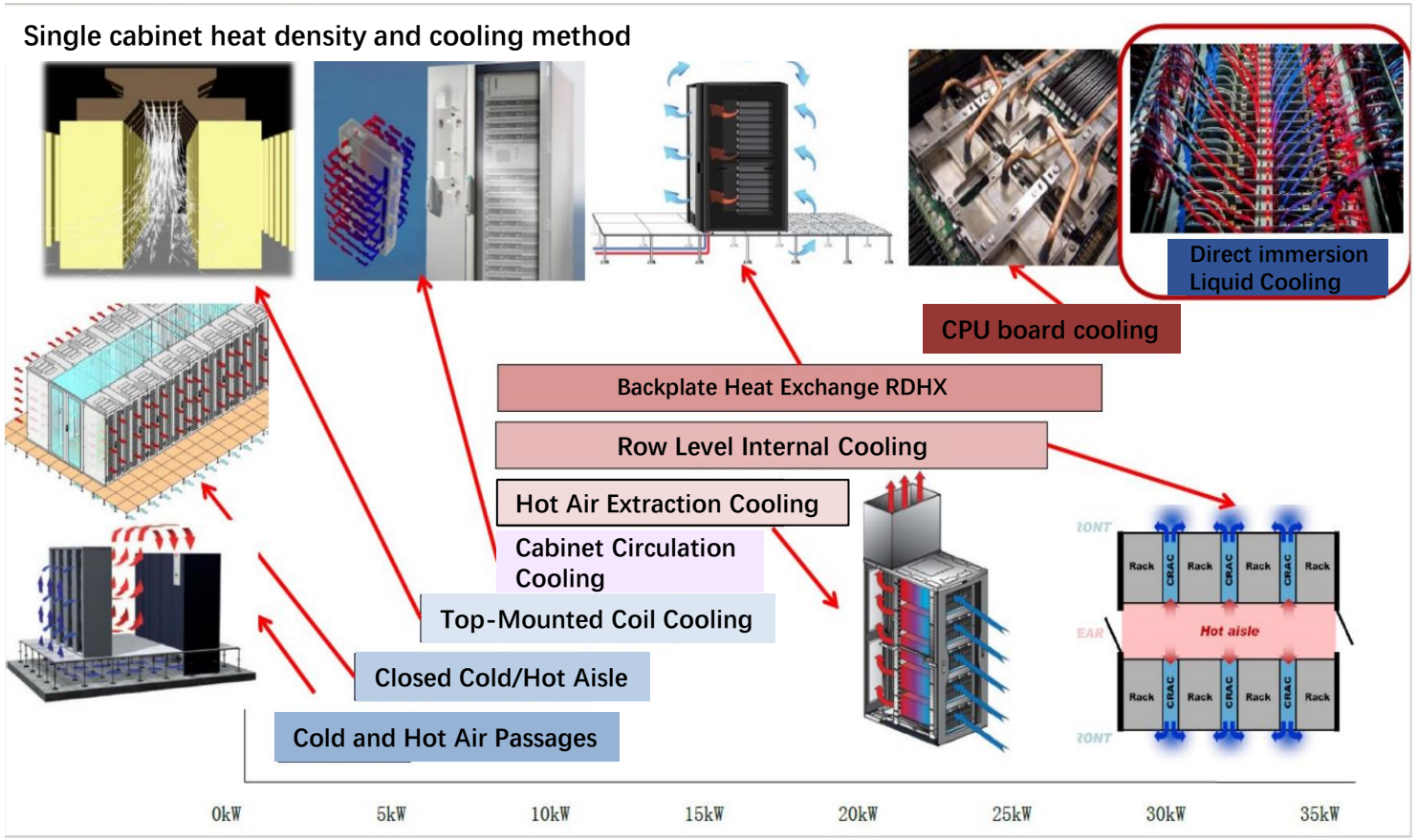
Data Center Dry Cooling Product Introduction
April 2025

01
PART ONE

Liquid Cooling Technology Application Background

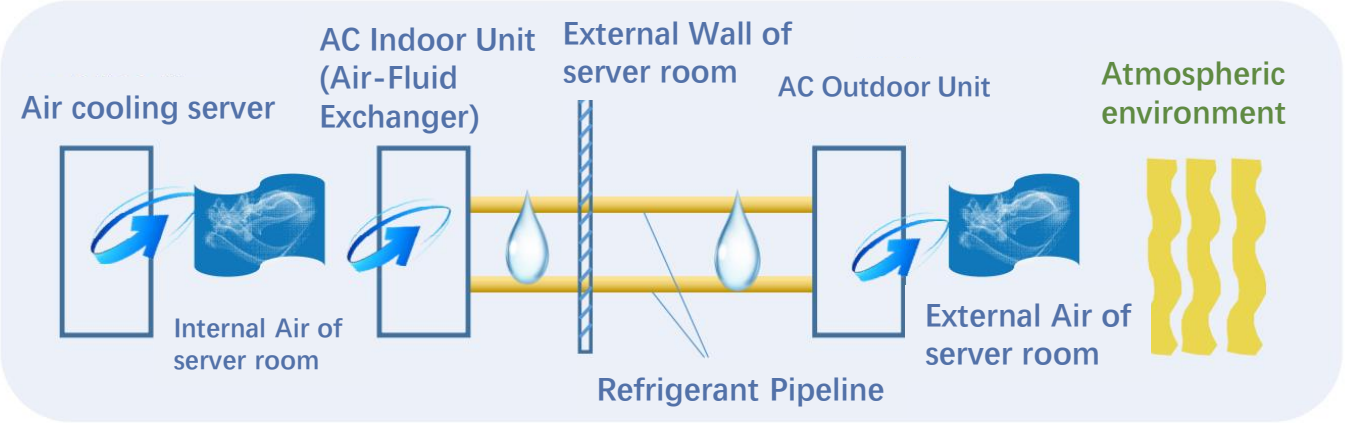
- Air-cooling technology has a power density limit of 30kW per cabinet, insufficient for high-performance computing servers. ;
- Liquid cooling offers 1,000–3,000x higher heat transfer efficiency than air;
- Liquid cooling technology single-cabinet power density is up to 160kW



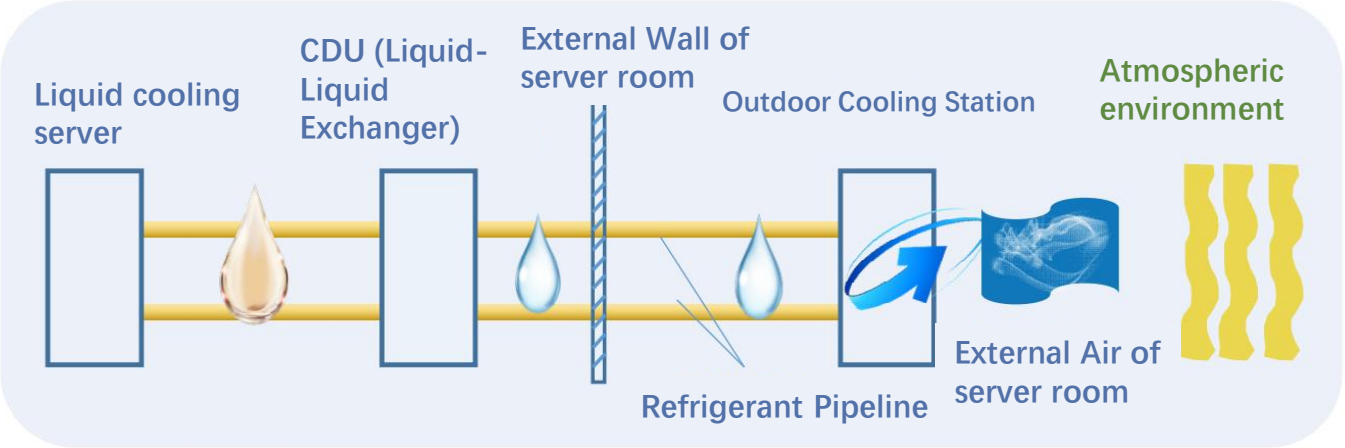
01
PART ONE

Liquid vs. Air Cooling Comparison

Air Cooling



Liquid Cooling



Air cooling:

- Low thermal conductivity and density
- Poor heat transfer efficiency
- Requires compressor refrigeration (high energy consumption)
- Fan noise >50 dB

Liquid cooling:

- High thermal conductivity and density
- Heat transfer efficiency: 1,000-3,000× air
- No compressor (dramatically reduced energy use)
- Noise: 0-30 dB

01
PART ONE

Terminal Cooling for Liquid Cooling Systems—Dry Coolers

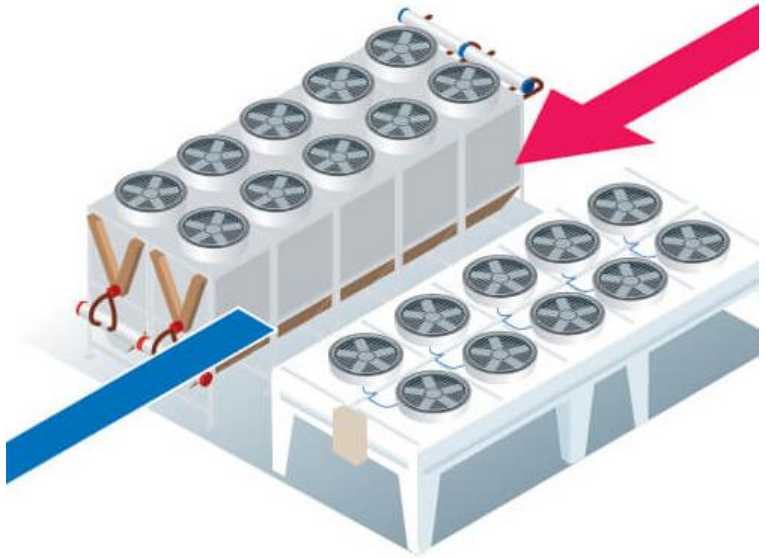
Liquid Cooling Technology

Contact Situation between Coolant and IT heat-generating components

- **Indirect Contact**
  - **Cold Plate Liquid Cooling**
- **Direct Contact**

Contact Form between Coolant and IT heat-generating components

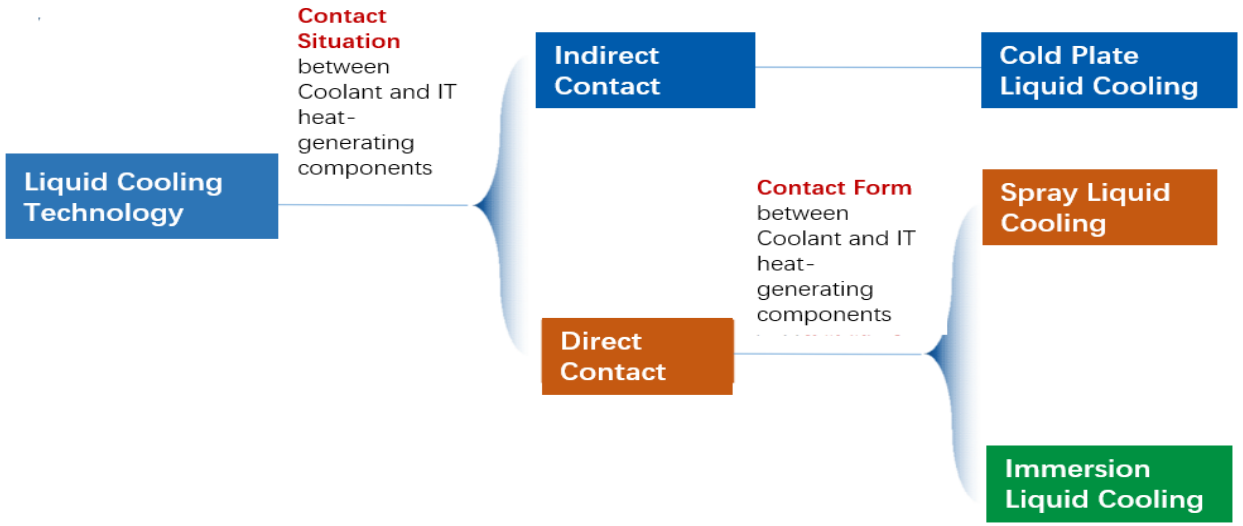
- **Spray Liquid Cooling**
- **Immersion Liquid Cooling**

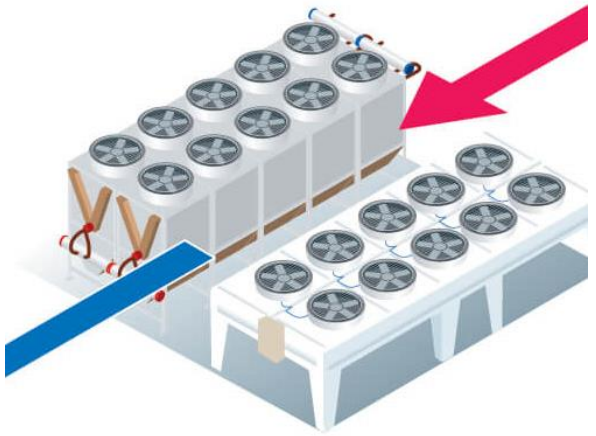


Amid rising energy consumption challenges in data centers, liquid cooling has emerged as a high-efficiency thermal solution. Integrated with dry coolers (dry cooling units), the natural cooling system provides **energy-saving, water-efficient, and cost-effective cooling for liquid-cooled data centers.

01
PART ONE

Terminal Cooling for Liquid Cooling Systems—Dry Coolers





Regardless of the liquid cooling technology used, using dry coolers for heat exchange is the most energy-efficient method.

Advantages of dry coolers over other cooling equipment:

- ✓ High Efficiency: Meets demands of high-performance computing;
- ✓ Energy Saving: Significantly reduces cooling energy consumption;
- ✓ Low Noise & Vibration: Equipped with low-noise fans and small-power motors;
- ✓ Smart Control: Full monitoring and intelligent control minimize downtime;

02
PART TWO

Core Advantages of Dry Coolers in Liquid Cooling Systems

- Zero Water Consumption (WUE≈0)

  Operates via sensible heat exchange: Coolant circulates in closed finned tubes, dissipating heat through air convection without water evaporation. Compared to traditional cooling towers (WUE: 1.5–2 L/kWh), dry coolers achieve near-zero water usage

- Low Investment & Maintenance Costs

  Low beginning cost： 30–40% lower upfront cost** than wet cooling systems due to simple structure (no pumps or cooling towers).

  Save ： 50% lower O&M costs: No water treatment, chemicals, or refilling required. Eliminates scaling and corrosion issues.

- Environmental Compatibility

  Zero pollution： No water drift, fogging, or chemical leakage risks. Ideal for urban or eco-sensitive areas.

  Wide operating temperature range： -30°C to 50°C with anti-corrosion coatings and modular design.

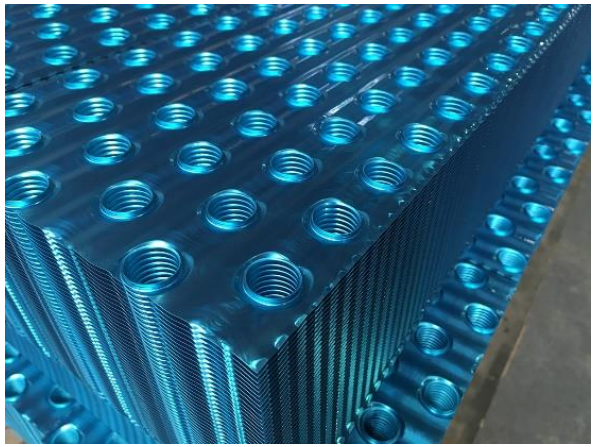
  Flexible modes： Dry, adiabatic, or spray cooling for extreme conditions.

03
PART THREE

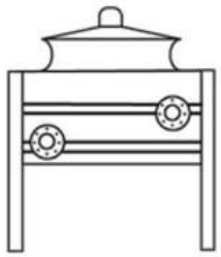
Full Product Ecosystem

Full Ecosystem Series Products

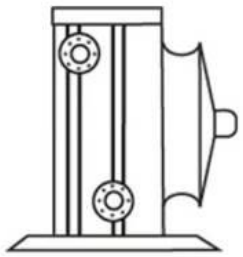
We are a professional non-standard customized heat exchanger manufacturer integrating R&D, design, production, sales, and service. Currently, we produce 5 structural types (Flat Plate: MPDK; Vertical: MLDK; V-Type: MVDK; Adiabatic: ADC; Spray: S) across 13 series of dry cooler products. Length ranges from 1m to 13m, width up to 3m. Products feature low height, low noise, and easy installation, meeting engineering needs for different footprints and sites.



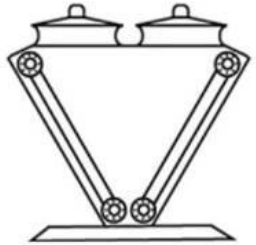
Multiple Cooler Orientations | V-Cooler | Half-V-Cooler | Vertical | Horizontal



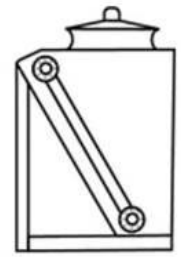
Horizontal Cooler



Vertical Cooler



V-Cooler



Half-V-Cooler

03
PART THREE

Dry Cooler Product Technical Advantage



MPDK Series Flat Plate Dry Cooler



MLDK Series Vertical Dry Cooler



MVDK Series V-Type Dry Cooler

Applicable Media: Water, ethylene glycol & propylene glycol solutions, lubricating oil, thermal oil, dielectric fluid, etc.
Economical Application Condition: Outlet temperature vs. ambient temperature differential ⩾8K.

Heat Exchange Range: 45kW~1,790kW (34% EG, 40°C / To=35°C, Tp=25°C)	Heat Exchange Tube OD: Ø12.7, Ø15.88, Ø19, Ø25mm
Tube Material: 304/304L/316L/2205/Ta2/T2 Copper	Fin Spacing: 2.1-6mm
Axial Fan: Ø500, 630, 800, 910; AC & EC Motors	Fin Material: 8011/5052/304/316L/T2/Ta2
Fan Quantity: 1~20 units	

03
PART THREE

Dry Cooler Product Technical Advantage



MVDK-S Series Spray Dry Cooler



MVDK-ADC Series Adiabatic Dry Cooler



MLDK-ADC Series Adiabatic Dry Cooler

Applicable Media: Water, ethylene glycol & propylene glycol solutions, lubricating oil, thermal oil, dielectric fluid, etc.

Heat Exchange Tube OD: Ø12.7, Ø15.88, Ø19, Ø25mm

Tube Material: 304/304L/316L/2205/Ta2/T2 Copper

Fin Material: 8011/5052/304/316L/T2/Ta2

Heat Exchange Range: 20kW~1,200kW

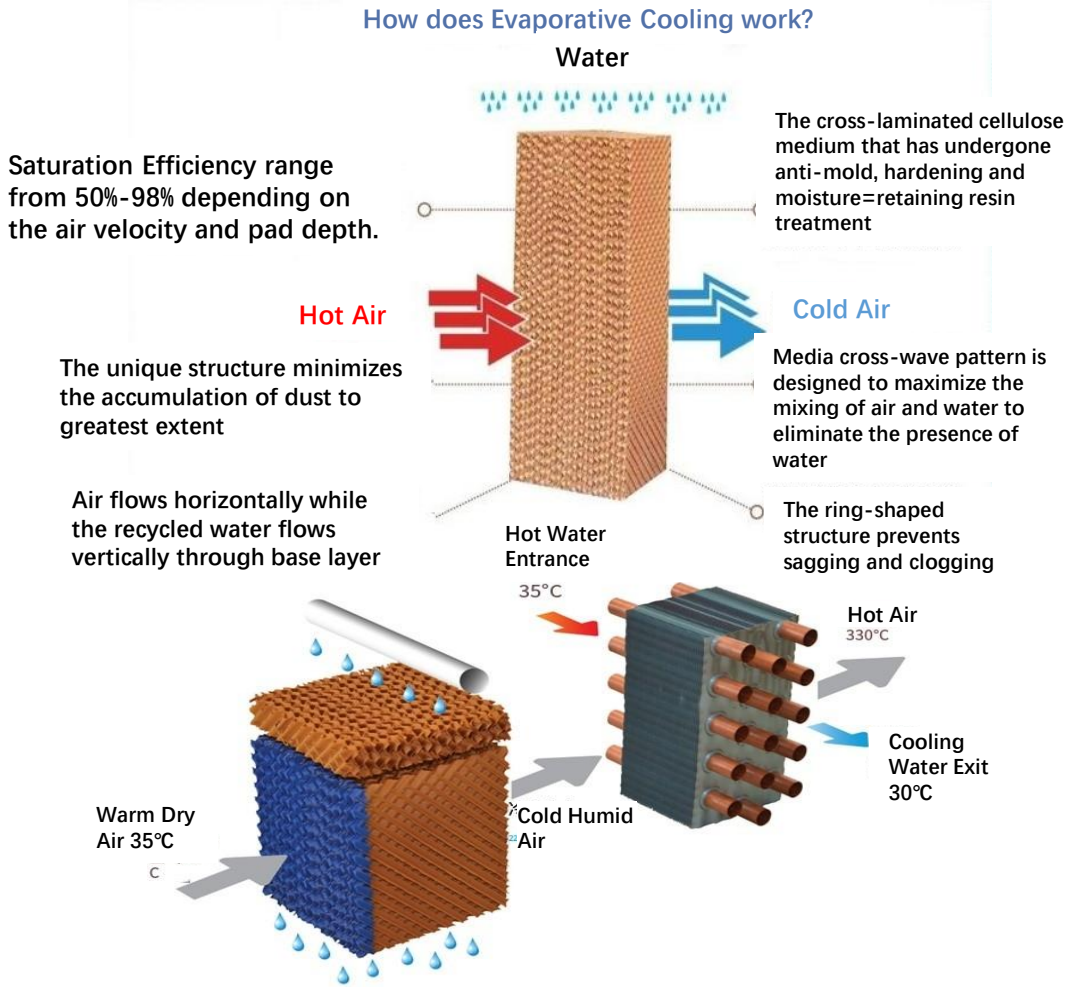
Axial Fan: Ø500, 630, 800, 910; AC & EC Motors

Fan Quantity: 1~20 units Fin Spacing: 2.1-6mm

Economical Application Condition: Outlet temperature vs. ambient wet-bulb temperature differential ≥10K.

03
PART THREE

Dry Cooler Product Technical Advantage



Adiabatic Cooling Working Principle: Spray water adiabatically humidifies air through wet curtains; water evaporation reduces air dry-bulb temperature to near wet-bulb temperature. Adiabatic cooling dry coolers can switch between modes based on actual needs: adiabatic cooling mode in high-temperature environments, dry cooling mode in dry environments. Minimizes energy consumption while ensuring heat exchange efficiency. Key advantages:

- Compared to standard dry coolers: 40% smaller footprint, 50% lower energy consumption, 200% higher heat dissipation capacity.
- Compared to cooling towers: Up to 95% water savings; 40% lower energy consumption.
- Combining standard dry coolers with adiabatic systems meets liquid cooling performance in high-temperature conditions while minimizing energy consumption.

03
PART THREE

Dry Cooler Product Technical Advantage

Comprehensive Fin Specifications

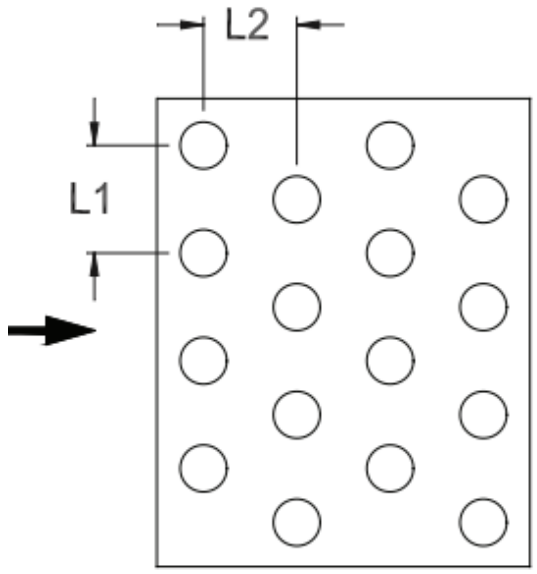
Dry cooler product fin mold specifications cover most products on the market, meeting non-standard customization needs.

翅片模具规格表 Fin Tooling Specification sheet

序号 No.	模具规格 Tooling Type	排布方式 Hole Layout	翅片间距 Fin Distance	翅片形状 Fin Surface	翅片边缘形状 Edge Type	管型 TypeTube type
1	Φ7	21*18.19 等边三角形 EQUILATERAL TRIANGLE	1.4～3mm	波纹片、开窗片 Corrugated & Windowed	直边+波纹 FLAT+WAVE	内螺纹 Grooved 光管 Smooth
2	Φ7	25*21.65 等边三角形 EQUILATERAL TRIANGLE	1.4～3mm	波纹片、开窗片 Corrugated & Windowed	直边+波纹 FLAT+WAVE	内螺纹 Grooved 光管 Smooth
3	Φ9.52	25*21.65 等边三角形 EQUILATERAL TRIANGLE	1.8～7mm	波纹片SINE-WAVE&V-WAVE	直边+波纹 FLAT+WAVE	内螺纹 Grooved 光管 Smooth
4	Ø12.7	31.75*27.5 等边三角形 EQUILATERAL TRIANGLE	1.8-7mm	波纹片SINE-WAVE&V-WAVE	直边+波纹 FLAT+WAVE	内螺纹 Grooved 光管 Smooth
5	Ø12.7	38.1*33 等边三角形 EQUILATERAL TRIANGLE	1.8-7mm	波纹片SINE-WAVE&V-WAVE	直边+波纹 FLAT+WAVE	内螺纹 Grooved 光管 Smooth
6	Ø15.88	38.1*33 等边三角形 EQUILATERAL TRIANGLE	1.8～9mm	波纹、平片 Corrugated / Smooth	直边、波纹 FLAT、WAVE	内螺纹 Grooved 光管 Smooth
7	Ø15.88	50*50 矩形 Tube Pattern	2.5～16mm	波纹、平片 Corrugated / Smooth	直边、波纹 FLAT、WAVE	内螺纹 Grooved 光管 Smooth
8	Ø19	30*25 等边三角形 EQUILATERAL TRIANGLE	2.1～6mm	波纹、平片 Corrugated / Smooth	直边、波纹 FLAT、WAVE	光管 Smooth
9	Ø25	60*50 等腰三角形 SOSCELES TRIANGLE	2.1～6mm	波纹、平片 Corrugated / Smooth	直边、波纹 FLAT、WAVE	光管 Smooth
10	Ø25	66.6*33.3 等腰三角形 SOSCELES TRIANGLE	2.1～6mm	波纹、平片 Corrugated / Smooth	直边、波纹 FLAT、WAVE	光管 Smooth

第 1 页

Common Fin Mold Summary Table



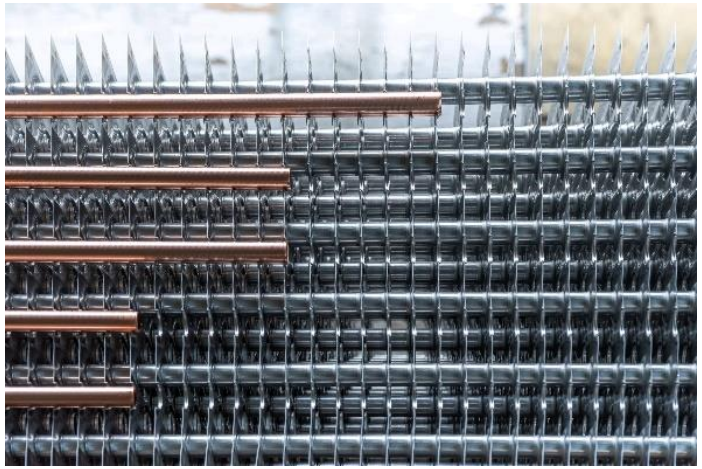
Heat Exchange Tube Layout Diagram

03
PART THREE

Dry Cooler Product Technical Advantage

High-Efficiency Fin Coils

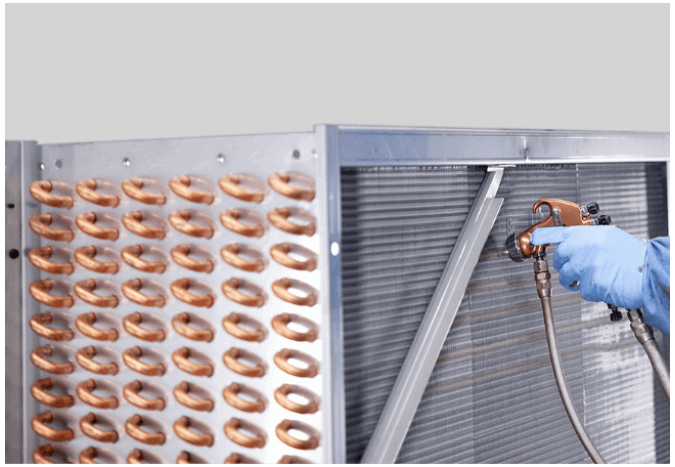
- Efficient Heat Transfer: Staggered arrangement design combined with special corrugated fins; tubes perfectly bonded to aluminum fins via mechanical expansion.
- Wide Application: Tube diameters from Ø7~Ø25mm applicable to various fluid cooling/condensation.
- Special Tube Protection: Tube sheets use stamped flanges during manufacturing to fully protect tubes from mechanical damage.
- Reliable Pressure Test: Coil pressure tests exceed 20 bar, with nitrogen pressure holding before shipment.
- Corrosion-Resistant Coating: Fins can be coated with acid/alkali/salt-resistant Epoxy Pheno



Efficient Aluminum Fin



Epoxy Phenolic Anti-Corrosion



Tube Sheet Stamped Flange Protection

03
PART THREE

Dry Cooler Product Technical Advantage

Aluzinc Steel Plate + Electrostatic Spray Shell

Shell sheet metal uses AZ150 Aluzinc Steel Plate with double-sided high-temperature electrostatic spraying (RAL7035), providing dual anti-corrosion for various environments. - Full-frame structure ensures higher robustness and stability.



RAL7035 Sprayed Shell





Full Frame Support Structure

03
PART THREE

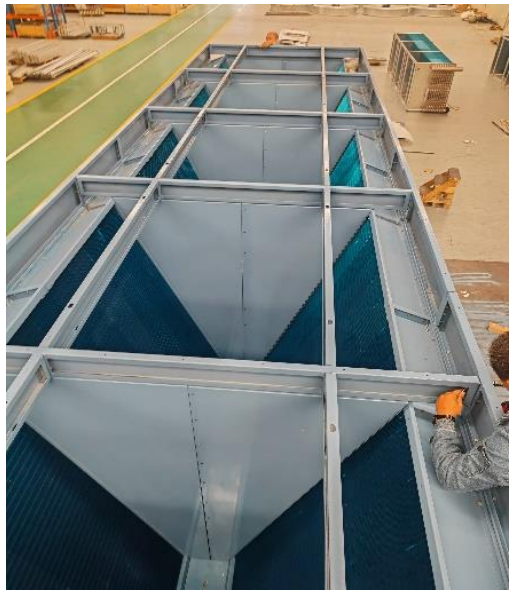
Dry Cooler Product Technical Advantage

Energy-Saving & Low-Noise Axial Fans

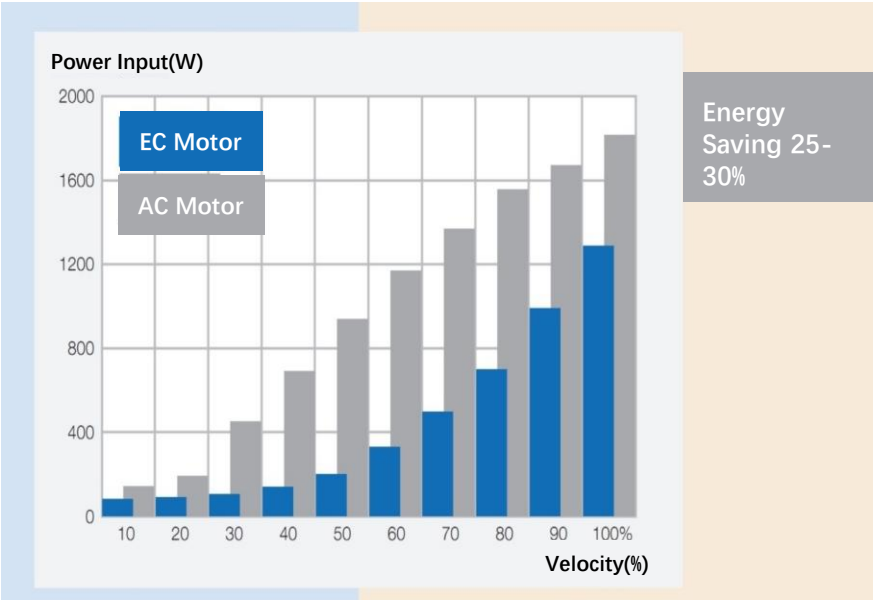
- Standard EC Axial Fans achieve maximum cooling performance with minimal energy consumption.
- Motors feature IP55 protection grade, Class F insulation, suitable for various working conditions.
- Independent air chamber structure ensures no mutual interference between fans.



EC Axial Fan



Independent Air Chamber



EC Fan Advantages

03
PART THREE

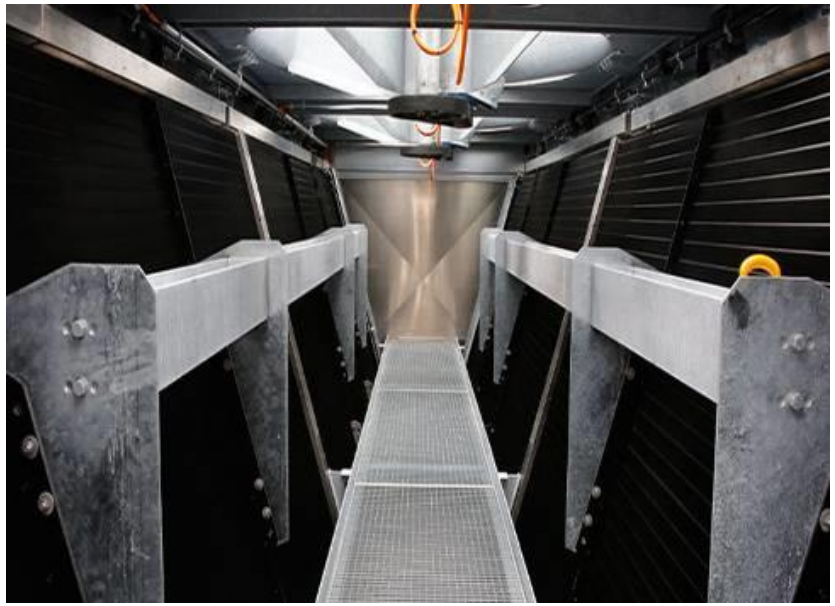
Dry Cooler Product Technical Advantage

Easy Operation & Maintenance

Maintenance windows, access doors, walkways, and hydraulic strut fan support structures are set on the casing for easy fin and fan maintenance.



Hydraulic Strut Structure



Maintenance Walkway



Maintenance Window

03
PART THREE

Dry Cooler Product Technical Advantage

Intelligent System

Dry coolers integrate **PLC intelligent control solutions**, intelligently adjusting fan speed and wet curtain operation by monitoring inlet/outlet temperatures, ambient temperature, liquid level, etc., ensuring precise energy savings and noise reduction. - PLC outputs **4-20mA signals or Modbus485 communication**, flexibly integrating into different control systems. Sensor, communication, and cloud technologies enable data exchange and analysis for smarter, more efficient, and automated services



Intelligent Control Panel



Control Module Unit



Cloud IoT

03
PART THREE

Dry Cooler Product Technical Advantage

Supports Non-Standard Design & Professional Customization

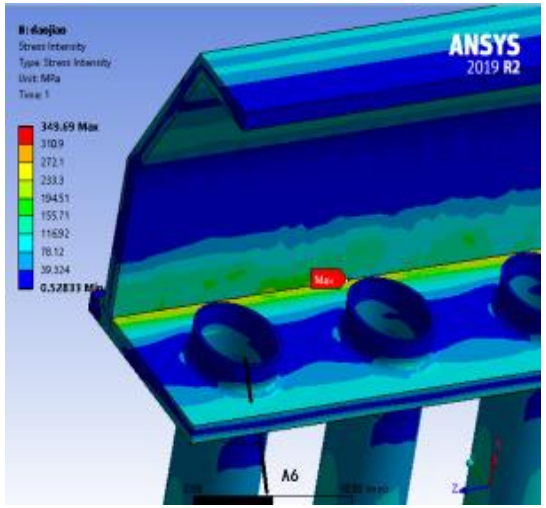
Uses professional pressure vessel design software (SW6-2011, PV Elite) to optimize tube type/material and header structures. Thermal design software (HTRI, Aspen EDR, Ansys) simulates thermal performance for round/elliptical/internal-grooved tubes and plain/corrugated/louvered fins, ensuring high heat transfer efficiency.



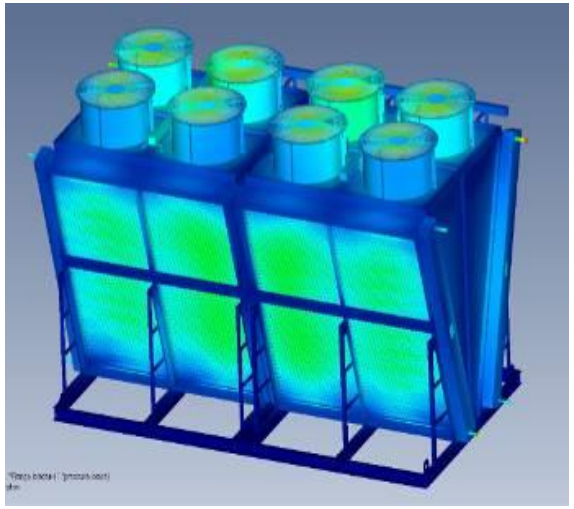
Aspen exchanger Design&Ratin



HRTI exchanger suite



Ansys Stress Simulation



FLUNT Flow Simulation

03
PART THREE

Dry Cooler Product Technical Advantage

Optional Material Configurations

Dry cooler optional configuration table covers needs for different industries and corrosive environments.

外壳 Frame	**翅片** Fin	**换热管** Heat-exchange Tube	**配管** Head
镀锌板 galvanized sheet	铝翅片 Al	铜管 Copper Tube	铜管 Copper Tube
铝 Aluminum	亲水铝翅片 Hydrophilic Al Fin	不锈钢304 Stainless steel 304	无缝钢管 Seamless Steel Pipe
不锈钢304 Stainless steel 304	铝镁翅片 Almg 25	不锈钢316 Stainless steel 316	不锈钢304 Stainless steel 304
不锈钢316 Stainless steel 316	铜翅片 Copper Fin	铜镍合金 B10	不锈钢316 Stainless steel 316
铜Cu	环氧树脂预涂层翅片 Pre-coated Epoxy Fin	铜镍合金 B30	铜镍合金 B10
	不锈钢翅片 Sus Fin	钛 Titanium	铜镍合金 B30
	喷涂翅片 Heresite/Blygold/Epxoy Coated Fin		钛 Titanium

04
PART FOUR

Dry Cooler Product Market Applications

Data Center	Electric Power Industry	Gas Compression Industry
● Immersion Liquid Cooling ● Cold Plate Liquid Cooling ● Spray Liquid Cooling ● Blockchain Server Cooling ● Chiller Dry Cooler	● Steam Turbine Cooling ● Thyristor Cooling ● Generator Set Antifreeze Cooling ● Transformer Oil Cooling System ● Solar Power Generation ● Laser Cooling ● High-Density Power Supply Cooling	● Hydraulic & Lubricating Oil Cooling ● Closed-Circuit Water Cooling ● Compressor Jacket Cooling ● Compressed Air Cooling ● Process Fluid Cooler ● Engine & Hydraulic Cooling
HVAC Industry	Smelting Industry	Chemical & Petrochemical Industry
● Commercial Air Conditioning ● Commercial & Industrial Refrigeration ● Water & Ethylene Glycol Fluid Cooling ● Heat Pump ● Energy Recovery	● Blast Furnace Wall Cooling ● Continuous Caster Water Cooling ● Medium-Frequency Electric Furnace Casting Cooling ● Quenching Water Cooling ● Vacuum Furnace Cooling	● Process Stream Cooling & Condensation ● Industrial Drying ● Chemical Gas Heating & Cooling ● VOCs Gas Treatment ● Injection Molding Machine Cooling ● Other Industrial Applications

05
PART FIVE

Basic Requirements for Dry Cooler Product Selection

干冷器&油冷器基本需求表 Dry Cooler Select			
1	换热量Capacity		kW
2	载冷剂类型Fluid type		水(Water)
3			乙二醇/水 ETHYLENE GLYCOL,%
4			丙二醇/水 PROPYLENE GLYCOL,%
5			其他传热介质 Other ,%
6	进液温度Inlet temp（DB）		°C
7	出液温度Outlet temp（DB）		°C
8	流　量Flow		m3/h
9	海拔/大气压力Altitude/AP		m/Pa
10	进气干球温度Inlet temp（DB）		°C
11	进气湿球温度/相对湿度Inlet temp（WB）		°C/%
12	风量/迎面风速Air flow/Face Velocity		m3/h /m/s
13	尺寸限制Frame dimension		mm
14	换热管 Hent-exchange Tube		铜管/Cu
15			不锈钢/SUS304
16			不锈钢/SUS316L
17			铜镍/CuNi
18			钛合金/Titanium
19	翅片Fins		铝箔/AL
20			铜箔/Cu
21			不锈钢/SUS304
22			不锈钢SUS316L
23	结构件Frame		镀铝锌板/DC51D+Z
24			铝板/AL
25			不锈钢/SUS304
26			不锈钢SUS316L
27	配管 Head Pipe		钢管/carbon Steel
28			不锈钢/SUS304
29			不锈钢/SUS316L
30			铜管/Cu
31	法兰标准Flange standard		HG/T20592(A)-2009
32			HG/T20592(B)-2009
33			HG/T20615-2009
34	电气要求Electrical requirements		电源Power supply
35			防护等级Protection class
36			绝缘等级Insulation class
37			风机形式Fan type
38	其他要求Other Requirement		

DOWELL

苏州达沃尔通风技术有限公司
Suzhou Dowell Ventilation Technology Co.,Ltd

Thank You!

真诚期待与您的合作!

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