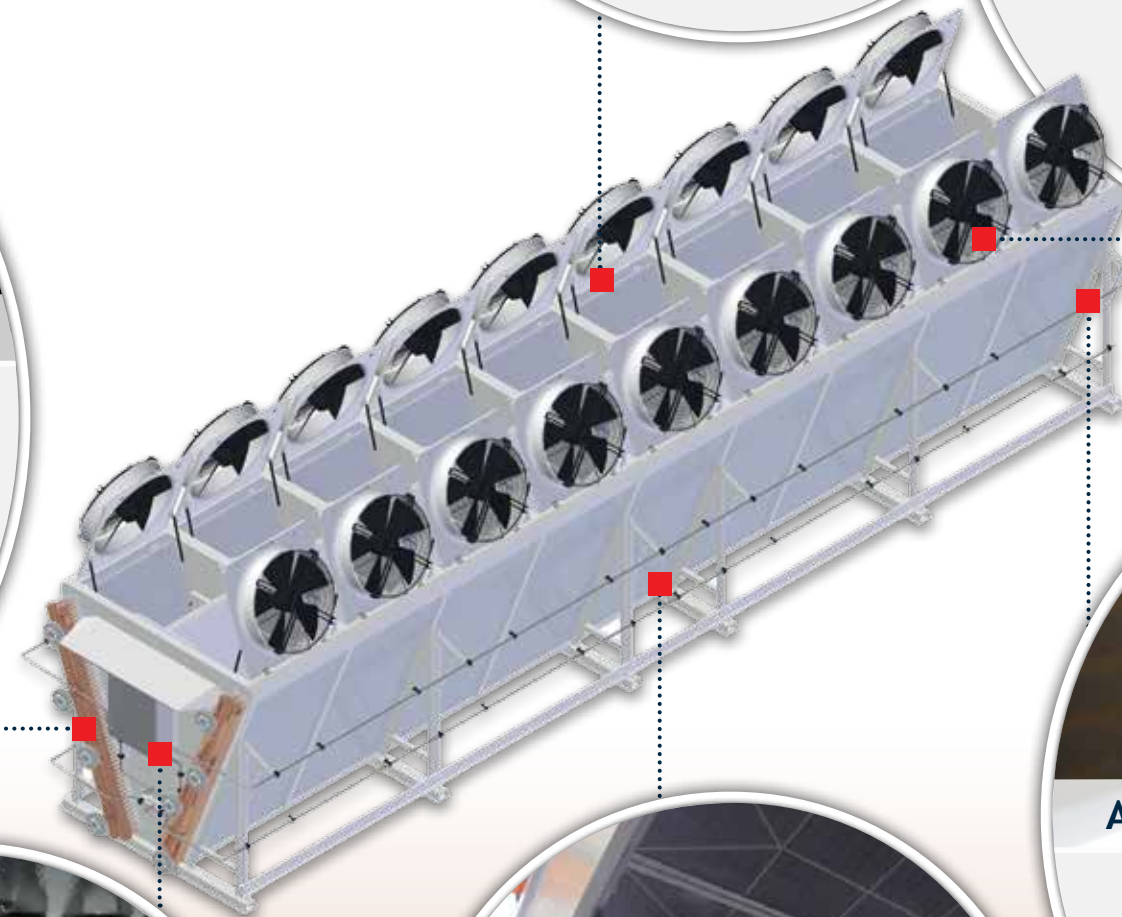
#### HEAT EXCHANGER COIL

##### tubes:

- copper or stainless steel 304 (1.4301)/316 (1.4404)
- staggered tube arrangement for an effective heat transfer
- individual operating pressure according to material

##### fins:

- aluminum, AlMg 2,5, epoxy-coated aluminium, cathodic dip paint coating, copper
- finned coil construction without supporting plate, smooth fin surface for easy cleaning
- fin spacing standard 2.2 or 2.4 mm, other fin spacings possible on customers' request



#### CASING

##### materials:

- sendzimir galvanised steel, powder coated (standard colour RAL 7035, special colours possible)
- option: stainless steel 316 (1.4404), coating is possible
- connection elements in stainless steel 304/316



#### FANS

- project-specific application of varied axial fan solutions
- aerodynamically optimised impeller geometry for a high efficiency and a minimum noise emission
- very quiet running thanks to the dynamical balance of the fans on two levels
- dimensioning for country-specific power grids and industrial networks
- CE marking and numerous further international approvals
- range of application from standard to hot air design



#### ADIABATIC SYSTEM FOR PEAK LOADS

- design with spraying systems
- spraying with variable selection of nozzles
- tubing in stainless steel 316
- pre-assembled spraying bar system in tiltable design for purposes of transport
- in case of multiple spraying bars: possibility of sequential activation
- possible accessories: control valves incl. the adiabatic control via TCS system



#### ELECTRICAL DESIGN

- individual control cabinets according to customers' requirements regarding material selection and cable glands
- entire wiring according to EN 60204-1
- elements and wiring can be optionally made according to other international standards



#### PROTECTION GRID

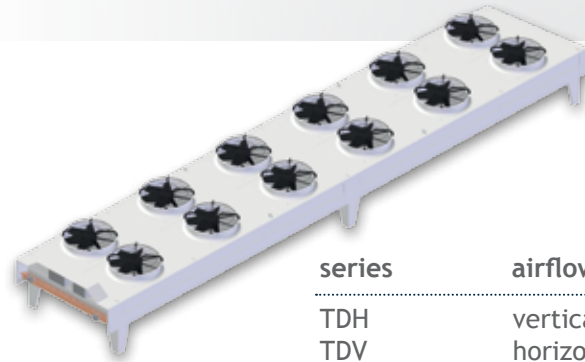
- small mesh size in front of the finned package on air inlet side as protection and for pre-filtration of dust and pollen, etc.
- larger mesh sizes for the protection against mechanical influences, vandalism, etc.



# Dry cooler industrial line

horizontal/vertical

optimal system solution thanks to the wide range of performance



series	airflow
TDH	vertical
TDV	horizontal
medium:	<ul style="list-style-type: none"> <li>• water</li> <li>• demineralised water</li> <li>• glycol mixture</li> <li>• oil</li> </ul>

## ACCESSORIES

- circuit partitions
- inspection openings
- extended/shortened legs
- special colours
- vibration dampers
- streamers for an increased air throw
- diffusers
- EC fans
- tiltable fans
- flange connections
- earthing points
- repair switches
- protection grids
- spraying system

## OPTIONS



### ELECTRIC DESIGN

- repair switch/motor protection switch (wired individually or pair-wise)
- wiring to terminal box
- TPD - thermofin® power distribution
- TCS - thermofin® control system
- control cabinet for the integration of all electrical components
- speed controller (phase control or frequency converter for AC motors)

### EFFICIENCY

- spraying system for peak loads in case of high ambient temperatures
- low water consumption
- improved COP of the system
- hygiene and frost protection thanks to the fully-automated drain system
- control with TCS controller (max. 4 spraying levels)

### SERVICE AND CLEANING

- smooth fin surfaces prevent soiling and facilitate cleaning
- optional: tiltable fans





# Dry cooler V-shape

double-row/single-row

high performance also in case of limited space,  
units combinable to a dry cooler field



series	airflow
TDD	drawing-in laterally,
TDW	blowing-out vertically upwards
medium:	<ul style="list-style-type: none"> <li>• water</li> <li>• demineralised water</li> <li>• glycol mixture</li> <li>• oil</li> </ul>

## ACCESSORIES

- circuit partitions
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- spraying system for peak loads in case of high ambient temperatures
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## ENERGY ASSESSMENT OPTIMISATION

- increase in efficiency thanks to the in-house developed and patented high-efficiency nozzle TEX

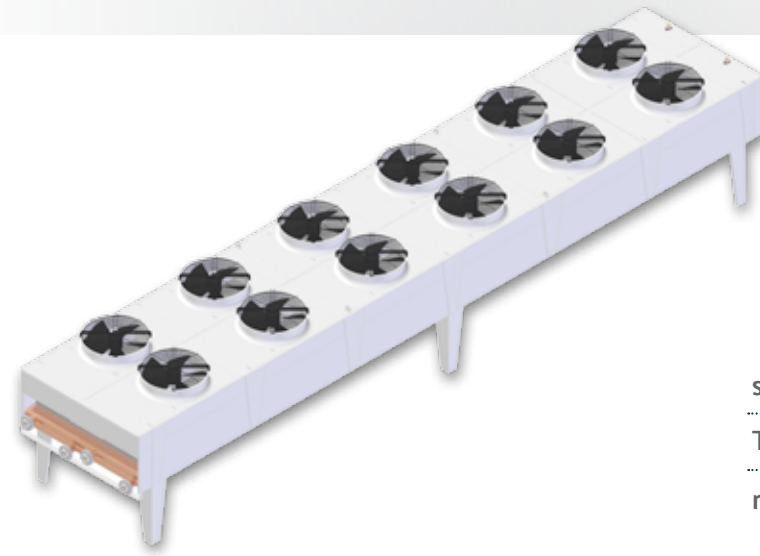




# Self-draining dry cooler

horizontal

*self-draining function thanks to the inclined coil positioning*



series	airflow
TSDH	vertical
medium:	• water

## ACCESSORIES

- circuit partitions
- inspection openings
- extended/shortened legs
- special colours
- vibration dampers
- streamers for an increased air throw
- diffusers
- EC fans
- tiltable fans
- flange connections
- earthing points
- repair switches
- protection grids
- spraying system

## OPTIONS



## ELECTRIC DESIGN

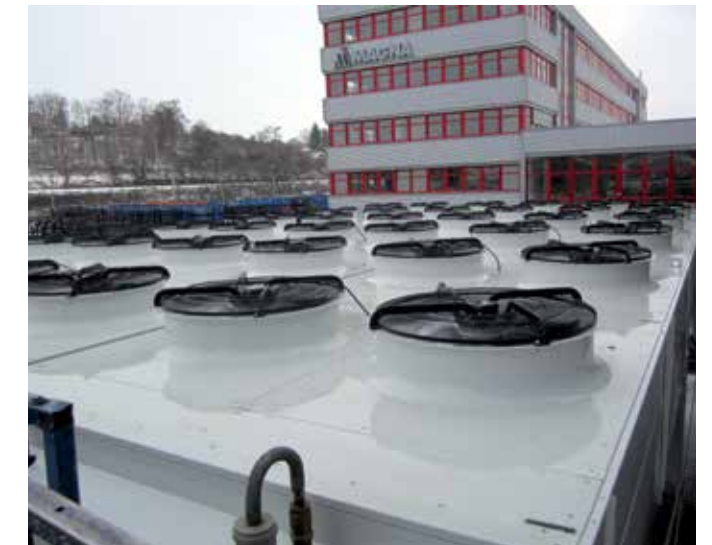
- repair switch/motor protection switch (wired individually or pair-wise)
- wiring to terminal box
- TPD - thermofin® power distribution
- TCS - thermofin® control system
- control cabinet for the integration of all electrical components
- speed controller (phase control or frequency converter for AC motors)

## EFFICIENCY

- spraying system for peak loads in case of high ambient temperatures
- low water consumption
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- hygiene and frost protection thanks to the fully-automated drain system
- control with TCS controller (max. 4 spraying levels)

## ENERGY ASSESSMENT OPTIMISATION

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# Dry cooler for power plants

horizontal/double coil V-shape

*dry coolers for power plant applications*



series	airflow
TMDH	vertical
TDDP	drawing-in laterally, blowing-out vertically upwards
medium:	<ul style="list-style-type: none"> <li>• water</li> <li>• demineralised water</li> <li>• glycol mixture</li> <li>• oil</li> </ul>

## ACCESSORIES

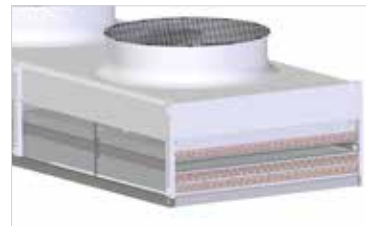
- circuit partitions
- inspection openings
- extended/shortened legs (depending on series)
- special colours
- vibration dampers
- streamers for an increased air throw
- diffusers
- EC fans
- tiltable fans
- flange connections
- earthing points
- repair switches
- protection grids
- spraying system

## OPTIONS



### MULTIPLE CIRCUIT PARTITION

- partition in high and low temperature circuit



### CLEANING

- distance between the coils for optimal cleaning



### RESISTANCE

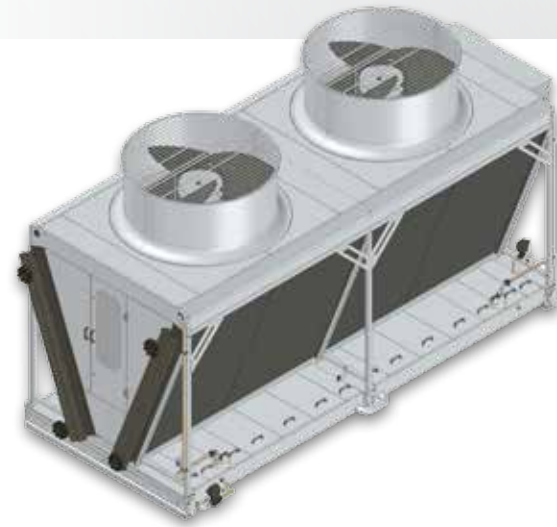
- particularly solid frame construction with connection points directly in the dry cooler for the assembly of railings on site





# Hybrid dry cooler

with an outstanding performance potential thanks to the interaction between wet and dry cooling

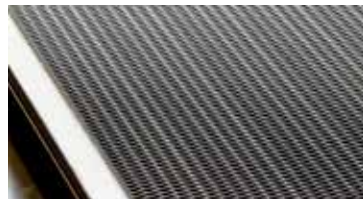


series	airflow
THDD	drawing in laterally,
THDW	blowing out vertically upwards
medium:	<ul style="list-style-type: none"> <li>• water</li> <li>• glycol mixture</li> </ul>

## DESIGN

- parts with contact to water made of stainless steel
- fans Ø 800 to Ø 2,000 mm
- fan selection optimised to sound values and energy efficiency
- continuous speed control of the fans
- completely piped water circuit
- water collection tray
- filling level sensor
- submersible pump for water circuit
- automatic draining system
- automatic conductivity measurement
- automatic control input of biocide-mixture

## OPTIONS



### HEAT EXCHANGER COIL

- high protection against corrosion thanks to cathodic dip-paint coating



### ELECTRIC DESIGN

- complete system mounted into a control cabinet for the control of all unit functions
- regulation of summer/winter mode with draining
- continuous regulation of the fan speed
- regulation of the deluging water circuit
- regulation of the desludging and refilling function



### SERVICE

- access door with automatic fan stop
- all valves and water-side service points are accessible from the outside

### WATER CIRCUIT

- deluging of the finned surface for an increased performance and a decreased medium temperature

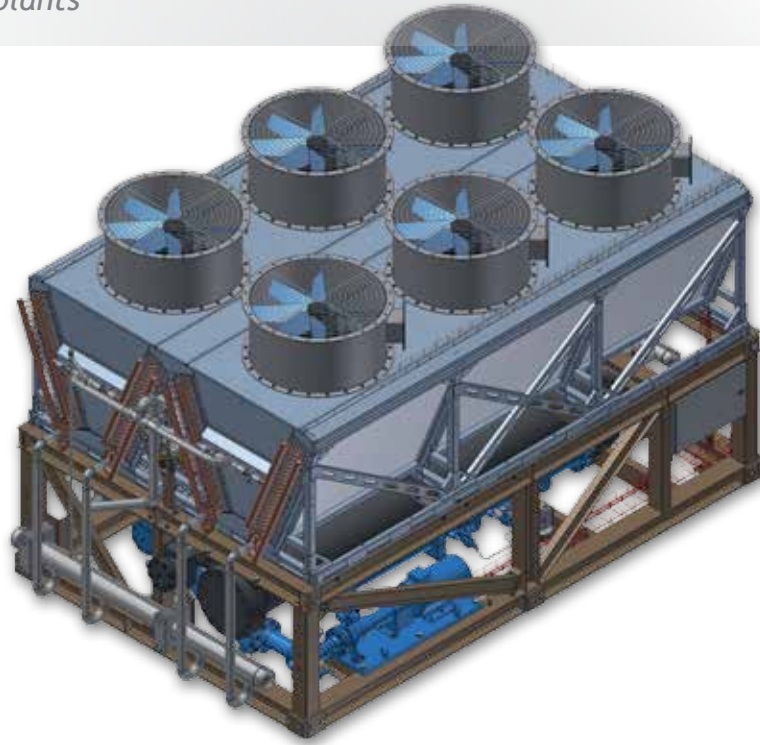




Special concepts

## NUCLEAR ENERGY

*individual solutions on highest technical level for the integration into power plants*



### ■ PROJECT-SPECIFIC DOCUMENTATION

In order to meet the high requirements of this industrial sector, our scope of services comprises the preparation of project-specific preliminary examination documents.

#### INCLUDED DOCUMENTS

- data sheets
- parts lists
- solder or welding plans (including process instruction and solder or welding certificates)
- material certificates for the pressurised parts
- records of leak testing processes
- acceptance test certificates
- declarations of conformity
- evidence of internal process flows

### ■ CONSTRUCTIONAL DESIGN

The constructional design of the units is subjected to detailed calculations of individual components. The operational reliability is ensured by various verifications and tests prior to delivery.

- strength verification of finite elements
- vibration tests imitating earth quakes





## Fans

**DESIGN**

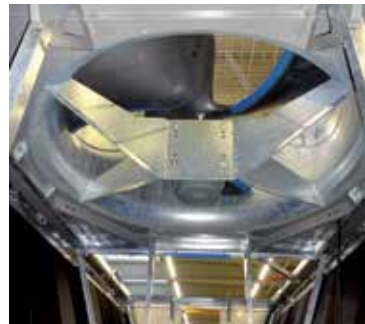
*individual applications according to project-specific requirements*

**AC FANS**

- external rotor motors with maintenance-free bearing
- optimised impellers with the most modern motor technology
- compact dimensions for any mounting situation
- fans controllable via frequency converter with an all-pole sinus filter according to prescriptions of manufacturer
- compliance with the current EuP guideline
- protection type IP54

**EC FANS**

- brushless synchronous motor with permanent magnet and electronics commutation
- high-efficient thanks to an integrated control function
- power electronic with integrated control and regulating function as well as motor protection and EMC filter
- independent from mains frequencies (50 or 60 Hz)
- flexible direct speed control possible via 0-10 V, 4-20 mA or Modbus systems
- emergency operation in case of a signal failure
- compliance with the efficiency class IE4 (IEC 60034-31)
- protection type IP54 (optional IP55)

**INDIVIDUAL FAN UNITS**

- internal rotor motors according to country-specific standards with individual impeller design
- consideration of motor manufacturers defined by customer
- impeller geometry up to a diameter of 2,000 mm
- direct-driven without power losses and maintenance works (e. g. V-belts)
- high air volume flows with a low speed
- protection type IP54, IP66

**OPTIMISATION****Diffusers:**

- increased volume flow
- energetic optimisation
- reduction of operating costs
- acoustic directivity
- easy retrofitting and/or integration
- power increase of existing systems

**System reliability:**

- streamers to increase the throwing distance and to prevent "thermal short-circuits"
- protection against corrosion according to resistance classes
- protection grid, optional made of stainless steel
- fan junction box in metallic design for a high mechanical load as well as demanding ambient conditions

**Service:**

- tiltable fans for the optimisation of maintenance interventions on the heat exchanger





## Electrical engineering

**TECHNICAL CONTROL DESIGN***energy-efficient and customer-oriented solutions*

Our competent team accompanies the complete internal planning from the creation of circuit diagrams until completion in electrical

installation department. Electrical elements can be selected in conformity with country-specific regulations.

**WIRING**

- complete wiring according to EN 60204-1
- cable labelling (plastic or stainless steel)

**Options:**

- separate wiring of the fans for individual control
- special cable glands in metallic design
- laying of cables in metallic flexible protective hose
- wiring to repair switch/motor protection switch, control cabinet/terminal box
- individual or pair-wise wiring of fans
- transmission of the signal wiring via wireless technology

**CONTROL CABINETS**

- executed individually according to customers' requirements regarding material selection, casing and mains voltage
- optional: heating, ventilation and lightening of control cabinets

**CONTROL SYSTEM**

- self-developed components for the easy integration into the system
- optimal adaption to the ambient conditions on site

**TCS - thermofin® control system:**

- continuous control of both fan types
- control of EC fans
- control of AC fans with frequency converters
- step control
- numerous control functions selectable via the menu without programming unit
- single or multi-circuit cooler systems possible
- combined systems of several coolers on one cooling circuit via TCS, without separate master control unit
- communication on site via Modbus RTU, Profibus ID or BACnet/IP
- freely programmable digital or analog IOs according to customers' requirements

**ACCESSORIES**

- repair switch in different material combinations
- motor protection switch
- pressure and temperature sensors, immersion sleeves

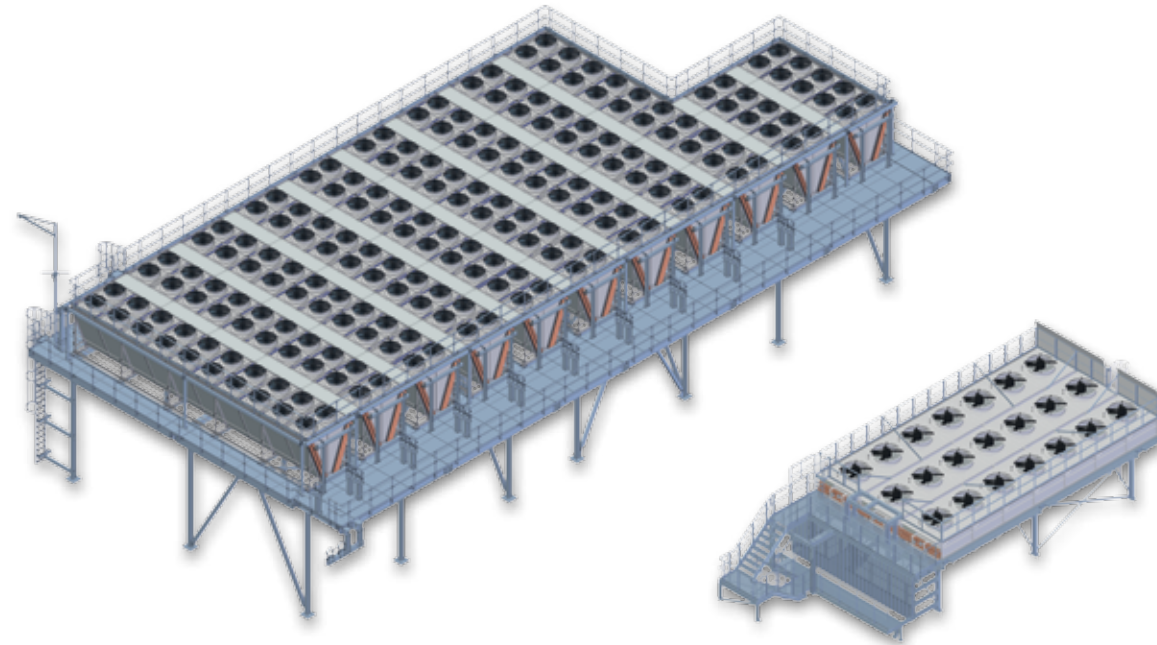




## Complete solutions

**STEEL CONSTRUCTION***overall concept for optimised positioning***■ SPACE-SAVING INSTALLATION**

- units can be combined to a dry cooler field
- positioning of table-shaped units directly next to each other
- positioning of V-shaped units with minimum distances depending on performance and number of fans (mounting of air baffles to prevent "thermal short-circuits")

**■ DESIGNS FOR OPTIMAL AIR DRAW-IN**

- achievement of the required air inlet by adjusting of the clear height
- heights up to 2 m for table-shaped units with extended legs
- for V-shaped units and heights above 2 m with separate steel structures
- individually manufactured railings with stairs



## Complete solutions

**PACKAGING***maximum safety for transport and storage*

The packaging provides our customers the certainty that the product reaches its point of destination in perfect condition and can be professionally unloaded and unpacked there. Only an undamaged delivery ensures the satisfaction of our customers and retains the absolute value of our product.

The selection of the right packaging depends on:

- design and size of the units
- type and duration of the transport path
- means of transport
- country of destination

**■ TYPES OF PACKAGING****TRUCK PACKAGING**

- individual packaging: units with leg heights up to 1,000 mm can be delivered fully assembled
- packaging of two stacked units possible for the optimal use of the loading space, the legs are delivered separately
- optional: units with protection for the finned surface made of plastics or packaging with shrinking foil
- labelling according to customers' and project specifications possible

**CONTAINER PACKAGING**

- preparation of all containers in our factory
- execution of packaging adapted to valid ISO container dimensions
- packaging onto transport base for container storage
- seaworthy packaging: airtight packaging in aluminium composite film with desiccant (optional for 1 or 2 years)
- necessary wooden structures made of treated wood (ISPM 15) according to IPPC standard
- execution of packages with shock indicators
- labelling according to customers' and project specifications possible

**PACKAGING IN A SEA BOX**

- box design depends on means of transport and transport path
- necessary wooden structures made of treated wood (ISPM 15) according to IPPC standard
- seaworthy packaging: airtight packaging in aluminium composite film with desiccant (optional for 1 or 2 years)
- attachment points for lift trucks or crane operation
- execution of packages with shock indicators
- optional: stackable
- labelling according to customers' and project specifications possible





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