



# FLUID COOLERS & CONDENSERS



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# Colmac Coil Manufacturing, Inc.

"The Heat Transfer Experts"

### History

Founded in 1971, Colmac Coil Manufacturing initially supplied heating and cooling coils to OEM customers and the HVAC industry. By the early 1980's Colmac Coil had expanded their refrigeration product line to include industrial air coolers and condensers for the ammonia refrigeration industry, developing a reputation for high quality products and the ability to engineer a wide range of heating and cooling solutions using their in-house developed heat and mass transfer modeling software.

### Mission

"The mission of Colmac Coil is to provide heat transfer markets worldwide with innovative, cost effective products that are configured, manufactured, and shipped with the shortest lead times in the industry, with fast, friendly service, for the mutual benefit of our employees, customers, and shareholders."





#### **Our Products**

#### **Refrigeration Evaporators**

A+Series™ air coolers, blast freezers/chillers, hydrocoolers, product coolers, and process room coolers

#### **Fluid Coolers & Condensers**

For refrigeration, power generation, HVAC, and gas compression industries

#### **Heating & Cooling Coils**

Any air heating or cooling application for almost any temperature and working fluid

#### **Heat Pipes**

Designed to efficiently transfer heat from a warm air stream to a colder one

### Markets

We serve a wide variety of markets and customers with an emphasis in the following industries:

- Industrial Refrigeration
- HVAC
- Power Generation
- Gas Compression

With our ability to accurately predict the performance of our heat exchangers and build with a wide variety of materials, we welcome the opportunity to help you find creative and efficient heat transfer solutions for your process or products.

# **Product Overview**



pg 6-7

pg 8-9

Vertical Flat I	Deck Configuration
Working Fluid	Any single or two-phase fluid
Fan Rows	1-2
Fans Per Row	1-8
Fan Motor	EC and AC
Fin Length	53 - 440 in
Fin Height	42 - 132 in
Max Design Press	1800 psig
CFM	Up to 120,000



pg 10-11

Dry v-Bank C	onfiguration
Working Fluid	Any single or two-phase fluid
Fan Rows	1-2
Fans Per Row	1-8
Fan Motor	EC and AC
Fin Length	45 - 440 in
Fin Height	48 - 95.4 in
Max Design Press	1800 psig
CFM	Up to 360,000

pg 12-13



# Horizontal Flat Deck Configuration

Working Fluid	Any single or two-phase fluid
Fan Rows	1-2
Fans Per Row	1-8
Fan Motor	EC and AC
Fin Length	53 - 440 in
Fin Height	42 - 132 in
Max Design Press	1800 psig
CFM	Up to 120,000



# Adiabatic V-Bank Configuration

Working Fluid	Any single or two-phase fluid
Fan Rows	1-2
Fans Per Row	1-8
Fan Motor	EC and AC
Fin Length	45 - 440 in
Fin Height	48 - 95.4 in
Max Design Press	1800 psig
CFM	Up to 260,000









Colmac Coil Manufacturing, Inc.

# **Flat Deck Features**

### Fluid Coolers and Condensers

By offering a wide range of flat deck condenser and fluid cooler configurations, Colmac Coil accurately meets any application demands.

Your requirements lead the design of your solution. Whether you need a low carbon footprint, low noise, improved capacity density or have limited space, you will get a solution that fits your requirements

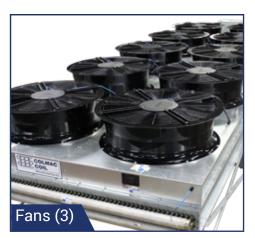
- Ready For Installation
- 100% Dry Operation
- **Industrial Grade Construction**
- Low Maintenance



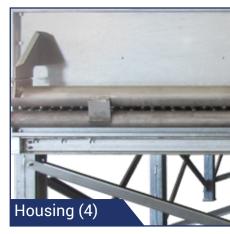
· Many leg heights are available on the vertical configuration to match the requirements of your application



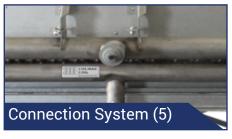
- Factory mounted and wired controls
- · UL 508A listed and marked
- · All fan motors are factory wired



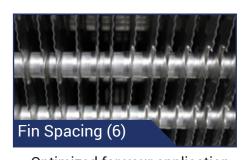
- · EC or AC fan motors are available for every Colmac Coil condenser and fluid cooler
- · Optimized to noise requirements



- · Robust galvanized steel housing
- · Optional stainless steel



- Connection diameter is optimized to the requirements of your application
- · Choice of butt weld, flange connections, & Victaulic groove



- Optimized for your application
- 4-12 fpi fin spacing
- Various fin thicknesses available





**Quality Guaranteed** 

Each Colmac Coil Fluid Cooler & Condenser is built to ASME B31.5 and backed by our industry leading 5-Year Warranty for pressure bearing components & 2-Year Warranty for all other components.

# **Flat Deck Features**

### Fluid Coolers and Condensers

With the latest cooling technology available, Colmac Coil offers proven dry cooling equipment. Available in any configuration and footprint.

Our dedicated applications team has the expert knowledge to ensure you get the best equipment for your application.

- Ready For Installation
- ▶ 100% Dry Operation
- Industrial Grade Construction
- Low Maintenance



 Colmac Coil condensers and fluid coolers work with all available refrigerants.



- Multiple coil blocks allows in-service replacement
- Optional fluid manifold available with isolation ball valves



- AC or EC available
- Low noise levels
- High efficiency
- · Compact dimensions





**Reduced Installation Costs** 

All Colmac Coil Fluid Coolers & Condensers are designed to ship in one piece, factory wired, and with fork lift channels that allow a seamless installation.



- Standard G-235 galvanized steel casing
- Optional Stainless steel cabinet
- Optional epoxy coated fins



- Multiple fin spacings and tube configurations
- Stainless steel tubes with aluminum fins standard
- Optional ASME U-Stamp



- Multiple tube diameters available to optimize capacity and pressure drop
- Floating tube sheet design

# **Dry V-Bank**

### Fluid Coolers and Condensers

Colmac Coil's V-Bank configuration offers a compact design with larger coils and high airflows with the smallest footprint and weight. The many customized options of fin type, coil rows, and modular design allows for capacity optimization.

The V-Bank configuration is ideal for an application requiring a high capacity and smaller footprint.

- **Increased Energy Efficiency**  $\triangleright$
- No Water Treatment
- **Small Footprint**
- **High Capacity**



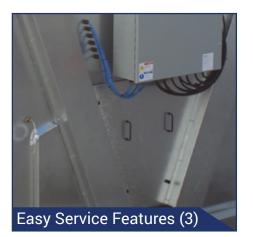
· Reduces damage during installation and operation by covering the return bends



High capacity designs can be achieved with a single unit.



- Factory mounted and wired controls
- UL 508A listed and marked



- Removable panel for easy access to coil and fan motors
- · Optional internal step deck



Fan Motors (4)

 Robust G-235 galvanized steel casing standard

Casing & Structure (5)



- epoxy coated fins
- Varying fin spacing for optimized heat transfer
- · Optional ASME U-Stamp





# **Adiabatic V-Bank**

#### Fluid Coolers and Condensers

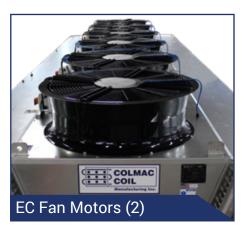
The adiabatic system increases unit performance by pre-cooling the intake air. Colmac Coil's Adiabatic V-Bank configuration runs either wet or dry, increasing the overall system efficiency.

The V-Bank configuration is ideal for an application requiring a high capacity and smaller footprint. Our industrial adiabatic system is supplied fully installed, wired and ready to use.

- **Increased Energy Efficiency**  $\triangleright$
- No Water Treatment
- **Easy Maintenance**
- Large Capacity Range



- Factory mounted and wired controls.
- UL 508A listed and marked
- All fan motors are factory wired



- · On-board fan speed control
- Compact & versatile
- · Low sound levels



- · Provides a more seamless installation
- Units lift as one piece





- · Maintains proper water flow rate across media pads to avoid fouling and scaling
- · Minimizes make up water required for optimum cycles of concentration
- Eliminates the need for circulation pump(s)
- Standard 3-way make up valve drains piping on shut down
- Balancing valves and flow meters provided to ensure proper flow rate at commissioning



- High quality, high cooling effectiveness adiabatic pads
- Two adiabatic pad designs for either a) lowest water usage or b) lowest first cost
- Designed for easy service and replacement
- Optional adiabatic control combined with our recirculated water system technology extends pad life





#### **Exclusive Feature**

**Recirculated Water System**: Water is recirculated through the water system to minimize water usage, and optimize cycles of concentration, while keeping media pads fully wetted for maximum adiabatic cooling effect and pad life.



# **Features & Options**

Colmac Condensers & Fluid Coolers are unique to the marketplace. Our parametric software design supports an unlimited number of configurations. We can exactly fit your footprint to maximize performance in the space available. Available in vertical air or horizontal air discharge, we also offer induced and forced draft variations for high temperature fluid cooling applications.

- ▶ Industrial Grade



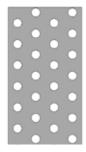
### **Optimized Heat Transfer**

Three unique tube diameters and patterns are used to optimize cooling performance, fan power, working fluid used, and operating temperatures specific to your application. Other manufacturers use a single tube and fin pattern for their product lines, forcing you to accept 'one-size-fits-all' and a less than optimum solution. Not with Colmac Coil.



#### 3/8" diameter staggered tubes

- · High pressure applications
- · Smallest internal volume and refrigerant charge
- · Ideal for air cooled and adiabatic condensers



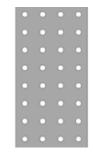
#### 5/8" diameter staggered tubes

- High or low pressure applications
- Most compact pattern
- Suitable for fluid or gas cooling, or condensing

# **Optional Features**

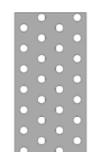
- Multiple coil circuits
- · Redundant coil blocks in a single unit
- Corrosion-resistant coatings
- Weather guards
- Vibration switches
- · Low ambient dampers
- Inlet bird screens





#### 5/8" diameter Inline tubes

- High or low pressure applications
- Most cost effective pattern
- · Suitable for fluid or gas cooling, or condensing



7/8" diameter staggered tubes

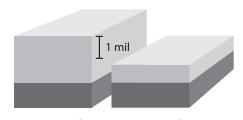
- Large capacities
- High flow rates with low pressure drop
- Ideal for industrial gas cooling

# **Industrial Grade Construction**

A wide range of cabinet construction options are available to enhance corrosion resistance. Colmac condenser & fluid cooler coil construction options give you the flexibility to match any working fluid or environment.

## **Housing Options**

#### **G235 Galvanized Steel housing**



G235 Coating G90 Coating 2.12 mils/side .81 mils/side

All galvanized Colmac Coil housings are coated to G235 specifications. This heavier coating means it will be more durable and can be expected to perform 2.6x longer than a more typical G90 coating.

#### **Optional Stainless Steel Housing**

Optional 304 or 316 stainless steel housing



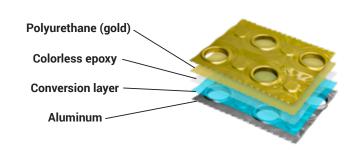
### Fin Options

A variety of fin materials and alloys are available to match performance and corrosion resistance requirements for your application.

- Aluminum
- 304 Stainless Steel
- Aluminum Epoxy Coated

The use of epoxy coated aluminum fins improves corrosion resistance and extends the life of your condenser and fluid cooler.

- Over 300% more resistant to corrosion than standard aluminum fins
- Flexible and highly resistant to abrasion







# **Tube Options**

#### **Stainless Steel Tubes**

The stainless steel tubes offer added corrosion resistance and resistance to mechanical damage compared to copper tube construction.

- 304L Stainless Steel
- 316L Stainless Steel
- All tubing and pressure bearing components are ASME code compliant

#### **Tube Thickness**

Coil cores and tube thickness options designed to meet the pressure requirements of every application.



### **Optional Coil Core Coatings**

Heresite Protective Coating:
A protective coil coating that protects against most corrosive environments.

#### ElectroFin:

Provides exceptional flexibility, durability, adhesion properties, coil coverage, and corrosion and UV resistance.



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Heresite

ElectroFin

# **Induced or Forced Draft Configurations**

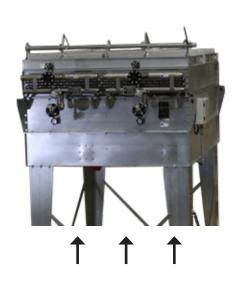
#### **Induced Draft**

Induced draft puts the fans on the leaving air side of the coil and results in very uniform air velocities across the face of the coil as well as long air-throw distances for the discharge air. This long air-throw can mitigate and reduce recirculation when condensers or coolers are mounted next to parapets or walls.



#### **Forced Draft**

Forced draft puts fans on the air entering side of the coil which becomes necessary when fluid temperature become high enough to cause damage to motor winding insulation systems. Normally, forced draft is recommended when air temperatures leaving the coil can exceed 120°F.



## **Multiple Coil Cores Per Unit For Redundancy**

Specifying split coil blocks allows for redundancy and changing out of one of the coil blocks while the unit remains in service.

### **Separate Coil and Fan Selection**

All Colmac condensers and fluid coolers, forced and induced draft, are designed with separate air and coil sections. This unique design feature allows replacement of either the fan section or coil section.



# **Factory Electrical Wiring Options**

 All motors wired to a common fused or non-fused disconnect switch located in a NEMA rated box





- All motors wired to a control panel with a common fused disconnect switch and individual IEC motor starters. All located in a NEMA rated box.
- Customized UL508 listed control panels available for all units
- Individual disconnect switch. Used to ensure that an individual motor is completely de-energized.





## **Available For Any Working Fluid**

Colmac Coil Fluid Coolers & Condensers can be supplied to utilize any working fluid, either volatile or nonvolatile, primary or secondary. Circuiting is matched to each application and optimized for highest heat transfer with lowest tube-side pressure drop.

#### **Volatile Fluids**

- Ammonia
- CO2
- HFCs
- Hydrocarbons

#### **Non-Volatile Fluids**

- Water
- Glycols
- Brines
- Process Gas

# **Fans and Fan Motors**

# **EC (Electronically Commutated) Fan Motors**

EC fans are a complete fan/motor assembly which includes a highly engineered fan and bell mouth matched to an Electronically Commutated (EC) motor. The EC motor is a brush-less DC motor with on-board programmable speed control.

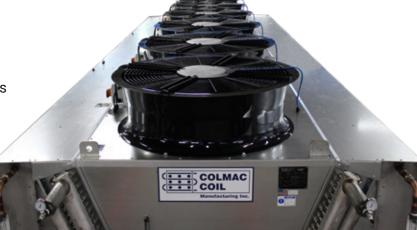


#### EC Fan Motor Benefits:

- · High energy efficiency, even at partial fan speeds
- · On-board electronic speed control
- Longer lifespan
- · Large airflow capacities
- · Extremely low sound levels
- · Long air throw with standard built-in straightening vanes
- High reliability and long life
- · Corrosion resistant construction
- Compact & versatile

### EC Fan Motor Standard Features:

- · Plug-and-play fan/motor/bell mouth assembly
- · High efficiency composite fan blades
- Ingress protection rating of IP55
- High temperature bearing grease
- Optimized inlet ring and integrated diffusers



### **AC Fan Motors**

AC fan motors are true industrial cooling tower duty with the following features as standard:

- VFD-ready
- · Premium efficiency
- Insulation class F
- · Totally enclosed fan cooled (TEFC) frame
- Service factor: 1.25 (severe duty)
- Ingress protection rating of IP55
- Double-sealed bearings permanently
- Lubricated
- · Shaft end rain shield
- Condensate drain holes
- Optional: Space heaters
- Optional: Class 1 Div 1 and Class 1 Div 2



Industrial Cooling Tower Motor

### Fan Blades

All fans installed on Colmac condensers and fluid coolers are propeller fans with true airfoil blade profiles. This type of fan results in maximum efficiency with minimum sound levels. All fans are dynamically balanced at the factory for minimum vibration and noise.

All fan motors used on Colmac Coil condensers and fluid coolers are arranged for direct drive and do not require belts or pulleys.



Airfoil Blade Profile

Need Parts?



Ensure the mechanical integrity of your coil by using only factory supplied replacement parts.

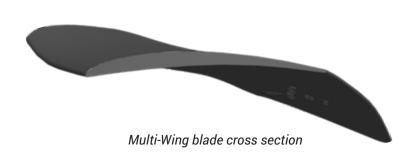
**Energy Efficient Airflow** 

# Fan Speed Control

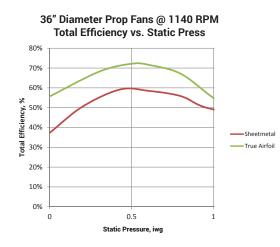
# **Energy Efficient Airflow**

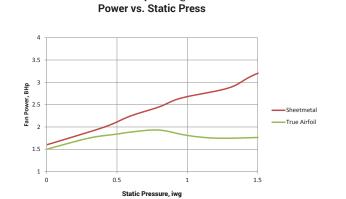
Colmac condensers & fluid coolers use high efficiency fan blades having a true airfoil shape profile for all fan diameters greater than 24 inches. This type of fan offers several advantages over stamped steel or aluminum blades:

- Non-overloading



36" Diameter Prop Fans @ 1140 RPM





The true airfoil blade shape can achieve mechanical efficiencies of 70%+. The best a stamped steel or aluminum sheet metal blade can achieve is approximately 60%. This means Colmac condensers and fluid coolers will operate with 10% less fan power for the same cooling load, which not only translates to lower operating costs, but also lower first cost for power cabling and transforming.

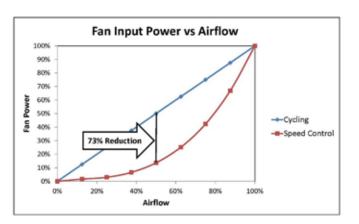
The higher efficiency of Colmac condenser & fluid cooler fans also results in lower sound levels during operation. A wide range of fan diameters and speeds are available to allow the selection of the appropriate sound level for the application and customer requirements.

Another benefit of Colmac fans with airfoil shape profile is the non-overloading power vs pressure characteristic curve. The power vs pressure curve is very flat which means that as dirt or debris accumulates on the evaporator and static pressure through the coil block increases, the brake power load imposed on the fan motor remains constant. Stamped steel and aluminum sheet metal fan blades have a steeper power vs pressure curve which results in brake power (and amperage) continuing to rise as dirt or debris accumulates and static pressure increases.

# **Fan Speed Control**

Fan speed control is highly recommended for all condenser and fluid cooler applications.

Controlling fan speed improves capacity control and saves energy



Controlling fan speed is an important means of matching the heat rejection capacity of the condenser or fluid cooler to either.

- A) falling ambient temperature, and/or
- B) part (reduced) load.

Over the course of the year most facilities operate on average at between 50% and 60% of the design load. Energy efficiency of the system at part load is therefore an important consideration when selecting a capacity control system, which is considerably improved by choosing fan speed control over fan cycling for capacity control. Because the power required by fans is reduced by the cube of the ratio of the speed, significant energy savings are realized with fan speed control compared to cycling fans on and off at full speed. For example, a unit operating at 50% capacity using fan speed control will consume 73% less power than the same unit using fan cycling control!

When AC fan motors are specified, Colmac offers optional UL508-listed fan speed control panels utilizing Variable Frequency Drive (VFD) technology. When EC fan motors are specified, the optional UL508-listed control panel utilizes the on-board electronics which vary the motor speed via a simple 0-10 VDC input signal.

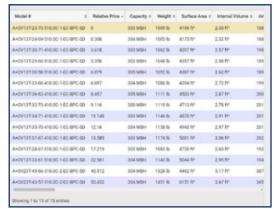
Fan speed is controlled either based on inlet pressure in the case of condensers, or on outlet temperature for either condensers or fluid coolers. The speed of all the fans on the unit are controlled in unison to enhance system stability and avoid sudden changes in system pressure or temperature typical of fan cycling type controls. The sudden changes in condensing pressure which typically result from using fan cycling control, can cause a number of operational problems including liquid hold-up in the condenser, flashing of liquid in vessels and liquid lines, loss of sub-cooling, and erratic expansion valve operation.

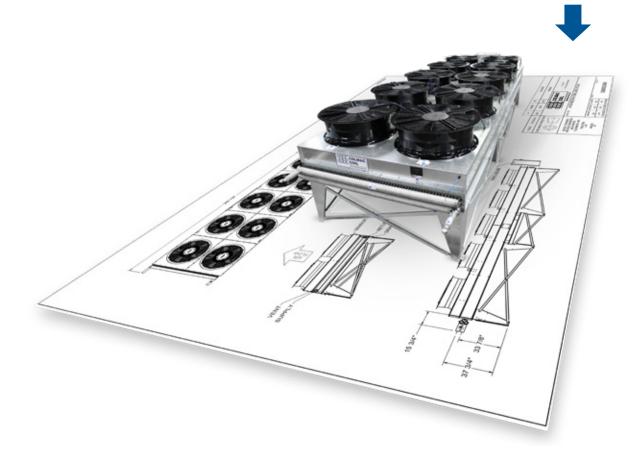
# **Dryware Online Selection Software**

We understand that quickly obtaining accurate and optimized equipment selections is critical to the success of your projects. Colmac Dryware online selection software runs through your browser and has been designed to make inputting selection criteria simple and intuitive.

The software is designed to allow the user to either select or rate air-cooled condensers and fluid coolers. Choosing the Select method presents you with a range of models which meet the capacity requirements you have specified. Choosing the Rate method allows you to calculate capacity for a particular condenser or dry cooler model at the operating conditions you specify.

Units	Method			Model			
●P Ost	● Select	Rate @AHOV OAHOH OAHV			4+4		
-			System Co	onfiguration	197		
The same of		Unit Type		Unit Type Input Par		arameters .	
		Ruid Cooler	. +	Outlet Temp/V	olumetric Flowrate	4	
		Fluid		Concentration		_	
1993		Propylene Glycol	v	30	% [0 to 60]		
X	- X		Design	Pressure			
			350 pai	g = [25 to 1800]			
			Air Flow Co	onfiguration		П	
		Fan/Motor Type		Flow Orientation			
	10	DC .	· w	Draw Through		٠	
		Fan Discharge		Air Inlet			
	13	Standard		Standard		_	





# **Custom Designed**



#### **Parametrics**

Dryware software puts the power of Parametrics at your fingertips and allows you to configure condensers and fluid coolers in a way that is totally flexible, not only exactly meeting your required capacity but also allowing dimensions to be adjusted to "fit your footprint". This unique approach to design of our equipment removes the constraints of traditional catalog product lines with fixed models and dimensions.

Dryware selection software calculates:

- Performance
- · Dimensions and weights
- · Electrical characteristics
- Pricing
- · Equipment specification information

Selection can be sorted to any criteria, such as:

- First cost
- Energy efficiency
- Sound level
- Refrigerant charge
- Weight
- Dimensions

Once your equipment is selected and specified it is stored online where it can quickly and efficiently be converted to a live order and entered into production when you are ready, all without re-entry of data.

Dryware is available for qualified users

Go to www.colmaccoil.com to request access

Title 24 (CA) Energy Code

# **Title 24 Energy Code**

The California Energy Code, Title 24, requires that air-cooled condensers meet a defined minimum Specific Efficiency for refrigeration applications. Specific Efficiency is defined as the Total Heat of Rejection (THR) capacity divided by all electrical input power including fan power at 100 percent fan speed. Title 24 also requires air-cooled condensers to have maximum fin spacing of 10 fins per inch.

Dryware condenser selection software allows the user to specify a minimum Specific Efficiency as defined by Title 24.



# **Class 1 Division 2 Explosion-Proof Construction**

Many applications for condensers and fluid coolers in the petro-chemical, gas compression, and oil and gas industries require explosion-proof construction. UL Class I Division 2 construction can be specified in Dryware as an option and includes compliant:

- Fans
- Motors
- Cabling
- External (Individual) conduit box



Colmac Coil Manufacturing, Inc.

# **Guaranteed Quality**

### **Safety Listings**

Having the correct safety listings and markings on equipment when it arrives at the job site is critical to safe installation and trouble-free startup and commissioning. Colmac has the quality systems, certifications, and listings to satisfy the various jurisdictions and listing requirements found throughout North America.

As an ASME-certified pressure vessel manufacturer, Colmac uses only certified and traceable materials of construction as well as weld and brazed joint designs executed according to our Quality Manual and documented procedures.

#### ASME B31.5 – Refrigeration Piping and Heat Transfer Components

**ASME B31.5** 

Colmac coils are manufactured in accordance with the ASME B31.5 code, which prescribes requirements for the materials, design, fabrication, assembly, test and inspection processes. ASME B31.5 applies to refrigerant heat transfer components and secondary coolant piping for temperatures down to -320 F (-195.6 C).



#### ASME "U" Stamp - American Society of Mechanical Engineers

Colmac coils are built in accordance with the applicable rules of the ASME boiler and Pressure Vessel Code, Section VIII for the manufacture of pressure vessels.



#### **CRN - Canadian Registration Number**

Colmac can provide heating and cooling coils that meet the strict quality standards for design and manufacturing outlined in Canadian standard CSA B51.



#### **CSA – Canadian Standards Association**

Colmac offers refrigerant coils with additional options that are certified with CSA and built in compliance with Std C22.2 and all provisions governing that certification.



#### **UL508 - Underwriters Laboratories, Inc.**

Colmac offers selected commercial refrigeration unit coolers that are listed with Underwriters Laboratories and built in accordance with the requirements of the UL508 standard for Industrial Control Equipment.



#### UL207 - Underwriters Laboratories, Inc.

Colmac offers selected air coolers that are listed with Underwriters Laboratories and built in accordance with the requirements of the UL207 standard for Nonelectrical Refrigerant-Containing Components and Accessories.

## **Standard Warranty**

#### 5-Year

All pressure bearing components are covered by our 5-Year Standard Limited Warranty to be free of defects in materials or workmanship.

#### 2-Year

All other electrical and assembled components are covered by our 2-Year Standard Limited Warranty to be free of defects in materials or workmanship.

These industry-leading standard warranty periods are our statement to you of our confidence in our people and products and our commitment to making your project a long-term success.





### **Pressure Testing**

Colmac Coil ensures each unit is leak free on delivery. We pressure test the coil in our test tank, then install a pressure gauge to show the dry air shipping charge. This provides a visual indicator that the equipment has maintained pressure through shipping and is ready to be installed.



# **Other Options**



# **Low Ambient Package**

- Includes weather hoods
- Inlet air dampers
- Optional interior heater
- Optional insulated cabinet



### **Inlet Protective Screens**

- · Prevents debris from entering coil.
- · Allows for easier cleaning

# Weather Hoods

- Gravity dampers on discharge
- Hoods protect the coil core from harsh weather conditions



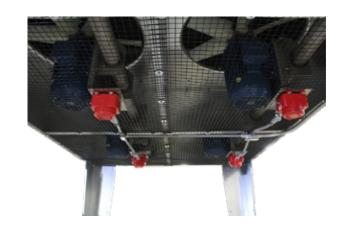
# Extended Base Legs

- Elevates condenser for liquid return
- Reduces the need for elevated platforms



### **Weather Guards**

· Low cost alternative to reduce weather damage



### **Vibration Switches**

 Turns off individual motors to prevent damage from motor failure

Colmac Coil Manufacturing, Inc.



# **Quality Products From Colmac Coil**







**Heat Pipes for Heat Recovery** 





www.colmaccoil.com "The Heat Transfer Experts"

### **North American Headquarters**

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CRN



**CSA** 

CE(PED) Certification, ASME Sec. VIII, Canadian Registration Number, UL508, Canadian Standards Association