Air Cooled Heat Exchangers for Process and Power Industries

Thermal Engineering
GEA Rainey Corporation

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GEA—A Leader In The Air Cooled Heat Exchanger Industry

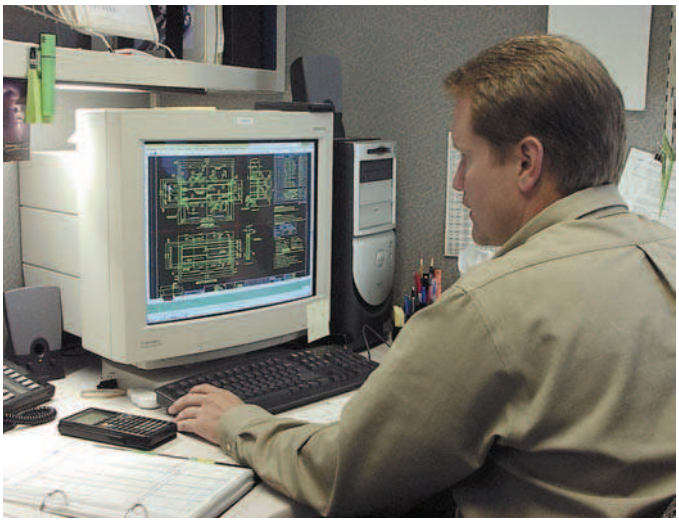
GEA Rainey Corporation's mission is to provide high quality products and services with honesty, integrity and commitment to our customers, employees, shareholders and the global community.

GEA Rainey Corporation located at Tulsa, Oklahoma's Port of Catoosa

We have been and continue to be a global leader in the design and manufacture of air cooled heat exchanger equipment. For over 40 years we have met the needs of the chemical, petrochemical and power industries' cooler requirements, through engineering and construction firms or directly with end users.

GEA Rainey, organized in the Thermal Engineering Division, is a subsidiary of GEA Group, the world's leader in heat transfer equipment technology specializing in energy and thermal technology as well as process, refrigeration and air treatment industries. This provides the technological and financial resources necessary to meet any requirement and allows access to manufacturing facilities located throughout the world. When you combine this experience it is easy to see why GEA builds successful designs for every continent.

Custom Engineering—Designs Specifically For Your Needs



No two process or power plants are alike. Plot space restrictions, climate, operating conditions, environmental and community considerations all affect the design of each air cooled heat exchanger system.

This is why our first step in developing a design begins with an analysis of the customer's needs. An experienced Sales Engineer reviews your specifications then utilizes proprietary rating software along with the latest commercial programs to provide the most economical and efficient solution.

While GEA Rainey routinely designs standard air coolers for typical installations, we have created solutions for exchangers exposed to harsh environments such as -60 to 140 degree Fahrenheit ambient temperatures, ultra-high pressures and earthquake zones.

Operating pressures from full vacuum to over 12,000 psig do not present a challenge.

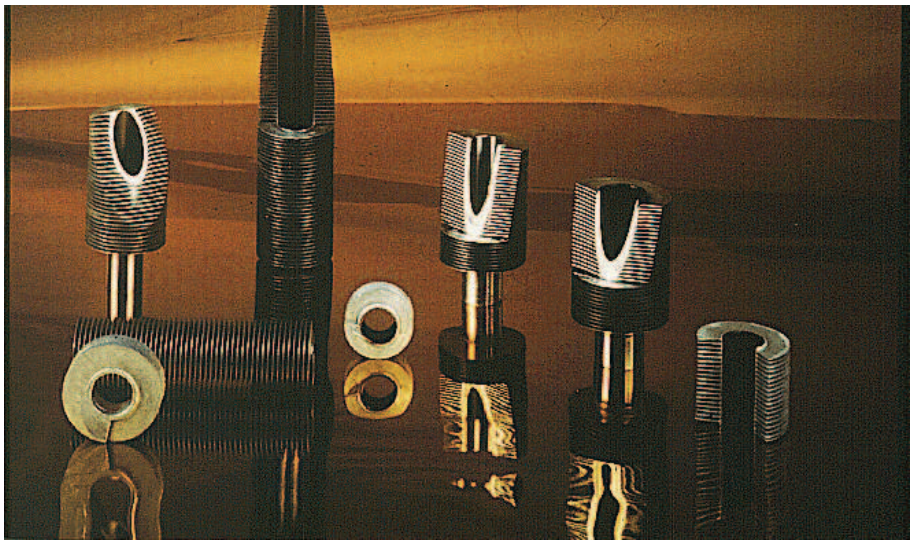
Upon order placement, our Sales team initiates the order process by entering the job specific information into our centralized database.

"We are ALWAYS looking for new and different ways to IMPROVE."

Customer requirements, raw material tracking, automated drawing generation and real-time project status are just a few examples of GEA Rainey's leading edge technologies.

Our infrastructure ensures no data is lost on your order during the transition from Sales to Project Engineer. The Sales person responsible for selling the order enters all key information into our database via InfoPath which in-turn routes critical information to each department, ensuring communication at multiple levels.

Once the order is entered into our database, it is the task of the Design Engineer to create customer approval drawings. The Design Engineer first reviews your site needs and specifications, verifying all sold requirements. Then utilizing proprietary software called Calqlys, the Design Engineer automatically generates all approval drawings, which if necessary are then further modified in accordance with your specifications.



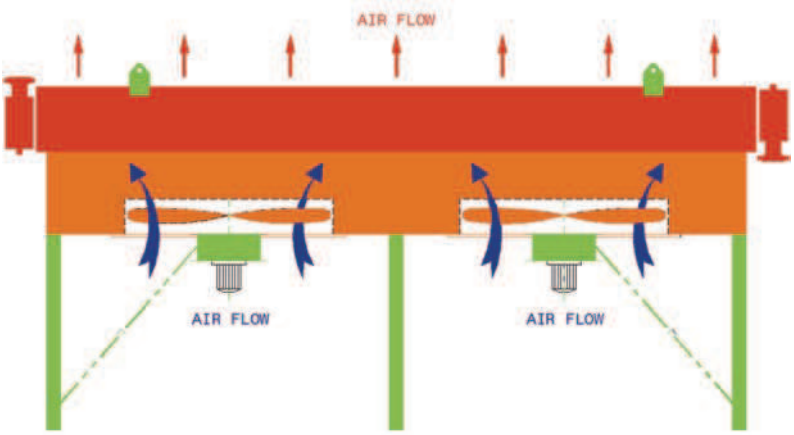
Following customer drawing approval, GEA Rainey begins purchasing and fabrication of critical path items such as header material, and initiates detail engineering to generate all structural drawings utilizing Calqlys, AutoCAD and necessary FEA programs.

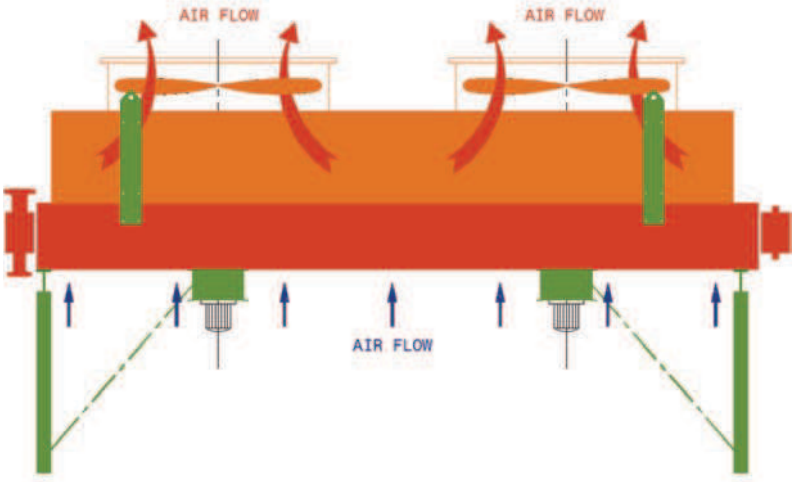
GEA Rainey's fabrication facilities are located at the Port of Catoosa, near Tulsa, Oklahoma. Our four manufacturing facilities contain over 250,000 square feet of work space which are equipped with the latest computerized milling systems, welding equipment, finning machines, 40 ton break press, as well as typical metal working machinery.

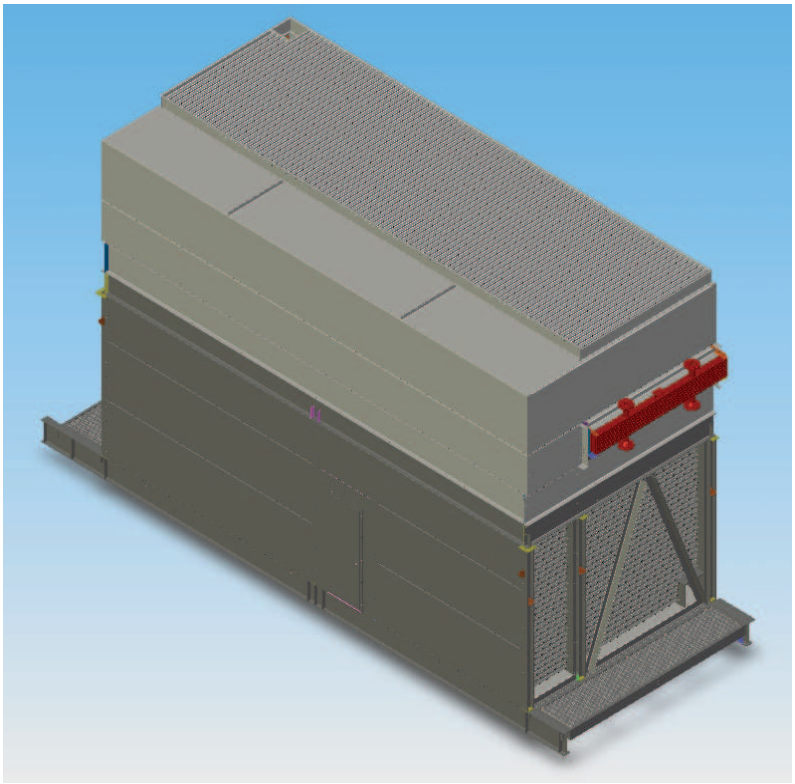
From inquiry to delivery, GEA Rainey will meet or exceed your expectations.

Over 250,000 ft² available manufacturing facility

Cooler Design—Configurations for All Situations







Forced Draft - The most common style of air cooled heat exchanger, a forced draft design positions the fans beneath the process bundle allowing easy access to all mechanical components. The design also allows simplified future plant expansions with direct access to the bundle. Structural disassembly is not required.

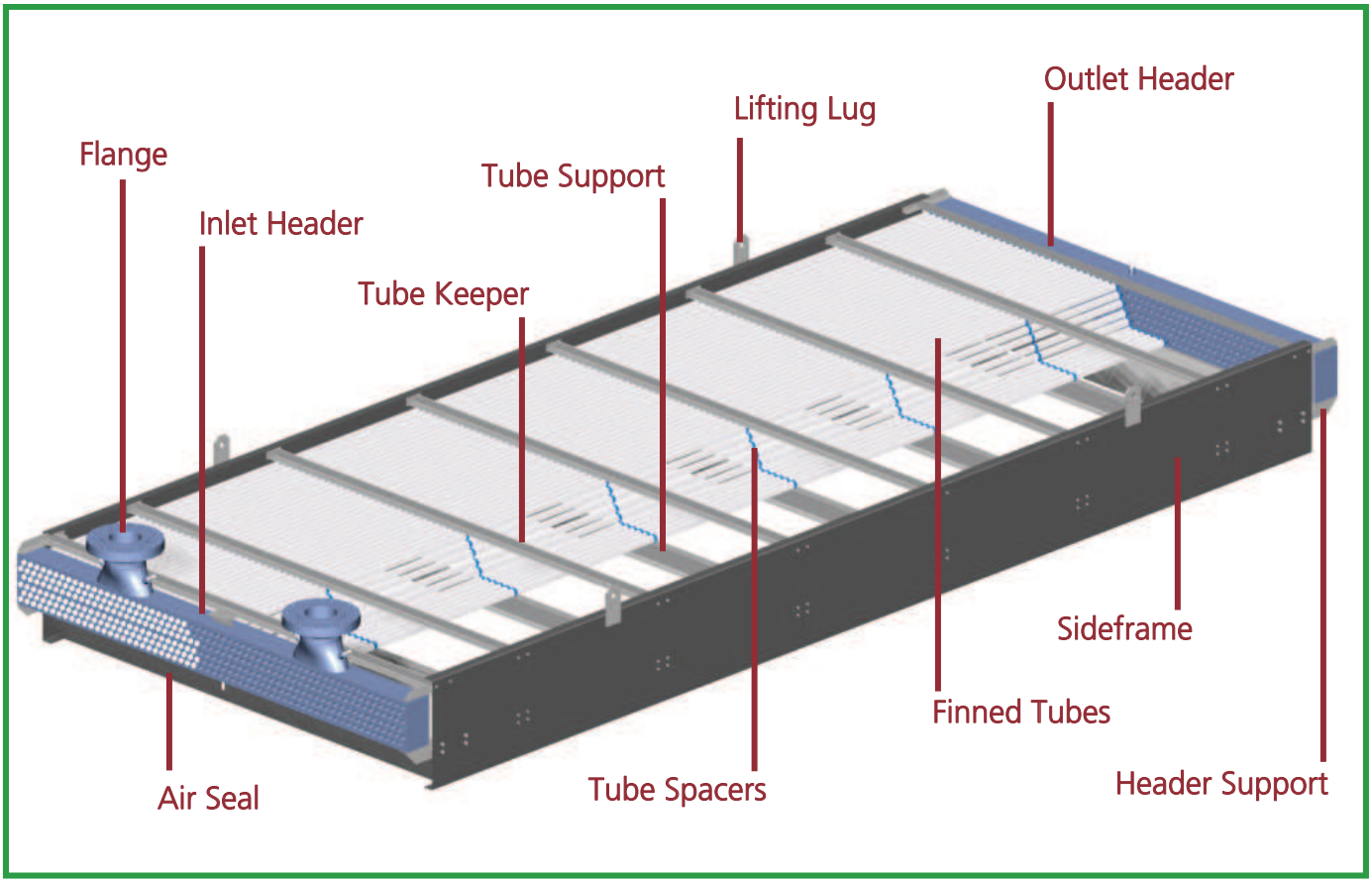
Induced Draft - Offering greater control of the process fluid through more efficient airflow distribution, the induced draft design also protects the pressure vessel by positioning the plenum chamber above the bundle. Locating the mechanicals below the bundle, as configured in the forced draft design, maintains accessibility. Other benefits include lower noise levels at grade and reduced potential for hot air recirculation.

Installations in extreme cold locations require different structure cooler styles to protect the fluid from cooling below critical levels. GEA Rainey Corporation offers two main designs to meet these harsh conditions.

Recirculation - This type completely encloses a forced draft cooler inside a structural building. Intake and exhaust louvers regulate the transfer of outside air while louvers located in the side recirculation duct provide further control. Winter temperatures down to of -60°F present no challenge with this design.

Shoe-Box Recirculation - For locations requiring recirculation units but which have installation restrictions, the shoe-box design is a cooler divided into pre-assembled upper and lower sections. Installation is as straight forward as bolting both sections together.

Pressure Vessel—The Components



The center of an air cooled heat exchanger is the bundle. This pressure vessel consists of three main sections; headers, finned tubes and supporting structure.

The inlet and outlet headers serve as a transition between the customer's manifolds and finned tubes, distributing the process fluid evenly within the pressure vessel.

Air passing across the finned tubes then cools or heats the process fluid, depending on the required design condition.

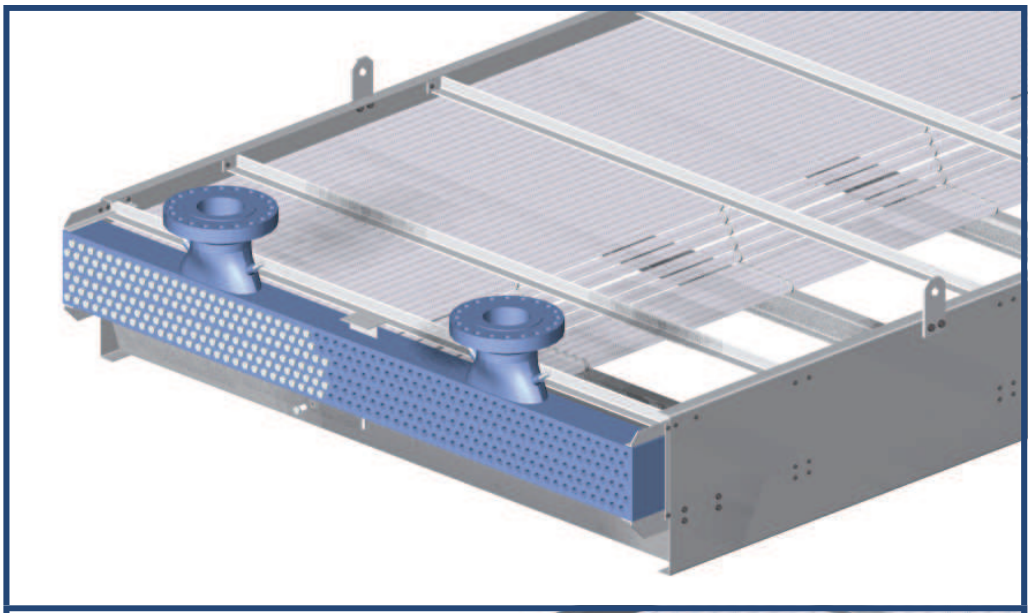
The supporting steel structure encases the tubes and headers in order to maintain structural integrity and allow for thermal expansion longitudinally due to the finned tube growth. Lateral movements caused by customer piping can also be absorbed within each bundle.

In addition, piping thrust is controlled via header support and slide pad systems which restrict or further enhance allowable movements.

GEA Rainey Corporation builds vertical, horizontal and angled pressure vessels to meet any process requirement.

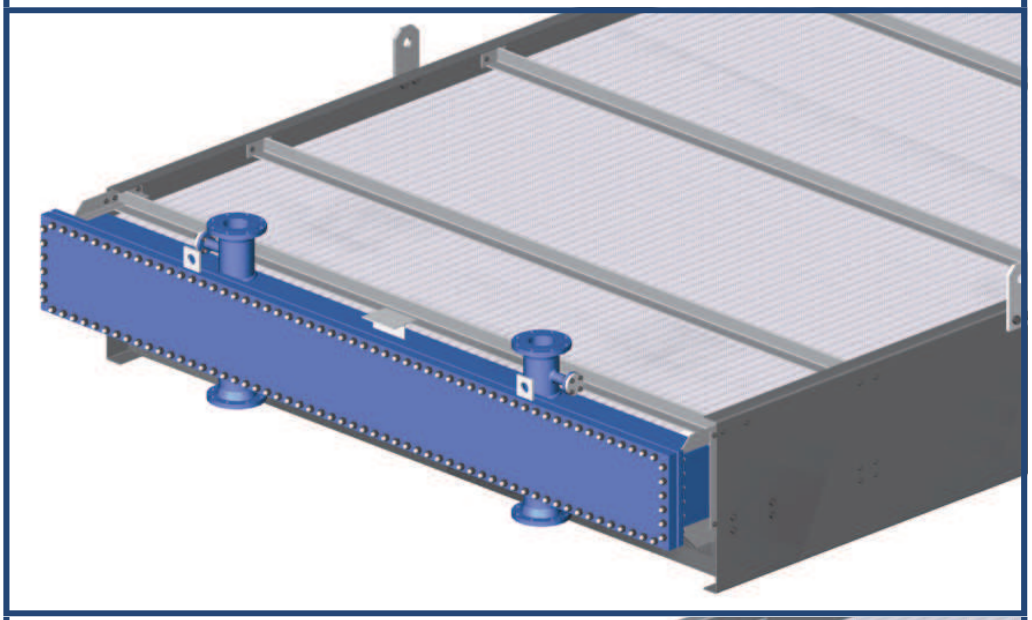
Plug Header

The most common air cooled heat exchanger header style, this general purpose design allows cleaning of individual tubes and is used for most refinery and power processes with low to moderately high pressures.



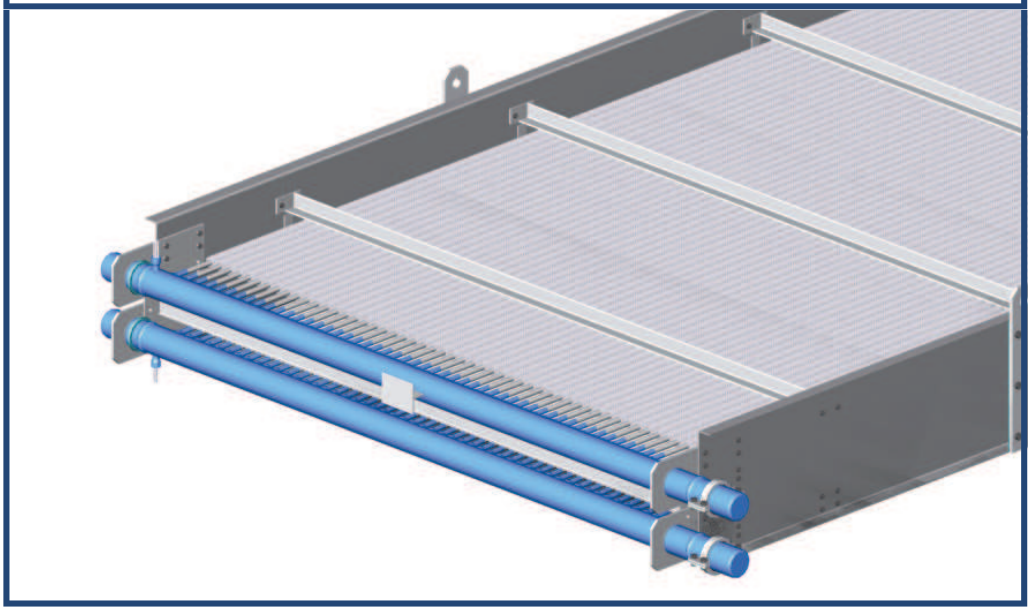
Cover Plate Header

Either removable cover or bonnet, a cover plate header is typically used in chemical applications or services with severe fouling conditions. This design is available for low to medium pressure (<300 psi) installations.



Pipe Manifold or Billet Header

Pipe manifold headers are common for all pressures, including full vacuum. Billet headers, machined from a solid piece of material, are used in extremely high pressure (>10,000 psig) applications.



Fin Tube—The Heat Exchanger's Core

"L" Fin

Commonly referred to as wrap on, the "L" fin is created by forming an aluminum strip into an L-shape which is then tension wound onto the primary tube. The fin sections are positioned against each other to ensure complete tube coverage.

Overlap "L" Fin

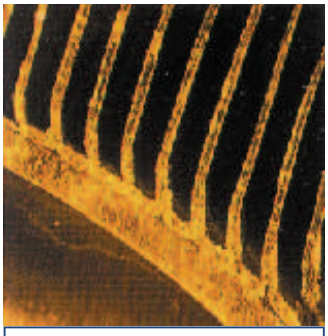
The overlap "L" fin is formed by creating a standard "L" fin but tension wrapped closer together, resulting in an overlap of the fin's base. This design offers increased corrosion protection and a wider operating temperature range.

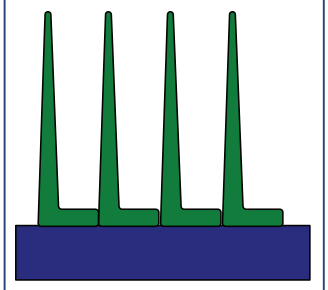
Extruded Fin

Primarily used in corrosive atmosphere and high temperature conditions, the extruded fin is manufactured by compressing an aluminum bloom, or sleeve, onto a parent tube. High compression forms the aluminum into the final fin profile.

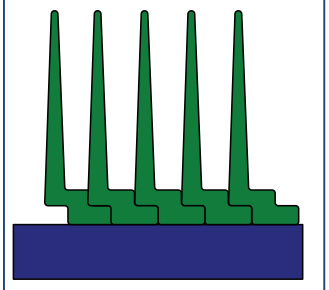
Embedded Fin

This design consists of an aluminum strip placed into a toleranced groove on the primary tube, tension wound on edge and finally "caulked" in place by the groove lip. The embedded fin's primary applications are high temperature or cyclic services.

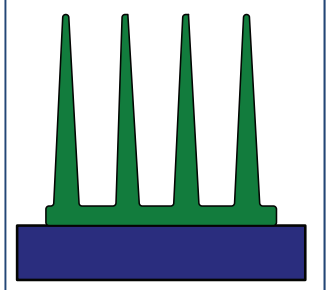




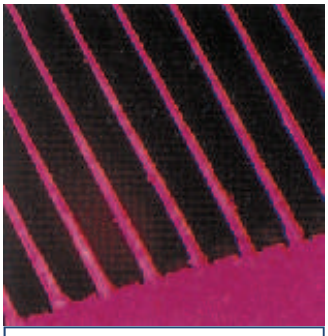
L
Maximum Temperature
300°F
Tube Diameters
5/8", 3/4", 1", 1 1/4", 1 1/2", 2"
Fin Heights
7/16", 1/2", 5/8"
Fins / Inch
7, 8, 9, 10, 11

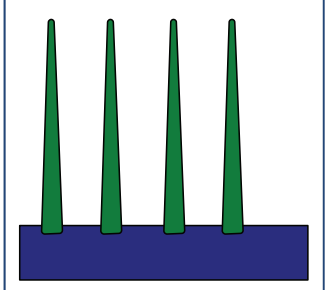


Overlap L
Maximum Temperature
350°F
Tube Diameters
1", 1 1/4", 1 1/2", 2"
Fin Heights
7/16", 1/2", 5/8"
Fins / Inch
7, 8, 9, 10, 11



Extruded
Maximum Temperature
550°F
Tube Diameters
1", 1 1/4", 1 1/2"
Fin Heights
1/2", 5/8"
Fins / Inch
8, 9, 10, 11





Embedded
Maximum Temperature
750°F
Tube Diameters
5/8", 3/4", 1", 1 1/4", 1 1/2", 2"
Fin Heights
1/2", 5/8"
Fins / Inch
7, 8, 9, 10, 11

Quality—A Foundation for Business

At GEA Rainey Corporation, we understand that quality is how we maintain a successful business. We always strive to meet or exceed our customer's requirements and understand that increasing efficiency does not mean cutting corners. As a result GEA Rainey has never had a thermal performance warranty failure.

Our Quality Assurance and Control Department reports directly to the CEO, ensuring full authority to enforce our quality standards. Combined with our philosophy of continuous improvement, Total Quality Management (TQM) and ISO 9001:2000 certification, GEA Rainey coordinates with authorized National Board inspectors for the supervision of our ASME U and R-stamped pressure vessels. We also routinely comply with requirements and recommendations listed in API 661 and 614, AWS, CWB, CRN, CISC, AISC and TEMA codes, just to name a few.

Certified ISO 9001 : 2000 by

BVQi

"In an industry where 10 to 15 years is the typical lifespan of an air cooled heat exchanger, GEA Rainey products are known to last over 25 years."