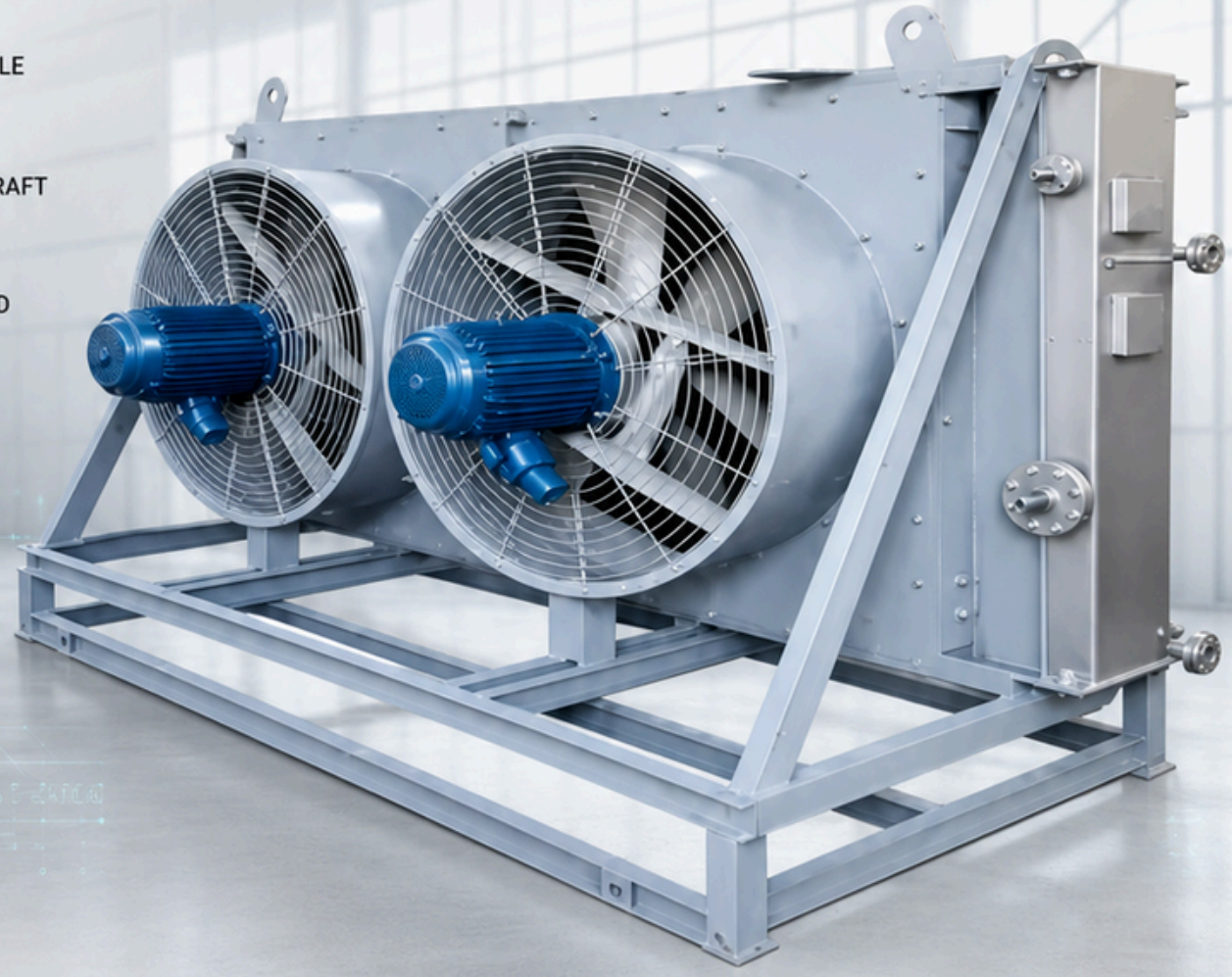
# VERTICAL AIR-COOLED HEAT EXCHANGER

## INDUSTRIAL PROCESS COOLING SYSTEM

مبدل حرارتی هوا خنک عمودی

- VERTICAL CONFIGURATION
- AXIAL FLOW FAN
- FINNED TUBE BUNDLE
- FORCED / INDUCED DRAFT
- CUSTOM ENGINEERED CAPACITY



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# HOW IT WORKS

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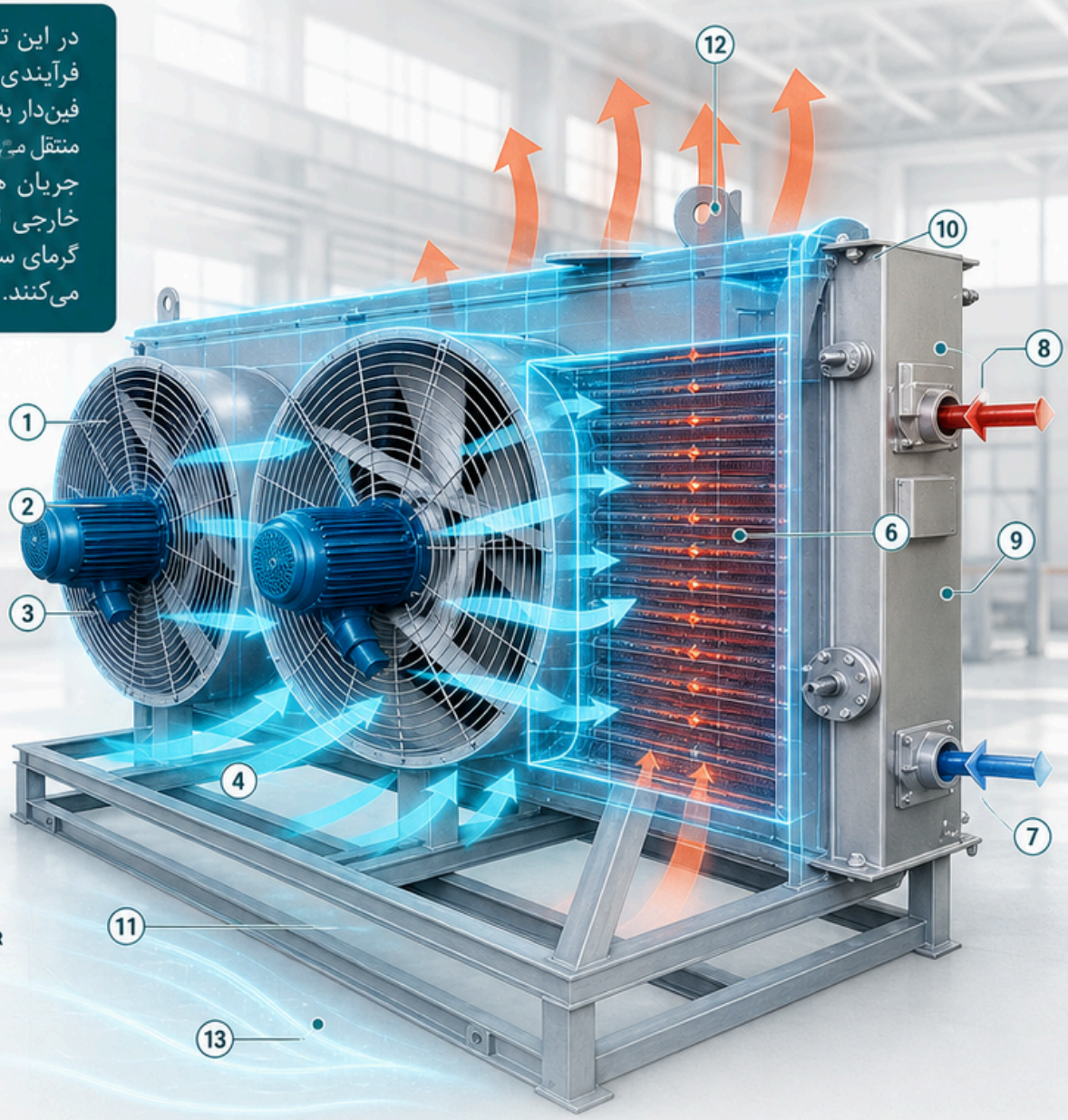
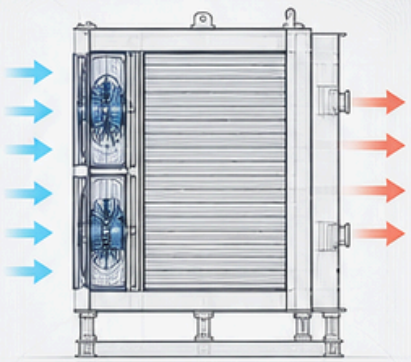
## Vertical Air-Cooled Heat Exchanger | Working Principle

در این تجهیز، حرارت سیال فرآیندی از طریق لوله‌های فین‌دار به جریان هوای محیط منتقل می‌شود. فن‌های محوری جریان هوا را از روی سطح خارجی لوله‌ها عبور داده و گرمای سیال را به محیط دفع می‌کنند.

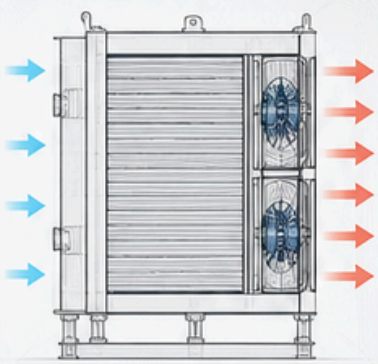



1. AXIAL FAN
2. ELECTRIC MOTOR
3. FAN GUARD
4. AIR INLET
5. AIR FLOW PATH
6. FINNED TUBE BUNDLE
7. PROCESS FLUID INLET
8. PROCESS FLUID OUTLET
9. HEADERS
10. PLENUM / AIR CHAMBER
11. STRUCTURAL FRAME
13. AMBIENT AIR
12. HEATED AIR OUTLET

### FORCED DRAFT



### INDUCED DRAFT



### WORKING PRINCIPLE

**PROCESS FLUID**
Hot process fluid enters the exchanger.

**HEAT TRANSFER**
Heat is transferred through the finned tubes.

**AMBIENT AIR REMOVES HEAT**
Axial fans draw cool ambient air across the fins and remove heat.

**WARM AIR DISCHARGE**
Heated air is discharged to the atmosphere.

### TECHNICAL NOTE

Air-side heat transfer is enhanced by extended fin surface because the air-side heat transfer coefficient is relatively low.

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# TECHNICAL SPECIFICATIONS

## Vertical Air-Cooled Heat Exchanger

- AXIAL FAN
- ELECTRIC MOTOR
- FINNED TUBE BUNDLE
- HEADER
- PLENUM
- STRUCTURAL FRAME
- PROCESS INLET
- PROCESS OUTLET

### PRODUCT CONFIGURATION

| | |
|---|---|
| Equipment Type | Vertical Air-Cooled Heat Exchanger |
| Air Flow | Cross Flow (Forced Draft) |
| Fan Type | Axial |
| Draft Configuration | Induced Draft |
| Heat Transfer Surface | Finned Tube |
| Tube Arrangement | Staggered |
| Tube Rows | 2–10 typical |
| Bundle Depth | Up to 30 rows |
| Tube Length | 6–60 ft |
| Tube OD | 5/8–6 in |
| Common Tube OD | 1 in |
| Tube Pitch | 2–2.5 × tube diameter |
| Fin Density | 7–11 FPI |
| Fin Height | 5/16–1 in |
| Fin Thickness | 0.010–0.035 in |
| Extended / Prime Surface Ratio | 7:1–25:1 |
| Net Free Air Area | Approximately 50% |

### FAN & DRIVE

| | |
|---|---|
| Fan Type | Axial |
| Fan Diameter | 3–60 ft |
| Blade Count | 2–20 |
| Blade Type | Airfoil |
| Drive | Direct / Belt Driven |
| Transmission | Belt / Coupling |
| VFD Control | Available |
| Fan Tip Speed | ≤12,000 ft/min |
| Typical Fan System Efficiency | PROJECT SPECIFIC |

### ENGINEERING FORMULAS

$$Q = U \times A \times CMTD$$

$$CMTD = F \times LMTD$$

All thermal performance values are PROJECT SPECIFIC and will be confirmed during detailed engineering.

### THERMAL DESIGN

| | |
|---|---|
| Heat Duty Q | PROJECT SPECIFIC |
| Overall Heat Transfer Coefficient U | PROJECT SPECIFIC |
| Heat Transfer Area A | PROJECT SPECIFIC |
| LMTD | PROJECT SPECIFIC |
| CMTD | PROJECT SPECIFIC |
| MTD Correction Factor F | PROJECT SPECIFIC |
| Cmin / Cmax | PROJECT SPECIFIC |
| Effectiveness E | PROJECT SPECIFIC |
| NTU | PROJECT SPECIFIC |
| Face Velocity FV | PROJECT SPECIFIC |
| Air Flow Rate | PROJECT SPECIFIC |
| Process Flow Rate | PROJECT SPECIFIC |
| Fouling Factor | PROJECT SPECIFIC |
| Pressure Drop | PROJECT SPECIFIC |
| Ambient Air Temperature | PROJECT SPECIFIC |
| Process Inlet Temperature | PROJECT SPECIFIC |
| Process Outlet Temperature | PROJECT SPECIFIC |

Robust Design
High Reliability

High Thermal
Performance

Low Maintenance
Easy Access

Energy Efficient
Operation

Modular Construction
Custom Engineered

# VERTICAL AIR-COOLED HEAT EXCHANGER

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## 01 APPLICATIONS



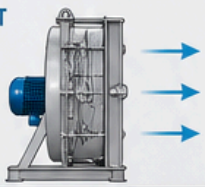




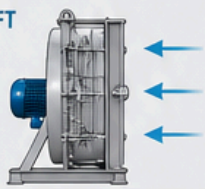

## 02 ENGINEERING CONFIGURATIONS

- FORCED DRAFT
- INDUCED DRAFT
- MULTI-FAN CONFIGURATION
- VARIABLE AIR FLOW CONTROL
- FIXED / ADJUSTABLE PITCH FAN
- VFD FAN CONTROL
- CUSTOM TUBE PASS ARRANGEMENT
- CUSTOM FINNED TUBE DESIGN
- CUSTOM HEADER CONFIGURATION

**FORCED DRAFT**
Fan pushes air across bundle.



**INDUCED DRAFT**
Fan pulls air across bundle.



## 03 ENGINEERING ADVANTAGES

- Direct heat rejection to ambient air
- No cooling-water requirement
- Finned extended heat-transfer surface
- Flexible thermal design
- Modular fan configuration
- Variable air-flow control
- Maintenance-access options
- Project-specific engineering

مبدل حرارتی هوا خنک عمودی برای پروژه‌هایی طراحی می‌شود که دفع مستقیم حرارت به هوای محیط، کاهش وابستگی به آب خنک‌کن و کنترل دقیق شرایط فرآیندی اهمیت دارد.

## CUSTOM ENGINEERED FOR PROCESS REQUIREMENTS

Thermal Duty · Ambient Conditions · Flow Rate · Temperature · Pressure Drop · Tube Geometry · Fan Selection

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