INDUSTRIAL COOLING

thermofin®
heat exchangers · Germany

thermofin® A PRESENTATION

Your strong partner

Kickoff

After company foundation in 2002, the first heat exchangers left the factory in Heinsdorfergrund already one year later. Thanks to the long experience and the emphatic support by Willy Löffler, thermofin® strongly established in the branch of refrigeration technology on the German and international market.

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 for highest mechanical stresses.

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.

Product development

The core of our development department is an own test stand. With the objective to continually develop and optimize 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. In cooperation with international universities, we examine in test stands amongst others hybrid dry coolers and different moistening and spraying systems.

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

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

Our vision

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 installation

FATs in our factory

In order to confirm the design values of our coolers, we can effect FATs internally or in the presence of our customers.

A selection of test steps:

- type test on our own test stand
- leakage tests
- measurements of operating and starting current
- measurement of layer thickness
- vibration test
- volume flow measurement
- noise level test by means of the enveloping surface method according to DIN EN 13487 or DIN EN ISO 9614-1

Project-related quality insurance

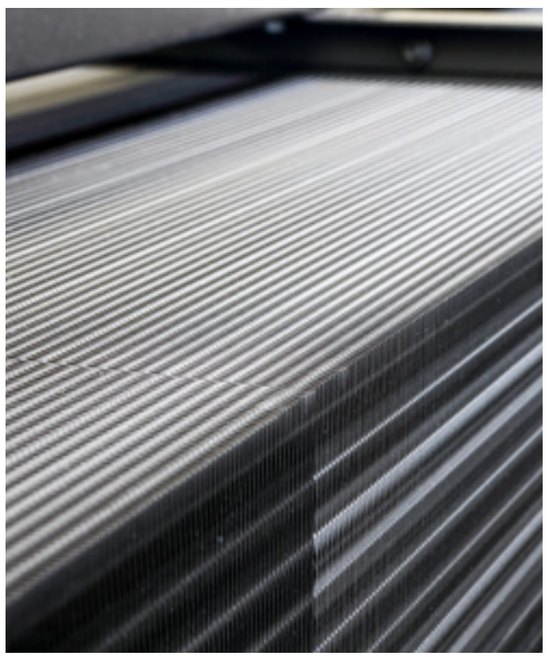
- evaluation of new types of units and fans
- individual noise assessment for each unit design and application considering the design-related noise generation
- noise emission values are verified by internal measurements

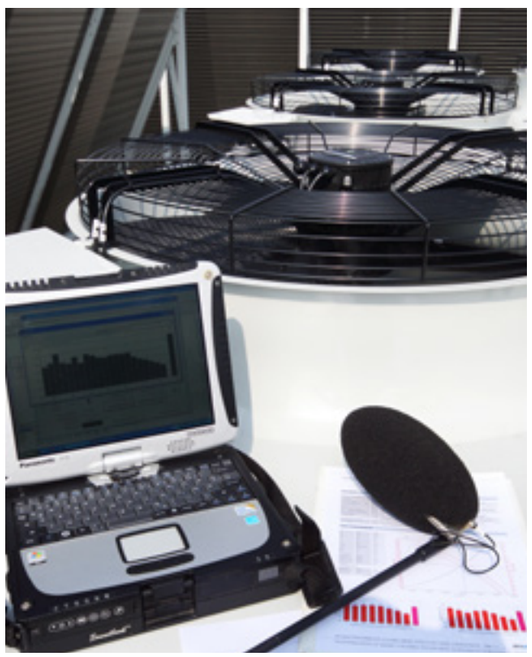
Casing design

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

Duplex systems

The duplex system for the protection against corrosion is a combination of a pregalvanised metal sheet and one or multiple coating layers based on polyesters which are 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.





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

*Term of protection with given coating thickness and ambient conditions. (corrosion class)

DRY COOLERS

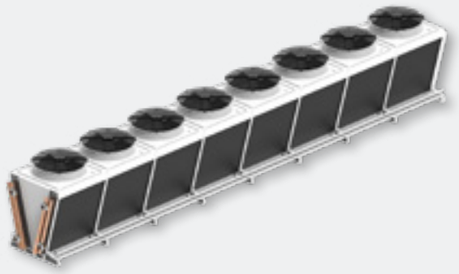
Product overview

DRY COOLERS 10 · 11

TDH, TDCH dry coolers industrial line horizontal

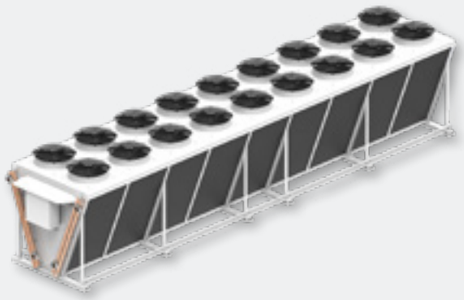
DRY COOLERS 10 · 11

TDV, TDCV dry coolers industrial line vertical



DRY COOLERS V-SHAPE 12 · 13

TDW dry coolers “V-shape” single-row



DRY COOLERS V-SHAPE 12 · 13

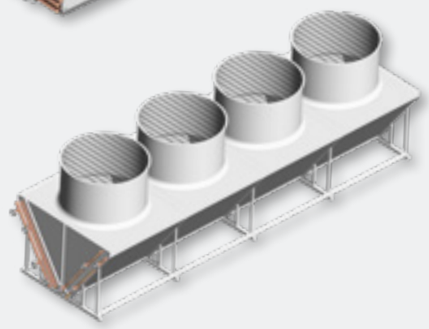
TDD dry coolers “V-shape” double-row

SELF-DRAINING DRY COOLERS 14 · 15

TSDH self-draining dry coolers horizontal

DRY COOLERS FOR POWER PLANTS 16 · 17

TMDH dry coolers for power plants horizontal

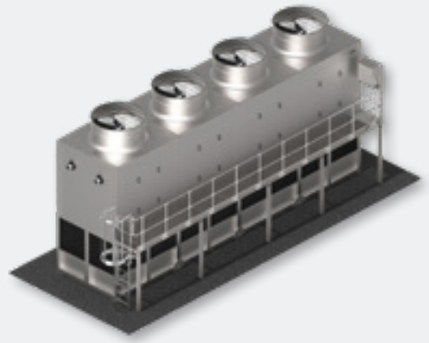


DRY COOLERS FOR POWER PLANTS 16 · 17

TDDP dry coolers for power plants “V-shape”

HYBRID DRY COOLERS 18 · 19

THDW hybrid dry coolers single-row
THDD hybrid dry coolers double-row



COOLING TOWERS 20 · 21

open, closed

TDE cooling towers

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, glycol mixtures, demineralised water as well as oil are applied as mediums.

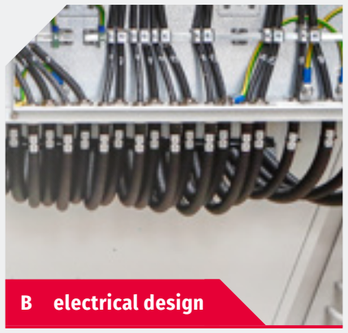
A heat exchanger coil

tubes:

- copper or stainless steel 304L (1.4307)/316L (1.4404)
- staggered tube arrangement for an effective heat transfer
- individual operating pressure according to material

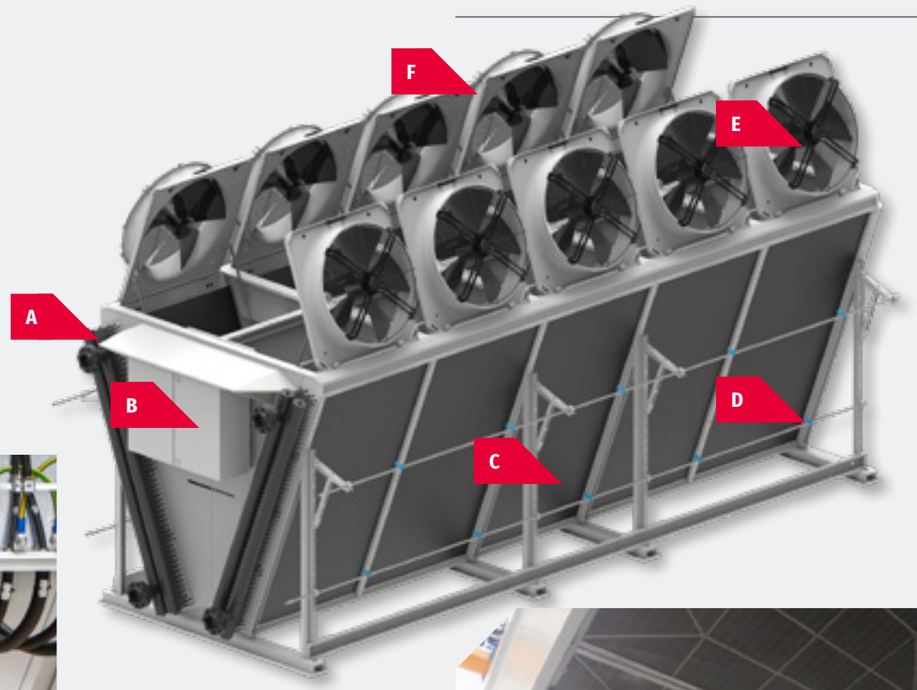
fins:

- 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 2.0 to 3.0 mm, other fin spacings possible on customers' request



B 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

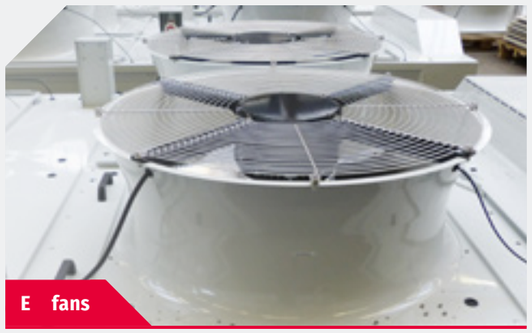


F casing

- sendzimir galvanised steel, powder coated (standard colour RAL 7035, special colours possible)
- option: stainless steel 316L (1.4404), coating is possible
- connection elements in stainless steel 304/316
- corrosion protection class C3 (option: C4, C5I/M)

C 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.



E fans

- project-specific application of varied axial fan solutions
- aerodynamically optimized 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

D adiabatic system for peak loads

- spraying with variable selection of nozzles
- tubing in stainless steel 316L (1.4404)
- 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

Dry coolers

HORIZONTAL · VERTICAL

optimal system solution
thanks to the wide
range of performance

series	airflow
TDH, TDCH	vertical
TDV, TDCV	horizontal

medium	water glycol mixture demineralised water oil

Accessories

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

Options

electric design

- repair switches / motor protection switches (wired individually or pair-wise)
- wiring to terminal box
- TPD — thermofin® power distribution
- control cabinet for the integration of all electrical components
- TCS — thermofin® control system

efficiency

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

service and cleaning

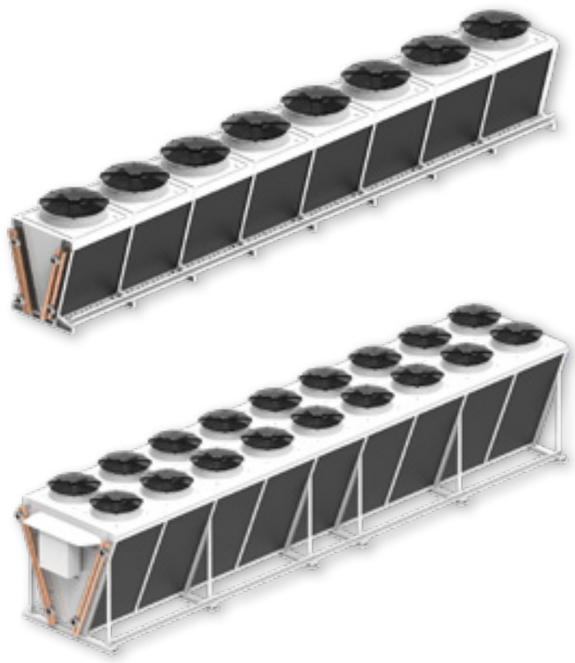
- smooth fin surfaces prevent soiling and facilitate cleaning
- optional: tiltable fans
- protection grids for the filtration of pollen and dust

Dry coolers V-shape

SINGLE-ROW · DOUBLE-ROW

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

series	airflow
TDW **TDD**	drawing-in laterally, blowing-out vertically upwards
medium	water glycol mixture demineralised water oil



Options

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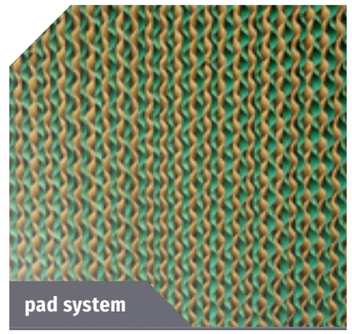


pad system

- activation of the humidification system in case of higher performance requirements
- even humidification of the entire surface on the length of the water distribution pipe
- no aerosol output
- direct assembly on the air inlet sides
- easy replacement of the pads thanks to a modular design

Accessories

- circuit partitions
- special colours
- vibration dampers
- streamers for an increased air throw
- diffusers
- tiltable fans
- flange connections
- earthing points
- repair switches
- protection grids
- spraying system

Self-draining dry coolers

HORIZONTAL

self-draining function
thanks to the inclined
coil positioning

series	airflow
TSDH	vertical
medium	water

Options

electric design

- repair switches / motor protection switches (wired individually or pair-wise)
- wiring to terminal box
- TPD — thermofin® power distribution
- control cabinet for the integration of all electrical components
- TCS — thermofin® control system

efficiency

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

energy assessment optimization

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

Accessories

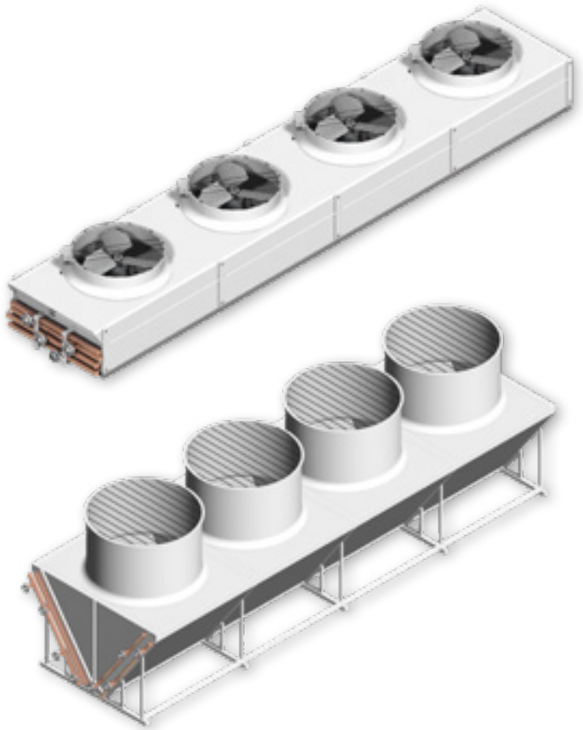
- circuit partitions
- inspection openings
- extended / shortened legs
- special colours
- vibration dampers
- streamers for an increased air throw
- diffusers
- tiltable fans
- flange connections
- earthing points
- repair switches
- protection grids
- spraying system

Dry coolers for power plants

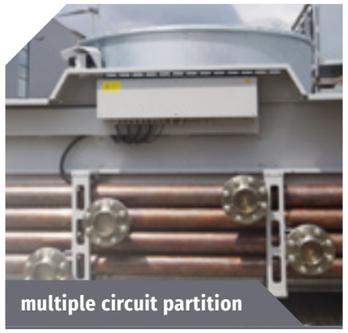
HORIZONTAL · DOUBLE COIL V-SHAPE

dry coolers for energy and power plant applications

series	airflow
TMDH	vertical
TDDP	drawing-in laterally, blowing-out vertically upwards
TMDV	horizontal
medium	water glycol mixture demineralised water oil

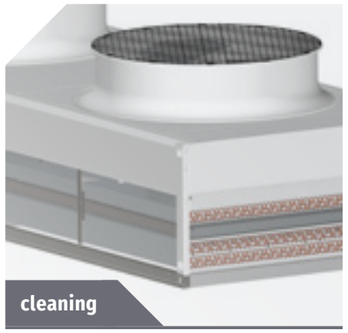


Options



multiple circuit partition

- combination of the high and low temperature circuit in one cooler



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

Accessories

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

Hybrid dry coolers

SINGLE-ROW · DOUBLE-ROW

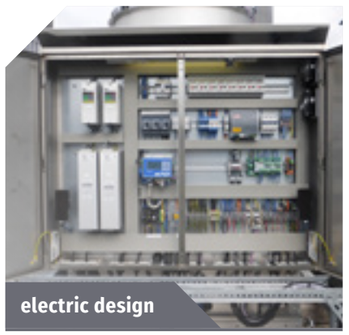
with an outstanding performance potential thanks to the interaction between wet and dry cooling

series	airflow
THDW **THDD**	drawing in laterally, blowing out vertically upwards
medium	water glycol mixture

Design

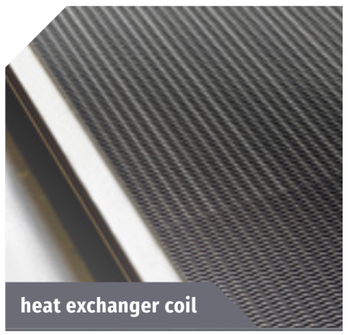
- parts with contact to water made of stainless steel
- fans Ø 800 to Ø 2,000 mm
- fan selection optimized to noise values and energy efficiency
- continuous speed control of the fans
- completely piped water circuit
- water collection tray
- filling level sensor
- submersible pump for water circuit
- conductivity measurement with automatic deluging system
- automatic control of the biocide mixture supply
- access door with automatic fan stop
- all valves and service points easily accessible

Design/Options



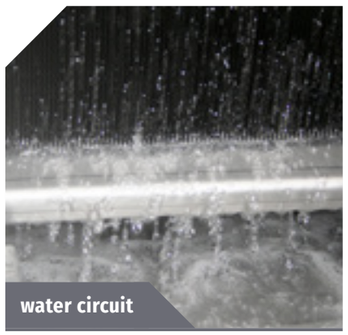
electric design

- control system with TCS for the regulation of all unit functions
- connection to higher level control
- regulation of summer/winter mode with draining
- continuous regulation of the fan speed
- regulation of the deluging water circuit with desludging and refilling function



heat exchanger coil

- high protection against corrosion thanks to cathodic dip-paint coating
- protective grid for the filtration of pollen and dust



water circuit

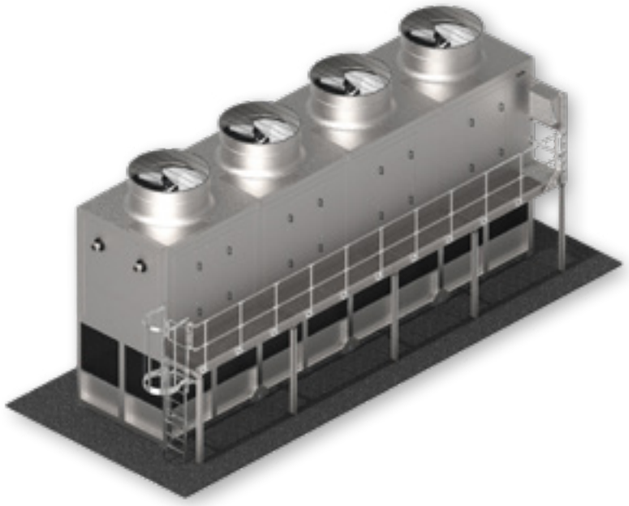
- deluging of the finned surface for an increased performance and a decreased medium temperature
- UV lamps to prevent microbial growth
- long cleaning intervals due to optimized tray design

Cooling towers

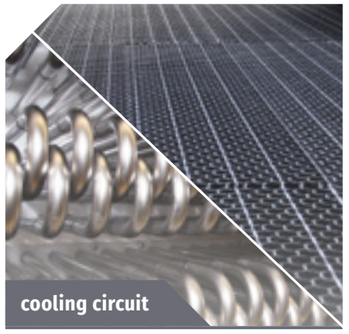
OPEN · CLOSED

high performance potential by evaporative cooling

series	airflow
TDE	drawing in laterally, blowing out vertically upwards
medium	water (open) glycol mixture (closed)



Design/Options



- open: process water cooling through plastic elements
- closed: corrosion protection ensured by heat exchanger coils made of stainless steel 316L (1.4404)

- stainless steel casing in robust industrial design
- optional: railing and access ladder

- completely welded water collection tray made of stainless steel 304 (1.4301)
- UV lamps to prevent microbial growth
- long cleaning intervals due to optimized tray design
- tray heater (frost protection)

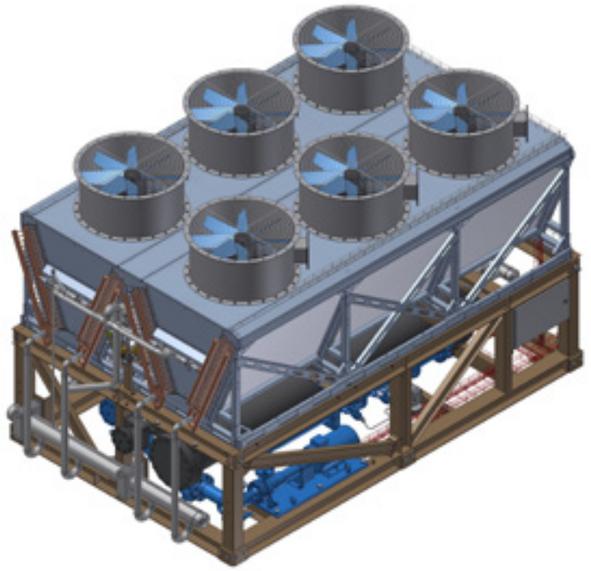
Design

- completely made of stainless steel
- fans Ø 800 to Ø 2,000 mm
- fan selection optimized to noise values and energy efficiency
- continuous speed control of the fans
- water noise absorbers
- completely piped water circuit
- filling level sensor
- automatic deluging system
- automatic conductivity measurement
- option: open water circuit or a closed one with pump
- biocide connection possible

Special conceptions

FOR HIGHEST MECHANICAL STRESSES

individual solutions on highest technical level for the integration into power plants and for projects with highest safety requirements



Project-specific documentation

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

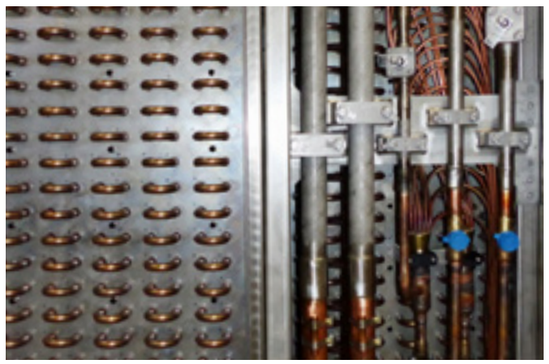
included documents

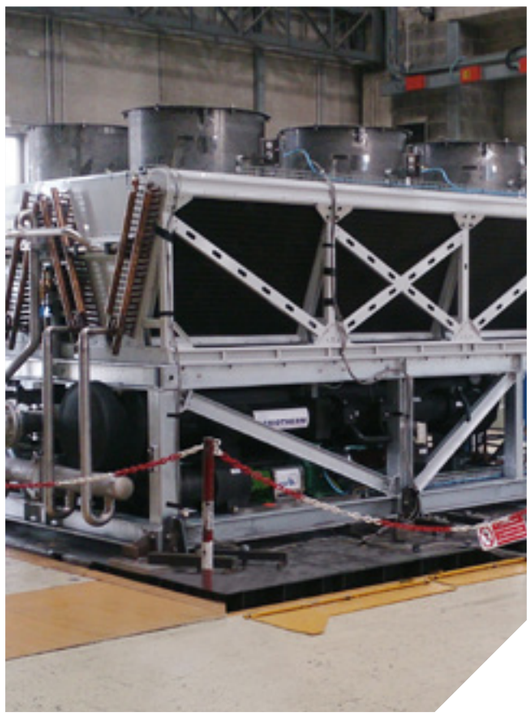
- data sheets
- parts lists
- solder or welding plans (including process instruction and solder or welding certificates)
- material certificates for the pressurised parts
- records of leak testing processes
- acceptance test certificates
- declarations of conformity
- evidence of internal process flows

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 and airflow optimization

individual applications according to project-specific requirements and the currently valid guidelines

AC fans

- external rotor motors with maintenance-free bearing
- optimized 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 ErP directive
- protection type IP54

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, option: IP55 (furthers on request)

EC fans

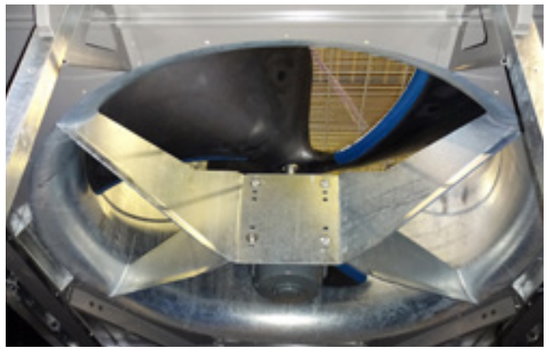
- brushless synchronous motor with permanent magnet and electronics commutation
- high-efficient thanks to an integrated control function
- power electronic with integrated control and regulating function as well as motor protection and EMC filter
- independent from mains frequencies (50 or 60 Hz)
- 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)

Optimization

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

- streamers to increase the throwing distance and to prevent “thermal short-circuits”
- protection against corrosion according to resistance classes
- fan junction box in metallic design for a high mechanical load as well as demanding ambient conditions

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



Technical control design

energy-efficient and customer-oriented solutions

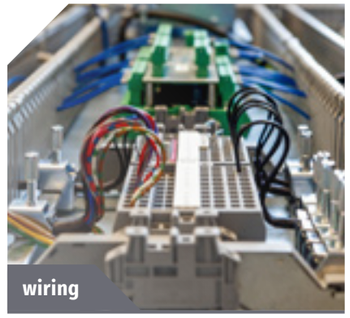
Our competent team accompanies the complete internal planning from the creation of circuit diagrams until completion in electrical installation department. Electrical elements can be selected in conformity with country-specific regulations.

control system

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

TCS – thermofin® control system:

- 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



wiring

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

options:

- separate wiring of load and control cables
- 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

options:

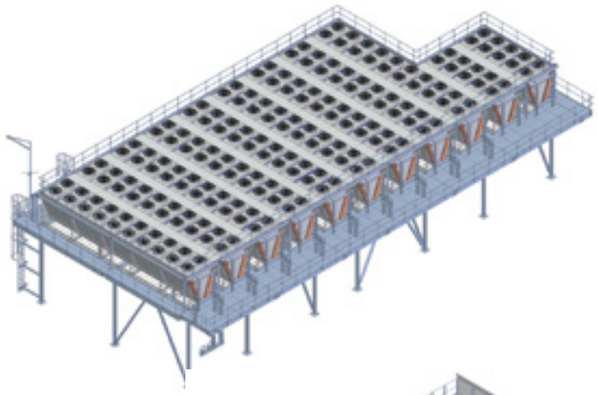
- heating, ventilation and lightening of control cabinets

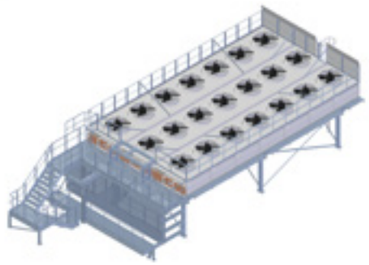
accessories

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

Steel Structure

overall concept for optimized 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 recirculations)

Designs for optimal air draw-in and work safety

- 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 installation heights of horizontal units above 2 m with steel structures
- individually manufactured railings with stairs or access ladders with safety cage
- anti-slip painting on the walk area on top of the coolers

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
- means of transport
- type and duration of the transport path
- country of destination

Types of packaging

truck

- 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
- optimal: units with protection for the finned surface made of plastics or packaging with shrinking foil
- labelling according to customers' and project specifications possible

container

- 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

seaworthy wooden 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 forklift trucks or crane operation
- execution of packages with shock indicators
- optional: stackable
- labelling according to customers' and project specifications possible

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